



Final decision

**Electricity transmission and distribution  
network service providers**

**Review of the weighted average cost of capital  
(WACC) parameters**

May 2009

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## Overview

The National Electricity Rules (NER) provide that the Australian Energy Regulator (AER) must review the weighted average cost of capital (WACC) parameters to be adopted in reset determinations for electricity transmission and distribution network service providers (TNSPs and DNSPs). Reviews are to be conducted every five years for transmission and at least every five years for distribution. This decision is the first of such reviews under the NER.

For transmission, the outcomes of this review are ‘locked-in’ for all reset determinations where the regulatory proposal is submitted after 1 May 2009 and prior to the next WACC review being completed. For distribution, the outcomes of this review will also apply to all reset determinations where the regulatory proposal is submitted after 1 May 2009 and prior to the next WACC review being completed, unless there is persuasive evidence to depart from the outcomes of this review at the time of the reset determination. Therefore, this WACC determination will have effect in the sector until 2019.

The AER’s review is limited to the individual WACC parameters rather than a review of the overarching framework in which the WACC is applied. For example, neither the use of the nominal post-tax framework nor the use of the capital asset pricing model (CAPM) for determining the cost of equity are subject to review by the AER.

On 6 August 2008, the AER released an issues paper seeking comments on a range of issues relevant to this review. On 10 October 2008, the AER held a ‘round table’ of finance experts to seek clarification on specific matters submitted by the industry. The AER subsequently on 11 December 2008 released its proposed (draft) statement of the revised WACC parameters (transmission) and statement of regulatory intent for revised WACC parameters (distribution) and its accompanying ‘explanatory statement’.

The AER has had extensive regard to submissions received in response to the issues paper, comments at the round table and submissions in response to the explanatory statement, in forming its final decision on the revised WACC parameter values, methods and credit rating.

Following a very extensive engagement with stakeholders since the explanatory statement and detailed review of additional market data and specific business information, the AER in this final decision has, for some WACC parameters, maintained its position as reflected in the explanatory statement but has also changed its position for others.

The AER in its review of each WACC parameter must have regard to, amongst other requirements, the need for the rate of return to be forward looking and commensurate with the prevailing conditions in the market for funds and the risk involved in providing prescribed transmission services or distribution standard control services. The AER has necessarily taken a long term view, reflective of current market conditions to the extent that the AER considers that these conditions may prevail over the period the revised WACC parameters apply.

Such a task is challenging even in a stable financial market environment. The additional uncertainty as a result of the ‘global financial crisis’ has clearly added another dimension to the task.

Where a method rather than a value has been prescribed for a parameter, such as the risk-free rate, this will be determined at the beginning of each regulatory reset period and so the value of that parameter will reflect those market conditions prevailing at that time. Where, however, the parameter is a fixed value, the global financial crisis in particular has influenced the AER to adopt a cautious approach to interpreting the market data whilst endeavouring to maintain the integrity of the CAPM framework pursuant to the NER.

For example, the AER has now adopted a market risk premium of 6.5 per cent (whereas, the AER proposed a value of 6 per cent in its explanatory statement) in this final decision, which recognises the additional uncertainty on a forward looking basis associated with the global financial crisis. Similarly, the AER has taken a cautious approach to the interpretation of empirical evidence on the equity beta of a benchmark electricity network business by adopting a value that is above the range indicated by empirical estimates.

In response to the issues paper and explanatory statement, industry submissions highlighted several broader challenges that stakeholders considered must be taken into account when determining the overall rate of return as part of this review. In particular, submissions argued that required rates of return across all industries have increased in general due to the current state of financial markets concurrent with increased investment needs in the energy industry. In response to the AER’s explanatory statement, the Joint Industry Associations (JIA) submitted that the AER must subject the entire ‘package’ of WACC parameters—that is, the overall return emanating from the collective parameter decision—to the National Electricity Objective (NEO) and the revenue and pricing principles in the National Electricity Law (NEL). The AER’s approach to this review is outlined in detail in chapter three of this final decision is consistent with this view. A key feature of this approach has been not to ‘mechanistically’ derive the WACC parameters from empirical estimates. The AER has also applied a number of analytical approaches to the market data and has exercised its judgement as to the strengths and weaknesses of different approaches in forming its position on the various parameters. The AER has applied this approach consistently across the various WACC parameters subject to review.

The AER has considered the overall WACC outcome (and the overall cost of debt and overall cost of equity) of this final decision derived from the revised WACC parameters. In terms of the overall outcome, the AER emphasises the following points:

- The AER maintains the view put in its explanatory statement that, while it is clear that current market conditions in debt markets are far from favourable, market based evidence from a number of sources strongly suggests that, rather than creating risks, the regulatory regime insulates energy network businesses from volatility.

- Debt financing is widely accessible to regulated network service providers (NSPs) through bank lending markets, albeit at higher costs than previously available, and these higher costs, however, are recoverable through the WACC framework.
- The ability of regulated NSPs to recover the costs of debt at the time of a reset determination mitigates a significant component of the risks associated with rising debt costs. The AER's decision to maintain the credit rating at BBB+ is to ensure this continues.
- On the equity side, the AER acknowledges the current uncertainty regarding the long term impact of the global financial crisis on current market conditions. Having regard to this uncertainty, the AER concludes that a forward looking MRP above the value adopted in its explanatory statement, and above the long-run historical average, is reasonable for this final decision.
- The empirical evidence considered suggests an equity beta of a benchmark efficient NSP is in the range 0.41 to 0.68. In considering this evidence, the AER has taken a balanced approach to the interpretation and application of the market data by, as noted above, having regard to the strengths and weaknesses of the data available.
- Having appropriate regard to the veracity of the evidence and also to other factors, such as regulatory stability to contribute to the NEO, the AER considers appropriate to set the equity beta value at 0.8, above the range suggested by market evidence.

The overall rate of return in accordance with the AER's final revised WACC parameters is outlined in table A.1:

**Table A.1: AER final decision—Revised WACC parameters**

Parameter	Previously adopted (TNSPs and NSW, ACT, VIC DNSPs)	Previously adopted (QLD, TAS, SA DNSPs)	MEU proposed	JIA proposed	AER proposed in explanatory statement	AER final decision
Gearing	60%	60%	65%	60 %	60%	60%
Nominal risk-free rate	10 year CGS <sup>(a)</sup>	10 year CGS <sup>(a)</sup>	10 year CGS <sup>(a)</sup>	10 year CGS <sup>(a)</sup>	CGS (Term matching the regulatory period) <sup>(b)</sup>	10 year CGS <sup>(a)</sup>
Market risk premium	6.0 %	6.0 %	5.5 %	7.0 %	6.0%	6.5 %
Equity beta	1.0	0.90	0.56	1.0	0.8	0.8
Credit rating	BBB+	BBB+	A+	BBB+	A-	BBB+
Gamma <sup>1</sup>	0.50	0.50	0.90	0.20		0.65
<b>Return on equity</b>	<b>11.68%</b>	<b>11.08%</b>	<b>9.04%</b>	<b>12.68%</b>	<b>10.48%</b>	<b>10.88%</b>
Cost of debt	7.45% <sup>(c)</sup>	7.45% <sup>(c)</sup>	7.28 % <sup>(d)</sup>	7.45% <sup>(c)</sup>	7.12% <sup>(e)</sup>	7.45% <sup>(c)</sup>
<b>Nominal ‘vanilla’ WACC</b>	<b>9.14%</b>	<b>8.90%</b>	<b>7.28 %</b>	<b>9.54%</b>	<b>8.47%</b>	<b>8.82 %</b>

Notes:

- (a) Calculated as the yield on 10 year CGS calculated over the five year period 1 April 2004 to 1 April 2009 (i.e. 5.68 per cent).
- (b) Calculated as the yield on five year CGS calculated over the five year period 1 April 2004 to 1 April 2009 (i.e. 5.66 per cent).
- (c) Calculated as the yield on 10 year BBB rated bonds calculated over the five year period 1 April 2004 to 1 April 2009 (i.e. 7.45 per cent).
- (d) Calculated as the yield on 10 year A rated bonds calculated over the five year period 1 April 2004 to 1 April 2009 (i.e. 7.28 per cent).
- (e) Calculated as the yield on an average of five year BBB and A rated bonds calculated over the five year period 1 April 2004 to 1 April 2009 (i.e. 7.28 per cent).
- (f) Relative change in returns from previously adopted values to final decision (expressed as a percentage).

For the reasons discussed herein, the AER considers that the rate of return provided in this final decision is sufficient to attract investment to the industry over the long term.

<sup>1</sup> As the rates of return displayed in table A are post-tax WACCs they do not incorporate the effect of gamma. However an overall pre-tax WACC has not been derived because it depends on tax related positions specific to an individual service provider. Accordingly, a pre-tax WACC, that would illustrate the effect of the change in gamma, is not displayed in table A 1.

While cognisant of current conditions in debt and equity markets, the AER has taken a longer term perspective in setting rates of return over the period 2010-2019. Accordingly, the AER concludes that:

- In determining the WACC parameters the AER has performed or exercised its discretion in a manner that will or is likely to contribute to the achievement of the NEO.
- The AER also considers it has had regard to the need to achieve an outcome that is consistent with the NEO.

Additionally the AER has chosen to take into account the revenue and pricing principles in reviewing the overall rate of return. The AER considers its final parameters are likely to lead to a regulatory cost of capital that:

- will provide service providers with a reasonable opportunity to recover at least efficient costs,
- will provide service providers with incentives to invest efficiently, and
- are appropriate having regard to the economic costs and risks of under and over investment in the sector.

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## Summary

The National Electricity Rules (NER) provide that the Australian Energy Regulator (AER) must review the weighted average cost of capital (WACC) parameters to be adopted in determinations for electricity transmission and distribution network service providers (TNSPs and DNSPs). Reviews are to be conducted every five years, for transmission and at least every five years for distribution. The NER provided that the first review had to be completed by 1 May 2009, with the release of a final decision for both transmission and distribution.<sup>2</sup>

The AER's review is limited to the individual WACC parameters rather than relating to the overarching framework in which WACC is used. The AER may review the values or methods pertaining to:

- the market value of debt as a proportion of the market value of debt and equity (i.e. the gearing ratio)
- the nominal risk-free rate
- the expected market risk premium (MRP)
- the equity beta
- the credit rating levels to calculate the debt risk premium (DRP), and
- the assumed utilisation of imputation credits (i.e. gamma) used to calculate the estimated cost of corporate income tax.

The AER's considerations and conclusions on each of the WACC parameters for this final decision is summarised below.

## Gearing

The AER's final decision is to maintain its position from the explanatory statement to adopt a value for the gearing ratio of 60 per cent. In considering a number of different sources and measurements of the gearing ratio, the AER for this final decision considers that:

- The average level of gearing across a number of approaches to calculating the gearing ratio ranges from 62.1 to 76.8 per cent over 2002 to 2007.

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<sup>2</sup> The AER submitted a rule change proposal to the AEMC on 14 April 2008 seeking to align the electricity distribution and transmission WACC reviews. The AEMC approved a rule change to align these reviews to take effect on 1 July 2008. The AER submitted a subsequent rule change proposal on 16 February 2009 seeking an extension to the timeframe for the AER's completion of its WACC review. The AEMC approved a rule change that moved the timeframe of completion of the WACC reviews from 31 March 2009 to 1 May 2009.

- The Bloomberg ‘market valuation’ approach (i.e market value of equity and book value of debt) provides an estimated average level of gearing of 62.4 per cent over the period from 2002 to 2007.
- When applied to total debt values, the ACG’s approach adjusts the Bloomberg ‘market valuation’ measure of gearing for loan notes, ‘double leveraging’ and stapled securities. The ACG approach results in an average level of gearing of 62.1 per cent from 2002 to 2007.
- The Bloomberg measure of book gearing (i.e. book value of debt and equity) provides a higher average level of gearing than the Bloomberg ‘market valuation’ approach and the ACG approach. The AER notes that under this approach no adjustments have been made for market valuations, stapled securities or double leveraging. As a result, the AER considers it is likely to represent an upper bound on the estimated gearing ratio.
- In addition, the Standard and Poor’s measure of gearing (i.e. book value of debt and book value of equity) provides an average of 65.4 per cent from 2002 to 2007.

Having regard to the further submissions, the AER does not consider there is persuasive evidence to depart from the currently adopted level of gearing of 60 per cent.

In accordance with the NER, the AER considers that the current level of gearing:

- is supported by the most recent available and reliable empirical evidence, which the AER considers does not support a change to the existing value, and
- generates a forward looking rate of return that is commensurate with prevailing conditions in the market for funds.

The AER has also considered the revenue and pricing principles. The AER considers the value of 60 per cent is consistent with the principle that a service provider being provided with a reasonable opportunity to recover at least efficient costs and the principle that a service provider being provided with effective incentives for efficient investment with respect to direct control network services or prescribed services as the case may be.

On this basis, the AER considers that its proposed value achieves an outcome that is consistent with and is likely to contribute to the achievement of the National Electricity Objective (NEO).<sup>3</sup>

## **Nominal risk-free rate**

The AER’s final decision is to maintain its position on the proxy for the risk-free rate, for the following reasons:

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<sup>3</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

- There is not persuasive evidence to suggest that a more appropriate proxy for the risk-free rate exists, or indeed that the CGS yield exhibits any downward bias. On this basis the AER maintains its view that the most appropriate proxy for the risk-free rate remains the CGS yield.
- Consistency between the term of the risk-free rate and the estimate of the MRP remains an important consideration as part of this review.
- The current NER methodology for calculating the risk-free rate will be retained with one addition – the AER will only accept an averaging period commencing as close as practically possible to the start of the regulatory control period. Subject to satisfying the formal NER methodology, the AER will accept as reasonable an averaging period between 10 and 40 business days in length.

Based upon new information received following the explanatory statement, the AER’s final decision is that there is not persuasive evidence to justify a departure from a 10-year term assumption for the risk-free rate. The AER’s reasoning is as follows:

- On average a 10-year term assumption is expected to over-compensate the benchmark efficient energy network business on the cost of debt. The major source of over-compensation is the term premium on the base interest rate component of the cost of debt, which via hedging instruments is converted to a term matching the length of the regulatory period.
- On average a term matching the length of the regulatory period (i.e. five years) is expected to under-compensate the benchmark efficient energy network business on average. The major source of under-compensation from a five-year term assumption is the term premium on the credit spread component of the cost of debt, which the JIA have shown is commensurate with a 10-year term and cannot be altered via hedging instruments.

The AER considers it is reasonable and appropriate to take a cautious approach on the term of the risk-free rate and retain a 10-year term assumption for this final decision. This reflects the AER’s concern that refinancing risk should not be increased for the sector, which is particularly important given the current market conditions. In reviewing the risk-free rate, as for the other parameters, the AER has given consideration to other factors, such as the importance of regulatory stability, in order to promote efficient investment, so as to contribute to the National Electricity Objective. The AER has taken a broader view, having regard to the current financial environment, and to all the relevant factors in the NER,<sup>4</sup> considers there is no persuasive evidence to depart from a 10-year term assumption for the risk-free rate.

In accordance with the NER, the AER considers that the method:

- is supported by the most recent available and reliable empirical evidence,

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<sup>4</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

- generates a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing prescribed transmission services or standard control services (as the case may be), and
- generates a return on debt that reflects the current cost of borrowings for comparable debt.

The AER has also considered the revenue and pricing principles. The AER considers the method for determining the risk-free rate is consistent with the principle that a service provider being provided with a reasonable opportunity to recover at least the efficient costs and the principle that a service provider being provided with effective incentives for efficient investment with respect to direct control services or prescribed services as the case may be.

On this basis the AER considers that its proposed method achieves an outcome that is consistent with and is likely to contribute to the achievement of the NEO.<sup>5</sup>

## Market risk premium

The AER's final decision is to adopt a market risk premium of 6.5 per cent. The AER notes that:

- Long term historical estimates (1883-2008, 1937-2008, and 1958-2008), 'grossed-up' for a 0.65 value of imputation credits, produce a range of 5.7 to 6.2 per cent—however, while not the preferred estimation period, the AER notes that this range would have been 6.6 to 7.2 per cent had the estimation period ended in 2007,
- Survey measures strongly indicate that a MRP of 6 per cent is by far the most commonly adopted value by market practitioners—though these surveys were before the global financial crisis
- Cash flow based measures currently indicate a forward looking MRP well above 6 per cent, however up until 2008 these measures consistently indicated a forward looking MRP well below 6 per cent.

The AER considers that prior to the onset of the global financial crisis, an estimate of 6 per cent was the best estimate of a forward looking long term MRP, and accordingly, under relatively stable market conditions—assuming no structural break has occurred in the market—this would remain the AER's view as to the best estimate of the forward looking long term MRP.

However, relatively stable market conditions do not currently exist and taking into account the uncertainty surrounding the global economic crisis, the AER considers two possible scenarios may explain current market conditions:

- that the prevailing medium term MRP is above the long term MRP, but will return to the long term MRP over time, or

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<sup>5</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

- that there has been a structural break in the MRP and the forward looking long term MRP (and consequently also the prevailing) MRP is above the long term MRP that previously prevailed.

Whilst it cannot be known which of these scenarios explain current financial conditions, both are possible, and both suggest a MRP above 6 per cent at this time may be reasonable. However, having regard to the desirability of regulatory certainty and stability, the AER does not consider that the weight of evidence suggests a MRP significantly above 6 per cent.

Accordingly, the AER considers that a MRP of 6.5 per cent is reasonable, at this time, and an estimate of a forward looking long term MRP commensurate with the conditions in the market for funds that are likely to prevail at the time of the reset determinations to which this review applies.

The AER has also taken into account the revenue and pricing principles in adopting a value of 6.5 per cent for the market risk premium. Based on the weight of evidence, the AER considers there is persuasive evidence to depart from the previously adopted MRP of 6 per cent, and that a MRP of 6.5 per cent achieves an outcome that is consistent with and is likely to contribute to the achievement of the NEO.<sup>6</sup>

## Equity beta

The AER's final decision is to maintain its position from the explanatory statement to adopt a value for the equity beta of 0.8. Based on the detailed analysis in this final decision, the AER makes the following conclusions on the equity beta value for this final decision.

- The AER considers that conceptual considerations do not give grounds to form a conclusive view on the equity beta of a benchmark efficient NSP
- Maintains its view that there is no compelling evidence to suggest that the equity beta should differ based on the form of control (i.e. revenue vs. price cap).

The AER has examined empirical evidence from Australian and foreign data, and considers that:

- Given the differences between estimating equity betas using discrete and continuous returns are minimal, it is appropriate to use the standard approach, which is to use continuous returns.
- It is appropriate to examine Australian data from the post 'technology bubble' period onwards. That said, the AER has examined the ACG's estimates which include pre 'technology bubble' observations.
- It is appropriate to examine equity beta estimates using weekly observations as well as equity beta estimates that use monthly observations.

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<sup>6</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).



- On the R-squared statistic:
  - while the R-squared is a measure of the model's power to explain total risk, it is not a direct measure of the precision or stability of the beta point estimate, and
  - a low R-squared demonstrates that there is a high level of non-systematic (asset specific) risk.
- Given the presence of the additional uncertainties and the indeterminate nature of the adjustments that may be required to ensure the United States equity beta estimates are comparable with the Australian equity beta estimates, the AER continues to place a limited amount of weight upon the United States equity beta estimates (treating the estimates as a check on the reasonableness of the Australian equity beta estimates).
- More weight has been given to the average of individual equity beta estimates due to concerns raised by interested parties and consultants about portfolio estimates. The AER has also placed weight on portfolio estimates of equity betas.
- The AER now agrees with the JIA and the ACG that if confidence intervals were to be considered it is appropriate to consider the bound which contains the previously adopted value. Given that the point estimates generated by regressions are more likely to represent the 'true' point estimate the AER has given greater weight to point estimates than confidence intervals. However, the AER has had regard to confidence intervals and observes that approximately 75 per cent of the portfolio equity beta estimates do not contain the previously adopted value.
- Noting that caution should be taken with individual equity beta estimates, there is little evidence of parameter instability.
- Neither the Blume nor Vasicek adjustments (assuming a 'prior belief' of an equity beta of one) should be applied in a regulatory context as either adjustment is likely to introduce an upwards bias in the beta estimates.
- The empirical evidence considered by the AER suggests that the equity beta of a benchmark efficient NSP is in the range of 0.41 (average portfolio estimated by the AER for Australian businesses post 'technology bubble') to 0.68 (average portfolio estimated by the ACG for the JIA using a five-year estimation period).
- On the potential limitations of the Sharpe CAPM the AER concludes that:
  - as the NER mandates the use of the Sharpe CAPM in determining the cost of equity, the use of alternative asset pricing models, such as the Black CAPM, is not permissible under the NER.
  - it is reasonably open to the AER is to apply the Sharpe CAPM in the conventional way, as is established regulatory practice.

- the Sharpe CAPM is a reasonable predictor of equity returns, though at the same time the AER acknowledges that it is not without limitations
- in determining the equity beta the AER has adopted a value higher than that suggested by empirical estimates using the Sharpe CAPM (specifically 0.12 to 0.39 higher), meaning that any possible issue of bias is likely to have been negated.
- Market data suggests a value lower than 0.8. However, the AER has given consideration to other factors, such as the need to achieve an outcome that is consistent with the NEO (in particular the need for the efficient investment in electricity services for the long term interests of consumers of electricity), the revenue and pricing principles (in particular providing the service providers with a reasonable opportunity to recover at least efficient costs, providing service providers with efficient incentives for efficient investment, and having regard to the economic costs and risks of the potential for under and over investment), the importance of regulatory stability. Having taken a broad view, the AER considers the value of 0.8 is appropriate.

Accordingly, the AER considers that there is persuasive evidence to depart from either the previously adopted equity beta of 1.00 or 0.90.

In accordance with the NER, the AER considers that an equity beta of 0.80:

- is supported by the most recent available and reliable empirical evidence, which the AER considers is persuasive in support of adopting a lower equity beta
- is an appropriate estimate of a forward looking rate commensurate with prevailing conditions in the market for funds for a benchmark efficient network service provider, and
- is likely to promote efficient investment in providing prescribed transmission services or standard control services in current market conditions.

On this basis the AER considers that the proposed equity beta value achieves an outcome that is consistent with and is likely to contribute to the achievement of the NEO.<sup>7</sup>

## **Credit rating**

In its explanatory statement the AER considered that there was persuasive evidence for a change in the credit rating for a benchmark NSP from the previously adopted value of BBB+ to A-.

The AER has re-examined median credit ratings and the ‘best comparators’ approach and observes that:

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<sup>7</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

- Irrespective of the period selected the median credit rating for energy networks remains at a credit rating of A-.
- The ‘best comparators’ approach suggests that a credit rating of BBB+ should be applied given the forecast average financial credit rating metrics from the AER’s most recent decisions.

Based upon the submissions received, the available data and evidence, the AER considers that:

- It is inappropriate to assume that the negative outlook on credit ratings has been solely driven by the global financial crisis. Standard and Poor’s has listed a number of different factors in its report cards that have lead to the negative outlooks on businesses.
- Although the AER considers it is inappropriate to assume that the negative outlook has been solely driven by the global financial crisis, the current state of the financial markets has decreased the likelihood that credit ratings would be upgraded in the near future. In particular, the deterioration in the state of the financial markets is unlikely to result in a credit rating upgrade due to higher interest expenses and lower interest coverage ratios resulting in from higher debt margins.
- The AER considers that examining median credit ratings of the energy network sample business is an appropriate approach to determine the credit rating of a benchmark efficient NSP. However, the AER for this final decision has also given significant weight to the ‘best comparators’ approach as the JIA’s submission has addressed a number of the AER’s previous concerns identified in its explanatory statement with this approach.
- The AER has given limited weight to regression analysis and simple averages for this final decision.
- The AER also considers it is inappropriate to place significant weight on standalone credit ratings in the context of this review other than to provide an indicator of bias in estimates of the credit rating.

The AER observes that the different techniques (i.e median analysis and the best comparators approach) provide a range of credit ratings from BBB+ to A-. Given there is no clear finding from the available evidence, the AER is not persuaded at this time that the previously adopted credit rating of BBB+ should be departed from. The AER notes that in order for it to be persuaded otherwise, a departure must be clearly supported by the most recent empirical evidence. Rather the evidence is mixed, with the median analysis suggesting A- is reasonable, while other approaches suggest a credit rating of BBB+.

The AER considers the credit rating of BBB+ will generate a return on debt that reflects the current cost of borrowing for comparable debt.

The AER has also taken into account the revenue and pricing principles in determining the credit rating of BBB+. On this basis the AER considers that its

proposed credit rating achieves an outcome that is consistent with and is likely to contribute to the achievement of the NEO.<sup>8</sup>

## **Assumed utilisation of imputation credits (gamma)**

The AER's final decision is to maintain its position from the explanatory statement to adopt a value for the utilisation of imputation credits of 0.65. Based on the analysis in this final decision, the AER makes the following conclusions on the gamma parameter for this final decision:

- The gamma is a measure of value of imputation credits and is defined as a product of the 'imputation credit payout ratio' (F) and the 'utilisation rate' theta ( $\theta$ ).
- The adoption of a positive value for imputation credits is not necessarily inconsistent with market practice. Further, while acknowledging the many complexities alluded to by market practitioners, the AER considers that it is indeed possible to arrive at a reasonable empirical estimate of gamma taking into account all the available evidence.
- The most appropriate estimate of the payout ratio is 1.0, which is consistent with the influential Officer WACC framework and the modelling assumptions in the AER's PTRM. Importantly, the AER considers there is not a significant issue of time value loss associated with the value of retained credits such that the adoption of an estimate for the payout ratio of 1.0 is unreasonable.
- The AER maintains its position from the explanatory statement with respect to the market definition. Under a domestic CAPM framework, foreign investors in the Australian market will be recognised in defining the representative investor, but only to the extent they invest in the domestic capital market.
- The AER maintains its view that there is compelling evidence to reject pre-2000 data from consideration in estimating a forward-looking theta. Accordingly, for the purposes of this final decision the AER has estimated theta based on post-2000 data only.
- Based on the empirical evidence available, the AER considers that the 2006 Beggs and Skeels study provides the most comprehensive, reliable and robust estimate of theta inferred from market prices in the post-2000 period. Accordingly the AER has placed significant weight on the 2001-2004 estimate of theta from this study, of 0.57.
- Despite the advantage of the SFG study providing more up-to-date estimates (i.e. to 2006), after a thorough review the AER has specific concerns regarding the reliability of the SFG study, and considers that correction of identified deficiencies would likely have a material impact on the results. Accordingly, while the AER has given full consideration to the SFG study, little weight has

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<sup>8</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

been placed on theta estimates generated by the study for the purposes of this final decision.

- The AER maintains its view that the methodology provided by the Handley and Maheswaran (2008) study provides a relevant and reliable upper bound estimate of theta in the post- July 2000 period. A reasonable range of theta estimated from tax statistics is 0.67 to 0.81 for the post-2000 period, which gives a point estimate for theta from tax statistics of 0.74.
- The AER considers the weight of empirical evidence supports its position to accept the empirical result that imputation credits have a positive value while maintaining the use of the standard Sharpe CAPM to estimate equity returns.

Based on the available evidence the AER considers that a reasonable estimate of the ‘assumed utilisation of imputation credits’ (i.e. gamma) is 0.65.

In accordance with the NER, the AER considers that a gamma value of 0.65:

- is supported by the most recent available and reliable empirical evidence, which the AER considers supports a change to the existing value, and
- generates a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing prescribed transmission services or standard control services (as the case may be).

The AER has also considered the revenue and pricing principles. The AER considers the value of 0.65 is consistent with the principle that a service provider being provided with a reasonable opportunity to recover at least efficient costs and the principle that a service provider being provided with effective incentives for efficient investment with respect to direct control services or prescribed services as the case may be.

On this basis the AER considers that its proposed value achieves an outcome that is consistent with and is likely to contribute to the achievement of the NEO.<sup>9</sup>

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<sup>9</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

# 1 Introduction

## 1.1 Background to review

The National Electricity Rules (NER) provide that the Australian Energy Regulator (AER) must review the weighted average cost of capital (WACC) parameters to be adopted in determinations for electricity transmission and distribution network service providers (TNSPs and DNSPs). Reviews are to be conducted every five years, for transmission and at least every five years for distribution. The NER provided that the first review had to be completed by 31 March 2009, with the release of a final decision for both transmission and distribution.<sup>1</sup>

Accompanying this final decision, the AER has released a statement of regulatory intent (SRI) for electricity distribution. The WACC parameters in the SRI will apply to all distribution determinations where the regulatory proposal is submitted after 1 May 2009 and before the completion of the next review, unless there is persuasive evidence provided in individual distribution proposals that justify a departure from the WACC values, methods or credit rating level set out in the SRI.<sup>2</sup> In the case of electricity transmission however, the AER's statement on the WACC parameter values, methods or credit rating level that will apply to TNSPs' transmission determinations is 'locked-in' for all transmission regulatory proposals submitted after 31 March 2009 and before completion of the next review.

The AER's review is limited to the individual WACC parameters rather than a review of the overarching framework in which the WACC is applied. For example, neither the use of the nominal post-tax framework nor the use of the capital asset pricing model (CAPM) for calculating the cost of equity are subject to review by the AER.

## 1.2 Definition of the WACC

For both electricity transmission and distribution, the NER provides the following description of the WACC:

The rate of return for a [Network Service Provider] for a regulatory control period is the cost of capital as measured by the return required by investors in a commercial enterprise with a similar nature and degree of non-diversifiable risk as that faced by the [network] business of the provider...<sup>3</sup>

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<sup>1</sup> The AER submitted a rule change proposal to the AEMC on 14 April 2008 seeking to align the electricity distribution and transmission WACC reviews. The AEMC approved a rule change to align these reviews to take effect on 1 July 2008. The AER submitted a subsequent rule change proposal on 16 February 2009 seeking an extension to the timeframe for the AER's completion of its WACC review. The AEMC approved a rule change that moved the timeframe of completion of the WACC reviews from 31 March 2009 to 1 May 2009.

<sup>2</sup> NER, cls. 6.5.4(a)-(b), 6.5.4(f), 6A.6.2(f)-(h) and 6A.6.4(b)-(c).

<sup>3</sup> NER, cls. 6.5.2(b) and 6A.6.2(b).

The NER provides that the cost of capital must be calculated as a ‘nominal vanilla’ WACC, in accordance with the following formula:

$$WACC = k_e \frac{E}{V} + k_d \frac{D}{V}$$

where:

- $k_e$  = the expected rate of return on equity or cost of equity
- $k_d$  = the expected rate of return on debt or cost of debt
- $E/V$  = the market value of equity as a proportion of the market value of equity and debt, which is  $1 - D/V$
- $D/V$  = the market value of debt as a proportion of the market value of equity and debt.<sup>4</sup>

The NER provide that the cost of equity is to be determined using the CAPM, calculated in accordance with the following formula:

$$k_e = r_f + \beta_e \times MRP$$

where:

- $r_f$  = the nominal risk-free rate of return
- $\beta_e$  = the equity beta
- MRP = the expected market risk premium.<sup>5</sup>

The CAPM specifies a relationship between the expected return of an individual risky asset or business and the level of systematic (or non-diversifiable) risk. The higher (lower) the level of non-diversifiable risk the higher (lower) the required or expected rate of return. The CAPM provides no compensation for bearing non-systematic (or diversifiable) risk, on the assumption that investors can eliminate this risk costlessly by holding a well-diversified portfolio of assets.<sup>6</sup>

The level of systematic (or non-diversifiable) risk borne by an equity holder of a particular business is the product of the market risk premium (MRP) and the equity beta. The MRP represents the additional return that investors require and expect to earn for investing in a well diversified portfolio of assets, as compared with investing in a risk free asset. That is, the expected MRP is the premium that investors require

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<sup>4</sup> NER, cl. 6.5.2(b) and 6A.6.2(b). cl. 6.5.2(b) only refers to the ‘value of debt/equity as a proportion of the value of equity and debt’ and not ‘the market value of debt/equity as a proportion of the market value of equity and debt’.

<sup>5</sup> NER, cls. 6.5.2(b) and 6A.6.2(b).

<sup>6</sup> Diversifiable risk refers to unique risks that are specific to an asset, which can be eliminated by investors who hold a well-diversified portfolio of assets. Conversely, non-diversifiable or systematic risk cannot be diversified away as it relates to market wide risk factors.

over the risk-free rate in order to be induced to invest in the market portfolio. The equity beta is a measure of the sensitivity of the return of a particular asset or business to the return on the market portfolio. An equity beta of less than one indicates that the asset has low systematic risk relative to the market (the market portfolio beta being equal to one). Conversely, an equity beta of more than one indicates the asset has a higher systematic risk relative to the market.

The NER provides that the expected cost of debt is to be calculated in accordance with the following formula:

$$k_d = r_f + DRP$$

where:

$r_f$  = the nominal risk-free rate of return

$DRP$  = the debt risk premium.<sup>7</sup>

The expected cost of debt is determined by the benchmark credit rating and the corresponding observed debt risk premium (DRP) above the risk-free rate.

The prescribed WACC formula set out in the NER prevents debt and equity raising costs from being compensated through the WACC. However the NER do not prevent such costs from being compensated through other mechanisms such as the capital or operating expenditure allowances, provided they meet the requirements in the NER for these allowances.

The NER also allow the AER to review the assumed value of imputation credits (referred to as ‘gamma’), which is an input to determining the estimated cost of corporate income tax. Under the imputation tax system in Australia, imputation credits attached to dividends have a value to investors in that they represent a saving in personal tax liabilities (or a cash rebate in some circumstances). This tax saving or cash rebate amount is quantified by the gamma value which measures the extent to which imputation credits are utilised in the Australian economy. The gamma value is not included in the WACC as the AER is required to apply a vanilla WACC (i.e. after tax WACC), but is included directly in the cash flows as a separate ‘building block’ for TNSPs and DNSPs.<sup>8</sup>

### 1.3 Scope of the review

The AER’s review is limited to the individual WACC parameters rather than relating to the overarching framework in which WACC is used. For example, the use of the nominal post-tax framework or the use of the CAPM for calculating the cost of equity are two issues not subject to review by the AER.

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<sup>7</sup> NER, cls. 6.5.2(b) and 6A.6.2(b).

<sup>8</sup> Although the gamma parameter is not a direct input into the WACC formula, for the purpose of this final decision the gamma is generally intended to be included when references are made to ‘WACC parameters’.



The AER may review the values or methods pertaining to:

- the nominal risk-free rate
- the equity beta
- the expected market risk premium (MRP)
- the market value of debt as a proportion of the market value of debt and equity (i.e. the gearing ratio)
- the credit rating levels to calculate the debt risk premium (DRP), and
- the assumed utilisation of imputation credits (i.e. gamma) used to calculate the estimated cost of corporate income tax.

## 1.4 Applicability of this review to forthcoming regulatory determinations

### 1.4.1 Electricity transmission

The NER provides that the AER may, as a consequence of this review, adopt revised values, methods or credit rating levels in a transmission determination, but only for the purposes of a revenue proposal that is submitted to the AER after the completion of the first review (i.e. 1 May 2009), or after completion of a future five-yearly review (as the case may be).<sup>9</sup>

### 1.4.2 Electricity distribution

Unlike electricity transmission, the WACC parameters for electricity distribution are not 'locked in' for all distribution determinations in the five years following a review. Rather, the AER may depart from a WACC parameter specified in the SRI for a particular distribution determination, but only if there is persuasive evidence to do so. The NER set out the following provisions:

- (g) A distribution determination to which a *statement of regulatory intent* is applicable must be consistent with the statement unless there is persuasive evidence justifying a departure, in the particular case, from a value, method or credit rating level set in the statement.
- (h) In deciding whether a departure from a value, method or credit rating level set in a *statement of regulatory intent* is justified in a distribution determination, the *AER* must consider:
  - (1) the criteria on which the value, method or credit rating level was set in the *statement of regulatory intent* (the ***underlying criteria***); and
  - (2) whether, in the light of the underlying criteria, a material change in circumstances since the date of the statement, or any other

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<sup>9</sup> NER, cl. 6A.6.2(h).

relevant factor, now makes a value, method or credit rating level set in the statement inappropriate.

(i) If the *AER*, in making a distribution determination, in fact departs from a value, method or credit rating level set in a *statement of regulatory intent*, it must:

- (1) state the substitute value, method or credit rating level in the determination; and
- (2) demonstrate, in its reasons for the departure, that the departure is justified on the basis of the underlying criteria.<sup>10</sup>

### 1.4.3 Applicable determinations

The outcomes of this review will only apply to electricity transmission and distribution determinations where the proposal is submitted after 1 May 2009 and before completion of the next review.<sup>11</sup>

For clarity this means that the outcome of this review **will** apply to:

- the forthcoming South Australian, Queensland and Victorian distribution determinations.

The outcome of this review **will not** apply to:

- the 2009-2014 ACT and NSW distribution determinations, or
- the 2009-2014 NSW and Tasmanian transmission determinations.

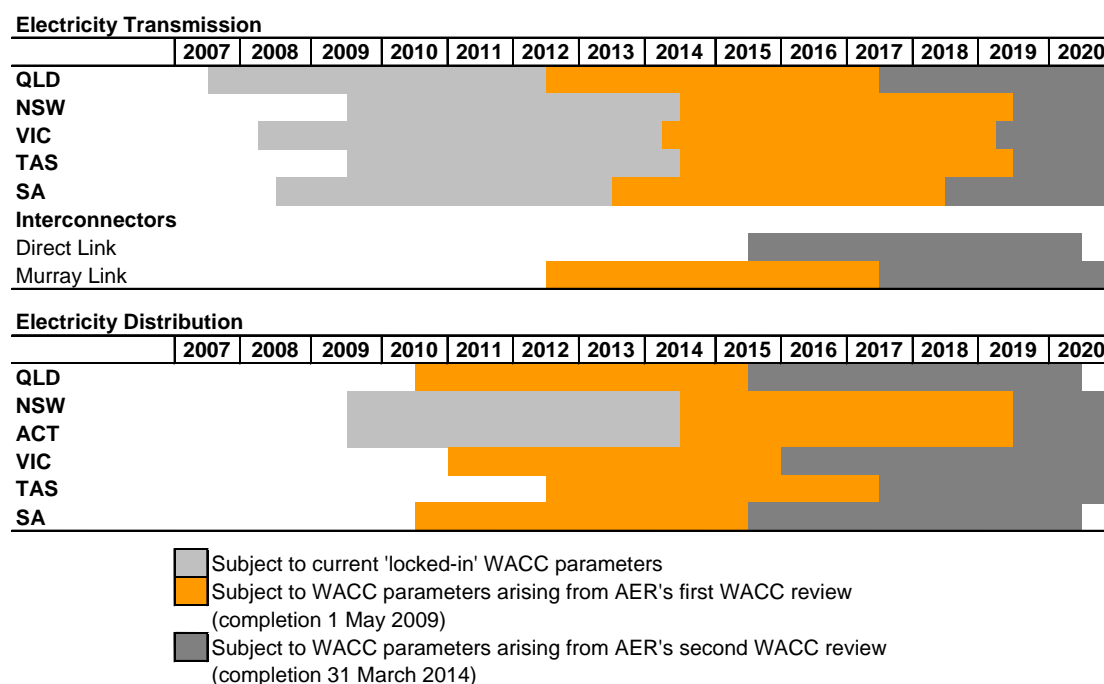
The applicability of this review to specific determinations is illustrated in figure 1.1.

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<sup>10</sup> NER, cl. 6.5.4.

<sup>11</sup> NER, cls. 6.5.4(a)-(b), 6.5.4(f), 6A.6.2(f)-(h) and 6A.6.4(b)-(c).

**Figure 1.1: Applicability of the review to TNSP and DNSP determinations<sup>12</sup>**



The outcome of the AER’s review will ‘lock in’ the WACC parameters for all transmission determinations over the relevant period. For distribution determinations, a departure from the outcomes of this review is permissible under the NER, but only where there is persuasive evidence to depart from a value, method or credit rating level determined as part of this review.

#### 1.4.4 Gas transmission and distribution

The outcome of the AER’s WACC review applies only to electricity determinations, and has no direct or formal applicability to gas access arrangements. The determination of the WACC for access arrangements is subject to requirements under the National Gas Law (NGL) and National Gas Rules (NGR), which are not being considered in this review.

Nonetheless, given the similarity of issues, the AER may use the outcomes of this review in the consideration of WACC issues in future gas access arrangement reviews.<sup>13</sup>

### 1.5 Timelines

For both electricity transmission and distribution, the AER has to complete its first review of WACC parameters by 31 March 2009.<sup>14</sup>

<sup>12</sup> Figure 1.1 assumes a five-year regulatory control period for all future determinations. Under the NER, five years is the minimum length of a regulatory control period, however service providers may propose a longer period.

<sup>13</sup> The National Gas Rules specifies that a well accepted approach that incorporates the cost of equity and debt; such as the WACC, is to be used, and a well accepted financial model such as the CAPM is to be used.

In conducting its review the AER must follow the transmission consultation procedures and distribution consultation procedures.<sup>15</sup> These procedures effectively require the AER to publish a draft decision, allowing for no less than 30 business days for the making of submissions. The AER may, but is not required to consider any submissions received after the closing date for submissions has expired. Within 80 business days of the proposed statement of revised WACC parameters (transmission) and proposed statement of regulatory intent (distribution), the AER must publish its final statement of revised WACC parameters (transmission) and statement of regulatory intent (distribution), respectively.<sup>16</sup>

While not a NER requirement, the AER may publish such issues, consultation and discussion papers, and hold such conferences and information sessions in relation the review as it considers appropriate.<sup>17</sup>

Table 1.1 outlines the AER’s consultation process for its review of the WACC parameters.

**Table 1.1: Consultation process**

<b>Date</b>	<b>Action</b>
6 August 2008	Issues paper published and written submissions invited
17 September 2008	Written submissions on issues paper closed
11 December 2008	Proposed statement of revised WACC parameters (transmission), proposed statement of regulatory intent on revised WACC parameters (distribution) and explanatory statement published and written submissions invited
17 December 2008	Public forum on proposed WACC parameters and explanatory statement held for purpose of explaining proposed WACC parameters and inviting oral submissions
28 January 2009	Written submissions on proposed statements closed
1 May 2009	Statement of revised WACC parameters (transmission) and statement of regulatory intent on revised WACC parameters (distribution) published

## 1.6 Structure of this final decision

The remainder of this final decision is structured as follows:

- chapter two addresses the overall WACC derived from the revised WACC parameters in this final decision

<sup>14</sup> For electricity distribution, the NER permits the AER to extend this timeframe in certain circumstances [NER, cl. 6.16(g)]. However no equivalent provision exists for electricity transmission, placing a practical difficulty on the AER extending the timeframe of the review for electricity distribution.

<sup>15</sup> NER, cls. 6.5.4(a), 6A.6.2(f) and 6A.6.4(b).

<sup>16</sup> NER, cls. 6.16 and 6A.20.

<sup>17</sup> NER, cls. 6.16 and 6A.20.

- chapter three addresses the regulatory framework that is relevant to all parameters subject to review
- chapter four addresses multi-parameter considerations that are relevant to all or most of the parameters subject to review
- chapter five addresses the value of debt as a proportion of the market value of debt and equity (i.e. gearing), which is relevant to the weights applied to the WACC
- chapter six addresses the nominal risk-free rate, which is relevant to the return on equity and the cost of debt
- chapter seven addresses the market risk premium, which is relevant to the return on equity
- chapter eight addresses the equity beta, which is relevant to the return on equity
- chapter nine addresses the credit rating level, which is relevant to the cost of debt, and
- chapter ten addresses the assumed utilisation of imputation credits (i.e. gamma), which is relevant to the estimated cost of corporate income tax building block.

## 2 Overall rate of return

This chapter considers the overall rate of return, including the cost of debt and the cost of equity from the AER's revised WACC parameters in this final decision in the context of broader issues raised in submissions.

### 2.1 Introduction

Many submissions on the explanatory statement noted the need for new investment in electricity networks—due to demand growth, ageing assets and climate change policies. These submissions echoed the sentiments of submissions the AER received in response to its issues paper. Many submissions also commented on the regulatory return—on both the equity and debt—as being parameters being lower than that prevailing in the market for funds.

Additionally the Joint Industry Associations (JIA) stated that the AER had not completed its task as it had not subjected the entire 'package' of WACC parameters—that is, the overall rate of return from the AER's revised parameters—to an assessment against the National Electricity Objective (NEO) and revenue and pricing principles. The JIA conclude:

In conclusion, the JIA consider that in its Explanatory Statement the AER has not fully undertaken its task. While the AER surveyed the evidence and proposed WACC parameters, it then failed to complete its task by subjecting the proposed parameters to the equally important tests of whether the entire package meets the requirements of the Revenue and Pricing Principles and the National Electricity Objective. Had it done so, the AER would have found that these additional requirements were not met and it was necessary to return to the parameter estimation exercise and continue to work at the task until the estimates did meet all the requirements. The JIA consider that, having fully completed its task, the AER would not have been persuaded by the evidence to downgrade any of the parameter values put forward in its proposed Statements and would have applied greater insight into the MRP/gamma issue.<sup>18</sup>

The Financial Investors Group (FIG) state that the AER's analysis of each individual parameter was too technical and theoretical and was not consistent with the approach taken by market practitioners. The FIG state:

Whilst debate about technical matters is a necessary part of the review, the FIG is concerned that in developing its proposals the AER has lost sight of the commercial importance of the cost of capital and the role that it plays in the investment decisions made by private sector infrastructure investors, operating in a competitive and particularly challenging capital market.<sup>19</sup>

The National Electricity Law (NEL) provides that the AER must, in performing or exercising an AER economic regulatory function or power perform or exercise that

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<sup>18</sup> JIA, *Network industry submission—AER proposed determination—Review of the WACC parameters for electricity transmission and distribution*, Submission in response, 2 February 2009, p.38.

<sup>19</sup> FIG, *Submission to the AER's WACC parameter review—The investor perspective*, Submission in response, 29 January 2009, pp.9-10.

function or power in a manner that will or is likely to contribute to the achievement of the NEO.<sup>20</sup>

The NEO is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:

- price, quality, safety, reliability and security of electricity, and
- the reliability, safety and security of the national electricity system.<sup>21</sup>

On the other hand, whether or not to take into account the revenue and principles in reviewing the WACC parameters is a discretion of the AER. Notwithstanding that the AER has this discretion, and as explained in chapter three, the AER has:

- chosen to take into account the revenue and pricing principles in reviewing each of the individual parameters—as demonstrated in each individual parameter chapter, and
- compared the regulatory return on equity, return on debt and overall rate of return derived from the AER’s individually determined WACC parameters with the revenue and pricing principles—as demonstrated in this chapter.

As also explained in chapter three, the AER considers that the revenue and pricing principles, which appear directly relevant to the WACC review, can be summarised as follows:

- providing a service provider with a reasonable opportunity to recover at least efficient costs (principle 7A(2)),
- providing a service provider with effective incentives to invest efficiently (principle 7A(3))<sup>22</sup>, and
- having regard to the economic costs and risks of under and over investment (principle 7A(6)).

## **2.2 Summary of position in explanatory statement**

In August 2008, the AER released an issues paper canvassing a number of issues relevant to this review. As the AER’s review is limited to a review of individual WACC parameters, the issues paper focused on matters specific to each WACC parameter, as well as multi-parameter considerations (e.g. the approach to benchmarking and the form of the CAPM). A number of submissions to the issues paper also highlighted several broader challenges that stakeholders considered must

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<sup>20</sup> NEL, s. 16(1).

<sup>21</sup> NEL, s.7.

<sup>22</sup> The efficient utilisation aspect of this principles is less relevant to the WACC, for the same reasons as given regarding principle 7A(7).

be taken into account when determining the overall rate of return as part of this review.

In their submission, the JIA specifically highlighted three broad challenges that the JIA considered were important. These challenges were:

- *the need for new investment* – the JIA considered that all parts of the national grid need new investment. Some of this investment is driven by growing energy growth, whereas other investment is driven by the need to replace ageing infrastructure
- *the response to climate change concerns* – the JIA considered that investors may consider there are increased risks from investing in the energy industry due to the policy uncertainty surrounding the response to climate change concerns by Australian governments. This would lead to a higher required rate of return for these investors. The JIA further considered that addressing the impact of the Carbon Pollution Reduction Scheme is likely to require significant new investment in energy networks as the sources of energy generation alter, and
- *the current state of financial markets* – the JIA considered that the world economy was entering a period of uncertainty, with risk continuing to be re-priced, and consequent increases in the hurdle rates for infrastructure investment.

The overall message of the broader issues raised by the JIA appeared to be that while the Australian energy industry has some attractive investment fundamentals, the industry must compete with many other infrastructure projects, both domestically and internationally. Significant new infrastructure investment is needed to address growing demand, the replacement of ageing assets, and changes in the sources of generation. This is occurring at a time of increased required rates of return across all industry sectors in general due to the current state of financial markets, and, specifically to the Australian energy industry, due to uncertainty around the policy response to climate change. In summary, the JIA submitted that the twin challenges of increased required rates of return and increased investment needs were occurring at the same time as capital was being rationed.

The JIA submitted that the regulatory rate of return needs to be sufficient in order to attract sufficient capital to the sector, in the light of both the large forward capital expenditure programs and higher required rates of return.<sup>23</sup>

The sentiments raised in the JIA's submission were also echoed in a number of other submissions from industry stakeholders.<sup>24</sup>

The JIA further stated that:

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<sup>23</sup> JIA, *Network Industry Submission – AER Issues Paper – Review of the weighted average cost of capital (WACC) parameters for electricity transmission and distribution*, Submission in response, September 2008, p.7.

<sup>24</sup> In particular, submissions from the Australian Pipeline Industry Association (APIA), Cheung Kong Infrastructure Holdings (CKI), the Energy Networks Association (ENA), EnergyAustralia, ETSA Utilities, CitiPower and Powercor, Grid Australia, Integral Energy, and SP AusNet.



The particular challenge for the AER is to balance the different aspects of the electricity market objective so that customers are delivered long term security of supply at a reasonable cost. That, in turn, requires network operators to be recompensed in an adequate and timely way for their investments.<sup>25</sup>

The AER noted that the focus of the NEO is on efficiency. In particular, the promotion of the efficient investment in, and efficient operation and use of, electricity services in the long term interests of end consumers. The AER considered that as the WACC is the allowed rate of return on capital employed, the WACC pertains more to promoting the efficient investment in electricity services, rather than the efficient operation of electricity services. This position was supported by Gilbert and Tobin.<sup>26</sup>

Of particular relevance in relation to the rate of return, is that the WACC be set at a level expected to be sufficient to incentivise efficient investment in electricity network infrastructure, while not set too high so as to incentivise inefficient overinvestment in electricity network infrastructure. The AER considered that if it determined values and methods for individual WACC parameters that produce an overall regulatory rate of return that is expected to achieve this outcome, then the AER will have exercised its power in a manner that will or is likely to contribute to the achievement of the NEO. In doing so, the AER also considered that, in respect of each parameter, it would have also had regard to the need to achieve an outcome which is consistent with the NEO.

In reviewing the individual WACC parameters, the AER had regard to a range of theoretical and empirical considerations and evidence, including that presented in submissions to the issues paper, and contained in expert reports commissioned by stakeholders and the AER. Having had regard to this range of considerations and evidence in reviewing the WACC parameters, the AER considered it had achieved the appropriate balance discussed above.

The AER's proposed parameters in its explanatory statement are outlined in table 2.1.

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<sup>25</sup> JIA, *Submission in response*, op. cit., September 2008, p.6.

<sup>26</sup> Gilbert and Tobin, op. cit., 22 September 2008(a), pp.6-7.

**Table 2.1—AER’s proposed WACC parameters –explanatory statement**

Parameter	Previously adopted (TNSPs – all)  (DNSPs – NSW, ACT, VIC)	Previously adopted (DNSPs – QLD, TAS, SA)	MEU and Energy Round Table	Joint Industry Associations	AER proposed
Gearing	60%	60%	70%	60%	60%
Nominal risk-free rate	10 year CGS <sup>(a)</sup>	10 year CGS <sup>(a)</sup>	10 year CGS <sup>(a)</sup>	10 year CGS <sup>(a)</sup>	CGS (Term matching the regulatory period) <sup>(b)</sup>
Market risk premium	6.0%	6.0%	5.5%	7.0%	6.0%
Equity beta	1.0	0.90	0.70	1.0	0.8
Credit rating	BBB+	BBB+	A+	BBB+	A-
Gamma <sup>27</sup>	0.50	0.50	0.85	0.20	0.65
<b>Return on equity</b>	<b>11.32%</b>	<b>10.72%</b>	<b>9.17 %</b>	<b>12.32 %</b>	<b>9.79 %</b>
Cost of debt	8.38% <sup>(c)</sup>	8.38% <sup>(c)</sup>	8.19 % <sup>(d)</sup>	8.38% <sup>(c)</sup>	7.81% <sup>(e)</sup>
<b>Nominal ‘vanilla’ WACC</b>	<b>9.56%</b>	<b>9.32%</b>	<b>8.48%</b>	<b>9.96%</b>	<b>8.60%</b>

Notes:

- (a) Calculated as the yield on 10 year CGS calculated over the three month period 25 August 2008 to 25 November 2008 (i.e. 5.32 per cent).
- (b) Calculated as the yield on five year CGS calculated over the three month period 25 August 2008 to 25 November 2008 (i.e. 4.99 per cent).
- (c) Calculated as the yield on 10 year BBB-rated bonds calculated over the three month period 25 August 2008 to 25 November 2008 (i.e. 8.38 per cent).
- (d) Calculated as the yield on 10 year A-rated bonds calculated over the three month period 25 August 2008 to 25 November 2008 (i.e. 8.19 per cent).
- (e) Calculated as the yield on five year BBB and A-rated bonds calculated over the three month period 25 August 2008 to 25 November 2008 (i.e. 7.81 per cent).

The AER considered that its proposed WACC parameters adequately reflected the balance between security and the efficient cost of supply as correctly identified by the JIA. On the specific issues raised, the AER observed the following:

<sup>27</sup> As the rates of return displayed in table A are post-tax WACCs they do not incorporate the effect of gamma. However an overall pre-tax WACC has not been derived because it depends on tax related positions specific to an individual service provider. Accordingly, a pre-tax WACC, that would illustrate the effect of the change in gamma, is not displayed in table 3.1.

- Electricity network service providers (NSPs) are adequately compensated through the regulatory regime for the scope and costs of new investment driven by demand growth, ageing assets, and other influences. It was expected that the AER’s proposed parameters would continue to provide returns for NSPs which were sufficient to attract and compensate for both equity and debt funding.
- The AER, on the evidence available, was of the view that the Australian Government’s response to climate change concerns had not and would not lead to an increase in the required rate of return for electricity NSPs.
- While it was clear that the current conditions in financial (particularly debt) markets are far from favourable, market-based evidence from a number of sources strongly suggests that, rather than creating risks, the regulatory regime insulates energy network businesses from market volatility.

In summary, based on detailed analysis of the available evidence from submissions and expert consultants, and considered in the context of all the relevant issues facing electricity NSPs, the AER expected that its proposed parameters would continue to provide incentives for efficient network investment in the long term interests of electricity consumers.

## **2.3 Need for new investment—demand growth, ageing assets, climate change policies**

### **2.3.1 Introduction**

In their submission to the issues paper the JIA submitted that the AER in its review needed to be mindful of the need for significant investment – in response to demand growth, ageing assets and climate change policies – particularly at a time when capital is being rationed due to the global financial crisis.

The JIA also submitted that, because of the increased uncertainty for the industry brought about by government policies to address climate change, the cost of capital allowance will need to increase.

### **2.3.2 Summary of position in explanatory statement**

In its explanatory statement, the AER considered there to be two elements to this broader issue on the need for investment as raised by the JIA and other stakeholders. First, whether the capital expenditure allowances of service providers are sufficient to deal with the scope and cost of efficient investment needs. Second, whether the allowed return on that capital expenditure is sufficient to attract funding, both equity and debt, for that investment.

The AER acknowledged that new investment in network assets is required in many areas of the National Electricity Market (NEM), to address, among other matters, network expansion due to growing energy demand (particularly peak demand), network replacement due to ageing assets, and network expansion and augmentation to facilitate new generation associated with climate change policies. However, the AER considered that these issues are adequately addressed through the existing regulatory regime.

The AER also considered that, on the evidence available, the Australian Government's response to climate change concerns has not (or will not) to an increase in the required rate of return for electricity NSPs.

### **2.3.3 Summary of submissions in response to explanatory statement**

In their response to the explanatory statement the JIA argues that the AER's proposed parameters result in an insufficient return on capital to facilitate the significant network investment required. The JIA submit that:

If the AER is determined to pursue such a dangerously low suite of proposed parameters it should first undertake a robust forward looking analysis of returns which incorporate its proposed lower WACC parameters and compare the results with market conditions.

From this it will be apparent that the proposed parameters remove any attraction to invest in the sector leaving reliability obligations as the only reason to continue to invest.<sup>28</sup>

The JIA notes the AER's reference in its explanatory statement to the significant amount of new capital investment approved under the current regulatory regime. According to the JIA:

- this investment is contingent upon the rate of return provided by the regulator, and
- the proposed WACC parameters will result in under-investment, particularly in discretionary and innovative areas.

The JIA argues in particular that the AER's proposed WACC parameters generate a return which is insufficient to attract the investment required in light of climate change policies, including:

- to accommodate any change in generation flows resulting from a change to the location and mix of generation, including the impact of intermittent generation,
- in inter-connectors to support any increase in flows between regions that results from the changed location of generators, and
- to accommodate innovative technology at the distribution level, particularly with respect to the installation of embedded generation.<sup>29</sup>

In support of these arguments, the JIA quote the report from S3 Advisory prepared for the AEMC, as follows:

There is... a review of the regulatory WACC underway by the Australian Energy Regulator, the outcome of which will influence whether augmentations of the networks, as a result of RET, will be considered economic to capital providers.

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<sup>28</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p.16.

<sup>29</sup> *ibid.*, pp.18-19.

Given that a number of international energy Market Participants have recently increased their hurdle rates it is hard to conceive of a reason for them to invest in regulated assets that will potentially have their economic returns reduced by the regulator.<sup>30</sup>

The AER also notes submissions from other market participants in response to the explanatory statement which discussed the investment implications. For example, Ed Rayner of Alliance Growth Equities states that:

...other companies have the ability to earn a return well in excess of their WACCs. Regulated utilities can only earn the regulated WACC (especially if the regulator removes any possibility of earning anything above this or even reduces the WACC)... Regulated utilities now look much less attractive investments than they did before the draft ruling so investors are much less likely to allocate capital to them.<sup>31</sup>

### **2.3.4 Issues and AER's considerations**

The AER accepts that a significant amount of new capital investment is likely to be required on electricity networks over the period 2010-2019. The reasons for new investment cited by the JIA – demand growth, ageing assets, and climate change policies – are all considered valid and relevant.

Facilitation of the required new investment by the regulatory regime is achieved through:

- Forecast capital expenditure allowances—which provide for regulated prices to reflect the costs of new investment as and when it is forecast to occur, and
- The allowed rate of return on new investment—which is the subject of this review.

It is reiterated from the explanatory statement that the regulatory regime facilitates efficient investment through the regulatory reset process. Under the NER, network service providers (NSPs) propose forecast capital expenditure for a regulatory control period. The AER must accept this forecast if it is satisfied the forecast reasonably reflects the relevant requirements, being:

- the efficient costs of achieving the capital expenditure objectives,
- the costs that a prudent operator in the circumstances of the service provider would require to achieve the capital expenditure objectives, and
- a realistic expectation of the demand forecast and cost inputs required to achieve the capital expenditure objectives.

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<sup>30</sup> S3 Advisory, *Final report to the AEMC: Financing of future energy sector investments in Australia – The potential effects of the Carbon Pollution Reduction Scheme and Renewable Energy Target*, December 2008, p.9.

<sup>31</sup> Ed Rayner, Alliance Growth Equities; in Equity Market Participants, *Submission to the AER – Equity market responses*, 30 January 2009.

As stated in its explanatory statement, the AER has approved or proposed to approve a significant amount of new investment in electricity networks in its recent decisions. Since June 2007, the AER has approved (or proposed to approve) \$22.81 billion of capital investment (compared to a businesses' combined proposed total of \$23.92 billion), over the period 2007 to 2014.<sup>32</sup>

This capital expenditure ('capex') allowance feeds into two of the main 'building blocks' which are the basis of an NSP's regulated revenue or prices.

Under the NER, capital expenditure is not intended to be recovered at the time that the expense is made, but rather over the economic life of the relevant asset. This building block is referred to as the 'return of capital' building block. For example, under a straight line depreciation approach, the costs of an asset with an economic life of 40 years would be recovered in equal portions over the next 40 year period.

To compensate for the delay between expense incurred and recovery, and the risks in providing regulated services, a 'return on capital' building block allowance is also provided. This building block is determined as the unrecovered portion of the asset base multiplied by the WACC. Accordingly, only a part of the regulated revenue in a particular regulatory period relates to the forecast capex over that period, with most of the recovery of an asset occurring in subsequent periods.

At the end of the regulatory period, an NSP's actual rather than forecast capex is 'rolled' in to the regulatory asset base (RAB). As with all other assets included in the RAB, this actual capex then generates a 'return of capital' and 'return on capital' in subsequent regulatory periods, for the remainder of the economic life of the asset. Accordingly, even where an NSP overspends its forecast capex allowance, the amount of the overspend gets 'rolled' in to the RAB without any assessment by the regulator of the efficiency of that amount. This mechanism applies symmetrically, so where an NSP underspends its allowance only the actual capex is rolled into the asset base. In summary, where an NSP over (under) spends its capital allowance, only the portion of return on and return of capital from the current regulatory period is under (over) recovered.

This capex incentive rewards businesses for achieving investment efficiencies, by allowing the NSP to keep the allowance for the duration of the regulatory period. This implies that efficient NSPs can earn above the regulated WACC during the regulatory period.

Other elements of the regulatory regime in relation to the recovery of capex include:

- While capex allowances are generally set based on a range of forecast projects and timing, NSPs are not locked into these projects or timing during the regulatory period – the regulatory regime allows NSPs to respond to changing investment demands.

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<sup>32</sup> AER, *Electricity transmission and distribution network service providers—Review of the weighted average cost of capital parameters*, Explanatory statement, 11 December 2008, p.27. Note that the approved amounts for NSW, ACT and Tasmania are based on the AER's draft decisions only.

- Transmission NSPs (TNSPs) may propose ‘contingent projects’ such that if the appropriate ‘trigger event’ occurs, the regulated revenue is increased.
- TNSPs and distribution NSPs (DNSPs) are provided with ‘cost pass-through’ provisions including ‘service standard event’ and ‘regulatory change event’ provisions. For example, if an NSP’s service performance standards increase, the NSP may apply for an increase in allowed revenues or prices. NSPs are also provided with ‘tax change event’ cost pass-through provisions. These provisions apply symmetrically.
- DNSPs can propose other cost pass-through events, in addition to the prescribed list in the NER.

Accordingly, the AER reiterates its view from the explanatory statement that NSPs are adequately compensated for the scope and costs of new investment driven by demand growth, ageing assets, and other reasons.

The JIA in their submission appears to accept that the regulatory reset process adequately allows for the required volume of capex. However it considers this to be much less significant to the rate of return. For example, the JIA submit that:

The AER is misguided if it assumes that because the investments have been included in regulatory allowances for future capex, such investment will take place...

...The lower rate of return proposed by the AER for the energy sector is both inconsistent with the policy objectives of the Commonwealth Government and is heading in entirely the opposite direction to the recommendations of Infrastructure Australia.<sup>33</sup>

The AER agrees that the rate of return provided by the regulatory regime to compensate for new investment is a critical element of the incentive framework in addition to the capex incentive itself. The overall rate of return provided by this final decision, particularly in the context of prevailing conditions in the market for funds, is discussed in the following two sections on the cost of debt and the return on equity.

### **2.3.5 AER’s conclusion**

The AER’s conclusions are as follows:

- The AER accepts that a significant amount of new capital investment is likely to be required on electricity networks over the period 2010-2019.
- It is reiterated from the explanatory statement that the regulatory regime facilitates efficient investment through the regulatory reset process.
- The AER considers that the overall rate of return provided in this final decision is sufficient to attract investment to the sector over the long term.

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<sup>33</sup> JIA, *Submission in response*, op. cit., 2 February 2009, pp.16-17.

## 2.4 Cost of debt

The AER received a number of submissions which raised practical issues associated with meeting the regulated cost of debt, and the associated interest rate risk faced by regulated businesses.

### 2.4.1 Introduction—final decision on cost of debt parameters

The NER provides that the expected cost of debt is to be calculated in accordance with the following formula:

$$k_d = r_f + DRP$$

where:

$r_f$  = the nominal risk-free rate

DRP = the debt risk premium.<sup>34</sup>

The NER further provides that the debt risk premium for a regulatory control period is the premium determined for that regulatory control period by the AER as the margin between the annualised nominal risk-free rate and the observed annualised Australian benchmark corporate bond rate for corporate bonds which have a maturity equal to that used to derive the nominal risk-free rate and a credit rating from a recognised credit rating agency.

The expected cost of debt is determined by the benchmark credit rating and the corresponding observed debt risk premium (DRP) above the nominal risk-free rate.

**Table 2.2 AER’s final decision—Cost of debt**

Parameter	Previously adopted value or method	AER’s final decision
Nominal risk-free rate	<i>Method adopted:</i> Yield on 10 year Commonwealth Government Security (CGS)	<i>Method adopted:</i> Yield on 10 year CGS sampled as close as practicably possible to date of the final decision
Credit rating	<i>Value adopted:</i> BBB+	<i>Value adopted:</i> BBB+

Source: NER<sup>35</sup>, AER analysis

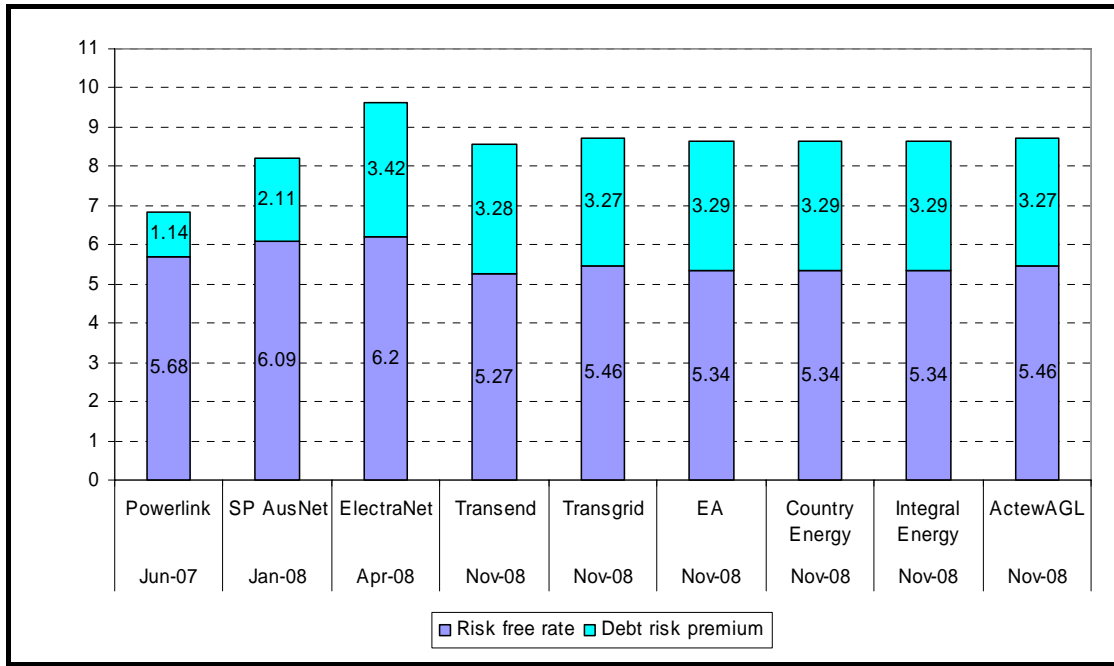
As detailed in table 2.2, the AER has not departed in this final decision from either the previously adopted term or proxy for the nominal risk-free rate, or from the previously adopted value for the credit rating. Figure 2.1 illustrates the cost of debt from recent AER decisions. This final decision endorses the same approach going forward.

<sup>34</sup> NER, cls. 6.5.2(b) and 6A.6.2(b).

<sup>35</sup> NER, cls. 6.5.2(b), 6.5.2(c), 6.5.2(e) 6A.6.2(b), 6A.6.2(c) and 6A.6.2(e).



**Figure 2.1: Cost of debt – recent draft and final AER decisions (per cent, nominal)**



Source: AER<sup>36</sup>

To reiterate, the current NER methodology for calculating the debt risk premium allows for regulated businesses to be fully compensated for prevailing market conditions at the time of the reset.

#### 2.4.2 Summary of position in explanatory statement

The AER received a number of submissions which raised practical issues associated with meeting the regulated cost of debt, and the associated interest rate risk faced by regulated businesses.

Having regard to these submissions and the available data, the AER formed the following conclusions in its explanatory statement regarding the cost of debt for a benchmark efficient NSP:

- The regulatory regime should continue to provide symmetrical outcomes with respect to the benchmark cost of debt, with interest rate risk fairly compensated for via the equity beta. This approach is consistent with most aspects of an incentive-based regulatory regime, whereby the methodology for determining the cost of debt is a benchmark assumption against which incentives are created for regulated businesses.

<sup>36</sup> AER, *Decision: Powerlink Queensland transmission network revenue cap 2007-08 to 2011-12*, Final decision, 14 June 2007, p. 106; AER, *SP AusNet transmission determination – 2008-09 to 2013-14*, Final decision, 31 January 2008, p. 107; AER, *ElectraNet transmission determination 2008-09 to 2012-13*, 11 April 2008, p. 71; AER, *Transend transmission determination 2009-10 to 2013-14*, Draft decision, 28 November 2008 (a), pp. 154-155; AER, *TransGrid transmission determination 2009-10 to 2013-14*, Draft decision, 28 November 2008(b), p. 97; AER, *New South Wales draft distribution determination 2009-10 to 2013-14*, Draft decision, 28 November 2008(c), p. 229; and AER, *Australian Capital Territory distribution determination 2009-10 to 2013-14*, 28 November 2008(d), p. 141.

- The current NER method for calculating the debt risk premium allows for regulated energy network businesses to be fully compensated for prevailing market conditions at the time of the reset. Therefore the exposure to volatility in credit markets is, to a large degree, mitigated.
- Current market evidence indicates that regulated energy network businesses could still gain access to finance via bank debt, for a yield less than the BBB+ corporate yield for a benchmark NSP. However, it was acknowledged that for some businesses the current cost of debt may exceed the regulated cost of debt as locked-in at a prior reset (i.e. prior to the onset of the credit crisis).
- Evidence indicates that network businesses are active in hedging markets, which allows interest rate risk to be mitigated to the greatest extent possible. Any operating expenditure allowances for hedging costs, including credit margin premiums, are beyond the scope of this review along with debt and equity raising costs.

Overall the AER observed that while the current conditions in debt markets were far from favourable, the regulatory regime tends to insulate energy network businesses from market volatility.

### **2.4.3 Summary of submissions in response to explanatory statement**

In response to the explanatory statement, the AER received submissions that specifically commented on the AER's proposed cost of debt from:

- the Australian Pipeline Trust and APT Investment Trust (APA Group)
- equity market participants
- the Queensland Treasury Corporation (QTC)
- the JIA, and
- the FIG

The JIA, in response to the AER's claim that the regulatory regime insulates network businesses from market volatility, state that it is the nature of the business profile (e.g. essential services, long lived assets) rather than the regulatory regime that drives the stability of cash flows that makes energy network businesses a relatively attractive lending proposition.<sup>37</sup>

The JIA argue that the regulatory regime itself creates regulatory risk, which tends to detract from the relative attractiveness of the sector. As evidence of this the JIA present statements from Standard & Poor's indicating a likely downgrade in credit

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<sup>37</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p.68.

ratings if the AER's position in its explanatory statement is implemented in the final decision.<sup>38</sup>

Similarly the FIG, an affiliation of eight major investors in Australian energy networks, states that:

The AER has overstated the ability of regulation to protect the businesses from market volatility and understated the impact of regulatory risk, which its proposals exacerbate.<sup>39</sup>

The JIA further state that the AER should be mindful that its benchmark assumptions on the cost of debt provide incentives for regulated energy network businesses to adopt efficient debt financing strategies.

The JIA submission is supported by a number of statements outlining the Treasury practices of energy network businesses, including Jemena, Envestra, Citipower & Powercor, and SP AusNet. These statements discuss the strategies employed by regulated energy network businesses to manage both refinancing and interest rate risk. The material provided is discussed furthering detail in relation to the term of the risk-free rate (section 6.5.2).

The JIA are critical of the AER's discussion on the cost and availability of bank debt in the current market:

... the JIA would like to state that the bank debt market is not able to satisfy the entire debt financing requirements of private energy network businesses. Banks' credit lines are constrained and many JIA members are already pushing up against these credit limits. Indeed with credit growth slowing, even contracting, distribution businesses will need to compete for a larger slice of a smaller pie ...<sup>40</sup>

The JIA also state that the current cost of debt is significant and rising. As an example, the JIA cite two Australian banks which have recently issued AAA rated debt at between 180 and 190 basis points (bps) over the Bank Bill Swap Rate (BBSW), implying indicative pricing available to BBB+ rated corporates in excess of this (after taking account of a positive credit spread). According to the JIA the only alternative source of funding for Australian energy network businesses is the US private placement market, with indicative pricing of 525 to 550 bps over the cash rate.

Likewise, the FIG submits that:

... prevailing market conditions are having a significant impact on the price of capital and access to capital markets".<sup>41</sup>

In particular, the FIG discusses the current status of bank debt and bond markets, as well as alternative sources of funding such as credit wrapped and hybrid instruments.

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<sup>38</sup> *ibid.*, p.68.

<sup>39</sup> FIG, *Submission in response*, op. cit., 29 January 2009, p.3.

<sup>40</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p.71.

<sup>41</sup> FIG, *Submission in response*, op. cit., 29 January 2009, p.69.

Similar views were reiterated by the APA Group, particularly with regard to current increases in the costs of debt financing.<sup>42</sup>

Finally, in response to the explanatory statement, the QTC provided a statement included in the JIA submission. Consistent with the arguments it has put forth to the AER previously, the QTC states that:

Reduced liquidity in the physical and derivative debt markets, coupled with significantly higher borrowing requirements, will change the way our regulated customers structure their debt at future determinations ...

... Greater emphasis will be placed on managing refinancing risk at the expense of hedging interest rate risk. This will increase the risk of our customers being unable to recover the regulated cost of debt. The current regulatory framework provides no compensation for this risk.<sup>43</sup>

The QTC states that there is insufficient liquidity to accommodate the required interest rate hedging transactions. The QTC highlight that going forward, this corresponds to a reduction in the ability of its businesses to meet the regulated cost of debt.

Specifically with regard to hedging costs, the QTC argues that a benchmark equity beta will not capture the interest rate risks unique to those businesses with very large debt portfolios. Based on the AER's benchmark assumption in its explanatory statement, the QTC argues that a regulated business should be very confident of being able to fully recover hedging costs in operating expenditure at the time of the reset.<sup>44</sup>

## **2.4.4 Issues and AER's considerations**

### **2.4.4.1 Impact of the regulatory regime**

The AER concluded in its explanatory statement that in the context of prevailing volatility in debt markets, rather than increasing risk, the regulatory regime may actually insulate energy network businesses from market volatility.<sup>45</sup>

However, in considering stability more generally, it was not the AER's intention to suggest that the regulatory regime is the only contributing factor. Indeed, as stated by the JIA, the nature of the assets and the services being provided (i.e. the long-lived assets and provision of essential services) are also pertinent factors in assessing exposure to market volatility.

Furthermore, the prevailing cost of debt for regulated NSPs is reflected in the allowed return on debt at the time of a business's regulatory reset. The ability to recover these increases is particularly important given the present deterioration in global economic

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<sup>42</sup> APA Group, *Response to the AER Explanatory statement on WACC Parameters*, Submission in response, 3 February 2009, p.3.

<sup>43</sup> JIA, *Submission in response*, op. cit., 2 February 2009, Appendix I, pp.3-4.

<sup>44</sup> QTC, *QTC submission to AER proposed statements*, Submission in response, 2 February 2009, p.14.

<sup>45</sup> AER, *Explanatory statement—Electricity transmission and distribution network service providers—Review of the WACC parameters*, Explanatory statement, 11 December 2008, p.109.

conditions. In a relative sense, this reduces the risks associated with rising debt costs. As Macquarie Research states, this is part of the safety net that underpins the strong position of listed distribution networks, and their ability to cope with tight, volatile credit markets.<sup>46</sup>

The AER recognises that refinancing risk is still an issue, especially in the current market, but businesses should be able to manage this through a diversified debt portfolio.

Refinancing risk is discussed in detail at section 6.5.2.

#### **2.4.4.2 Cost and availability of debt**

The AER considers that submissions from the FIG, and particularly the JIA, may overstate the reduced availability of debt financing in the current market. The JIA claim that with bank credit lines constrained, and the majority of foreign banks retreating from the domestic market, a significant funding gap has been left in the Australian bank market.<sup>47</sup>

These comments are in contrast to the views published by the Reserve Bank of Australia (RBA) in its March 2009 Financial Stability Review. Specifically, the RBA highlights that:

... credit conditions have tightened with lenders increasing risk margins. Notwithstanding this, most borrowers have still been able to refinance maturing debt as needed. As an illustration, large borrowers in the commercial property sector – a sector that has reportedly found it particularly difficult to source funds – have had \$5.3 billion of new syndicated loans approved since end-June 2008, more than offsetting the \$3.4 billion of maturities over that period.<sup>48</sup>

Furthermore, empirical evidence provided in figure 2.2, below, shows the steady increase in the value of bank loans and advances to the commercial sector since 2007. Despite the worsening economic conditions, the value of such loans has not markedly fallen in recent months.

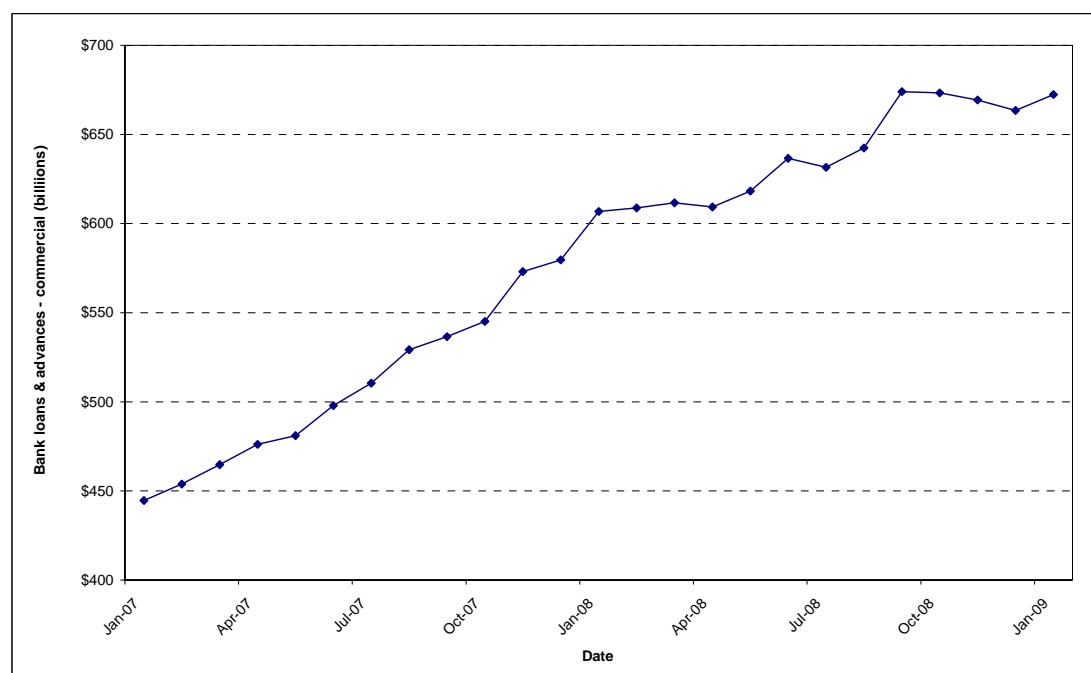
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<sup>46</sup> Macquarie Research, *DUET Group: FY08 – another excellent year*, 1 September 2008, p.19.

<sup>47</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p.72.

<sup>48</sup> Reserve Bank of Australia (RBA), *Financial Stability Review*, March 2009, p.59.

**Figure 2.2: Value of domestic bank loans and advances to the commercial sector**



Source: RBA<sup>49</sup>

Importantly, within the commercial sector the AER considers that regulated NSPs are likely to remain relatively attractive lending propositions. As such, the AER reasonably expects that debt financing in the form of bank loans will continue to be available for privately-owned, regulated NSPs.

This view is supported by ABN Amro, which observes that regulated utilities still had access to debt markets in 2008, even when these markets were largely closed:

When taking a look back at last year, despite the debt markets effectively closing for much of the year, numerous refinances were achieved within the utility space...

...Further to that, in the final weeks of the year, when it appeared that credit market Armageddon was upon us, DUET still managed to secure A\$150m of debt to help fund UED's capex requirement for the interval meter roll out. This was a five-year facility with a margin of ~220bp. In our view, this was an important milestone in alleviating concerns that the banks have completely turned the taps off – at least not in the regulated utility space anyway.<sup>50</sup>

Regarding foreign bank commitments, the RBA states:

These banks had, as a group, been expanding their business lending at an above-average pace for several years and made notable gains in their share of the large-value segment of the market. While, in aggregate, foreign-owned banks continued to extend credit to domestic borrowers over the past six months, the pace of expansion is noticeably slower than had previously been the case. At the same time, credit extended by the five largest banks has

<sup>49</sup> RBA, Bulletin Statistical Tables, March 2009, Banks – Assets (Table B02).

<sup>50</sup> ABN Amro, *Utilities – Sustainability underestimated*, 17 February 2009, p.4.

increased at a slightly faster pace than total business credit over the past six months.<sup>51</sup>

In its report, ABN Amro also identifies a sharp slowdown in foreign bank lending in recent months:

We believe loans outstanding to households and companies had been growing at an annualised rate of close to 50% before the credit crunch hit, but this has since slowed to 12% and is broadly unchanged over recent months... we suspect this is evidence of credit rationing, as foreign banks are more reluctant to commit scarce capital given the pressure on their parents' balance sheets...<sup>52</sup>

However, comments from the Australian Financial Markets Association (AFMA) executive director Duncan Fairweather consider that the suggestion of a withdrawal of foreign banks is an exaggeration:

We don't want to give the impression abroad that foreign banks are writing Australia off, because it's just not the case. Fears that there's going to be a wholesale exodus of foreign banks from Australia seem to be somewhat exaggerated, at least on figures to date.<sup>53</sup>

The AER also acknowledges that while bank debt financing appears available, evidence suggests that the costs of such debt have risen.

Highlighting the increased costs of debt, the RBA provides that in January 2009, the spread over BBSW for BBB rated corporate bonds with one to five years to maturity was 389 bps.<sup>54</sup> This compares to risk free AAA rated debt issued by Australian banks at between 180 and 190 bps over BBSW (inclusive of the guarantee fee payable to the Australian government).<sup>55</sup> Furthermore, the allowance for the cost of debt, the benchmark level set by the AER, is that of a BBB+ rated entity.<sup>56</sup> Considering this, the AER expects a regulated benchmark NSP to be able to access bank debt financing at costs below the regulated cost of debt (i.e. the 10 year BBB+ rated corporate bond).

As evidence of this, ABN Amro estimates that the utility sector achieved almost \$5 billion in refinancing in 2008, of which 65 per cent came from SP AusNet, Spark Infrastructure, DUET and Envestra. The debt raised was for terms between one and five years, and with margins of between 40 and 250 bps over the BBSW.<sup>57</sup>

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<sup>51</sup> RBA, *Financial Stability Review*, March 2009, p.32.

<sup>52</sup> ABN Amro, *Utilities – Sustainability underestimated*, 17 February 2009, p.7

<sup>53</sup> David Crowe, *RBA figures heat up RuddBank debate*, Australian Financial Review, 30 March 2009, p.8.

<sup>54</sup> RBA, Bulletin Statistical Tables, March 2009, Capital Market Yields and Spreads – Non-government Instruments (Table F03).

<sup>55</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p.71.

<sup>56</sup> The AER bases the benchmark cost of debt on Bloomberg's BBB rated series, as a corresponding BBB+ series is not available. However, the BBB rated series includes BBB+ rated corporate bonds in its sample.

<sup>57</sup> ABN Amro, *Utilities – Sustainability underestimated*, 17 February 2009, p.4. The companies analysed include APA, SPN, SKI, DUE, HDF, TSI, ENV and BBI.

ABN Amro has also recently examined the ability of the Diversified Utility and Energy Trust (DUET) to refinance debt for Multinet and the Dampier Bunbury Natural Gas Pipeline (DBNGP) in the current market:

We remain reasonably confident that DUE will succeed in re-financing this debt, albeit the margins will be much higher than previously (ie. we expect DBP to increase from 50bp up to 200-250bp).<sup>58</sup>

The AER also considers that regulated NSPs maintain some ability to raise debt through the issuance of corporate bonds, albeit on a limited and expensive basis. The AER cites the recent issuance by Woodside Finance of both 5 and 10 year BBB+ rated debt instruments as an example, though acknowledges the high yields (495 and 555 bps above BBSW respectively) at which this debt was issued.<sup>59</sup> On this evidence, the AER considers that corporate bond issuances are unlikely to represent the cheapest source of debt financing in the current market.

Finally, in light of the extension of the Federal guarantee of debt to cover State borrowing, the AER expects that State-owned, regulated NSPs should be able to access debt financing at reasonable prices relative to the regulated cost of debt.<sup>60</sup>

#### **2.4.4.3 Liquidity in market for hedging instruments**

The AER notes the submission from the QTC that there is currently insufficient liquidity in hedging markets for NSPs to undertake the transactions required to prudently manage interest rate risk.<sup>61</sup> However, there is limited empirical evidence provided by the QTC to support these views.

The historical bid-ask spreads for both 5 and 10 year, AA rated interest rate swaps are provided in figure 2.3. As noted by the RBA, albeit in the context of foreign exchange markets, bid-ask spreads are widely regarded as a measure of liquidity.<sup>62</sup>

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<sup>58</sup> ABN Amro, *DUET Group – Banks should be keen on a DUET*, 23 February 2009

<sup>59</sup> Bloomberg professional service, Bloomberg, New York, 2009.

<sup>60</sup> Australian Government, Press Release No.027 – *Temporary guarantee of State borrowing*, 25 March 2009, accessed on: 8 April 2009.

<sup>61</sup> JIA, *Submission in response*, op. cit., 2 February 2009, Appendix I, p.4.

<sup>62</sup> Chris Ryan, RBA, *Recent conditions in the Australian foreign exchange market*, February 2009, <[http://www.rba.gov.au/Speeches/2009/sp\\_so\\_160209.html](http://www.rba.gov.au/Speeches/2009/sp_so_160209.html)>, accessed on: 8 April 2009.



**Figure 2.3: Historical bid-ask interest rate spreads**



Source: Bloomberg

As figure 2.3 demonstrates, even through the current economic climate the bid-ask spreads for AA rated interest rate swaps have remained consistent with recent historical values. Hence, the AER considers that there is evidence to suggest that sufficient liquidity exists in the AA rated interest rate swap market.

The AER also considers that relative to AA rated swaps, bid-ask spreads on BBB+ rated interest rate swaps may be higher, and possibly consistent with the bond yields themselves.<sup>63</sup> However, these bid-ask spreads are not publicly available.

The AER further notes that only the QTC raises liquidity in markets for hedging instruments as a pertinent issue. Importantly, similar concerns were not discussed by private-industry Treasurers in statements provided to the AER pertaining to debt financing strategies.<sup>64</sup> Given the lack of supporting evidence provided by the QTC, the AER can only infer that such liquidity issues are specific to the QTC's circumstances. Significantly, the AER considers that the extension of the Federal guarantee on debt to cover State borrowing is likely to have alleviated some of these concerns to the extent that liquidity in hedging markets is an issue.

In response to whether empirical estimates of the equity beta are likely to account for the interest rate risk faced by the benchmark regulated NSPs, the AER does not accept the QTC's view that these issues should be dealt with at a firm-specific level. Under the NER, the AER's approach is to set an equity beta for a benchmark efficient NSP.

<sup>63</sup> Deloitte, *Refinancing, debt markets and liquidity*, , November 2008, Report to the AER, p.9, graph 1.

<sup>64</sup> JIA, *Submission in response*, op. cit., 2 February 2009, Appendices E, F, G and H.

Finally, the AER notes that specific hedging strategies adopted by regulated NSPs, and whether their associated costs should be explicitly compensated by the regulatory regime, are discussed at section 6.5.2.

#### **2.4.5 AER's conclusion**

Having considered the available data and the range of submissions regarding the ability of regulated NSPs to meet the regulated cost of debt, the AER maintains its views in its explanatory statement. Based on the analysis above, the AER concludes that:

- Overall, while it is clear that current conditions in debt markets are far from favourable, market-based evidence from a number of sources strongly suggests that, rather than creating risks, the regulatory regime insulates energy network businesses from market volatility.
- Debt financing for privately-owned, regulated NSPs is widely accessible through bank lending markets, albeit, at higher costs than previously available.
- Similarly, debt financing for State-owned, regulated NSPs is widely available, especially in light of the Federal Government's extension of the Federal guarantee on debt to cover State borrowing.
- The ability of regulated NSPs to recover the prevailing cost of debt at the time of a regulatory reset mitigates a significant component of the risks associated with rising debt costs. Furthermore, the allowance for the cost of debt, the benchmark level set by the AER, is that of a BBB+ rated entity. The AER expects that regulated NSPs can access debt financing at costs below this level.
- Substantive evidence has not been presented to suggest that liquidity constraints are restricting regulated NSPs from undertaking the transactions required to prudently manage interest rate risk.

The AER's final decision on the cost of debt parameters will lead to the cost of debt for a particular determination being set as the prevailing yield on 10 year Australian corporate bonds with a credit rating of BBB+.

For the reasons outlined above, the AER considers that:

- In determining these parameters the AER has performed or exercised its discretion in a manner that will or is likely to contribute to the achievement of the NEO.<sup>65</sup>
- The AER also considers it has had regard to the need to achieve an outcome that is consistent with the NEO.<sup>66</sup>

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<sup>65</sup> NEL, s. 16(1).

<sup>66</sup> NER, cls. 6.5.4(e)(4) and 6A.6.2(j)(4).

Additionally, the AER has chosen to take into account the revenue and pricing principles in reviewing the cost of debt parameters. The AER considers its final parameters are likely to lead to a regulatory cost of debt that will:

- provide service providers with a reasonable opportunity to recover at least efficient costs, and
- provide service providers with effective incentives to invest efficiently, and
- are appropriate having regard to the economic costs and risks of under and over investment.

## 2.5 Return on equity

### 2.5.1 Introduction—final decision on cost of equity parameters

The NER provide that the cost of equity is to be determined using the CAPM, calculated in accordance with the following formula:

$$k_e = r_f + \beta_e \times MRP$$

where:

- $r_f$  = the nominal risk-free rate
- $\beta_e$  = the equity beta
- MRP = the market risk premium.<sup>67</sup>

The previous adopted value or method for each parameter of the CAPM and the AER's final decision is set out in table 2.3.

**Table 2.3 AER's final decision—Cost of equity**

Parameter	Previously adopted value or method	AER's final decision
Nominal risk-free rate	<i>Method adopted:</i> Yield on 10 year Commonwealth Government Security (CGS)	<i>Method adopted:</i> Yield on 10 year CGS sampled as close as practicably possible to date of the final decision
Equity beta	<i>Value adopted:</i> 0.9 or 1.0 depending on the service provider	<i>Value adopted:</i> 0.8
Market risk premium	<i>Value adopted:</i> 6 per cent	<i>Value adopted:</i> 6.5 per cent

Source: NER<sup>68</sup>, AER analysis

<sup>67</sup> NER, cls. 6.5.2(b) and 6A.6.2(b).

The previously adopted approach was to set the cost of equity equal to a fixed premium—5.4 per cent (0.9\*6 per cent) or 6 per cent (1.0\*6 per cent)—above the prevailing yield on a 10 year CGS at the time of the reset. The approach outlined in this final decision is to continue to set cost of equity as a fixed premium over the prevailing yield on a 10 year CGS at the time of the reset, however going forward that fixed premium will be set at 5.2 per cent, instead of either 5.4 per cent or 6.0 per cent.

### **2.5.2 Summary of submissions in response to explanatory statement**

The JIA calculate that the AER's proposed parameters reduced the cash compensation for the cost of equity by 19 per cent. The FIG argue that, on any reasonable assumptions, the AER has reduced the real after tax return on equity by at least 20 per cent.

As noted above, the JIA argued that the AER had not fully undertaken its task in the explanatory statement. They argued that the combined package of value and methods must be assessed against the overarching criteria found in the NEO and revenue and pricing principles by having regard to the combined impact of each parameter on the total compensation for the cost of capital. The JIA argue that having done so, the AER would not have been persuaded to depart from any of the previously adopted parameters.

Specifically, on the cost of equity, the JIA state:

- The regulatory cost of equity from the previously adopted parameters was already at an all time low (due to historically low CGS yields, which it considers are expected to persist), while the actual cost of equity and cost of debt were at historically high levels (which the JIA also expect to persist). The JIA argues that the AER's proposed parameters made the gap even wider.
- There has been a general repricing of risk in the equity and debt markets caused by the global financial crisis, with equity markets hardest hit. The JIA claims that, as a matter of theory, the repricing in debt markets must have been preceded by an even larger repricing in equity markets because equity holders are residual claimants.
- In the explanatory statement, the AER implied that repricing had only occurred in debt markets. The JIA consider this runs counter to both theory (as described above) and facts. The factual evidence of repricing of risk in equity markets is proven by higher observed dividend yields—the RBA states dividend yields have almost doubled in Australia. CEG states that dividend yields in equity markets are analogous to interest rates in debt markets.
- CEG states that the fall in share prices for utilities in 2008 was as great as the S&P200. Unless profitability of utilities has fallen (by 38 per cent), the JIA argue this demonstrates that the increase in the cost of equity has been as great for utilities as for the market as a whole.

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<sup>68</sup> NER, cls. 6.5.2(b), 6.5.2(c), 6A.6.2(b) and 6A.6.2(c).

- The JIA argue that there has been a ‘flight from risk’—associated with the increase in the cost of equity and debt—that has been mirrored by a ‘flight to safety’. That is, demand for government debt has risen dramatically causing nominal CGS yields to fall dramatically. The JIA argue that CGS yields are currently at unprecedentedly low levels with no imminent signs of recovery.
- CEG estimate the MRP, as at November 2008, to be 12 per cent. Officer and Bishop estimate the MRP at between 16 and 18 per cent. The JIA note the difference being the CEG’s estimate is a long term estimate while Officer and Bishop’s estimate is short term.
- The JIA argue that the AER’s proposed parameters would make regulatory return on equity below both the current actual cost of equity and below the actual cost of equity before the global financial crisis (when risk was at historically low levels).
- CEG’s dividend growth model estimates using individual utilities show the implied average equity risk premiums—that is, the equity beta multiplied by the MRP—would be 14 per cent assuming dividends per share grow at 2.5 per cent in perpetuity beyond 2013. Accordingly to CEG, an implied equity risk premium of 4.2 per cent (0.8 equity beta multiplied by 6 per cent MRP) is only reconciled with an assumption that dividends per share will decrease by 17 per cent in perpetuity beyond 2013. CEG argue a more realistic way to explain these results is to consider that the equity risk premium of utilities is in line with the market average.
- The JIA consider there are a number of ways current market conditions should have been incorporated into the AER’s proposed parameters. The JIA consider the MRP should have been set at the long term historical average. They argue that the AER did not do this in part on the basis of, now outdated, cash flow measures.

The FIG considers that the cost of equity as determined by the AER in its explanatory statement is well below the prevailing cost of equity in the market.

Historical CAPM parameters do not reflect current expectations about capital market conditions. In other words, the market risk premium is likely to be above 6.0%, the equity beta is likely to be close to one (as the performance of listed energy infrastructure funds over 2008 shows), and risk-free rates are being impacted by Government efforts to negate the effects of the crisis...

...If the prospective returns from investing in Australia’s regulated energy network infrastructure are not competitive, capital – which has become scarce as a result of the global financial crisis – will be shifted into investments of similar risk, but which offer better returns.<sup>69</sup>

The FIG argues that the AER’s estimation period for the equity beta (from January 2002 to September 2008) does not capture the worsening market conditions in the last three months of 2008:

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<sup>69</sup> FIG, *Submission in response*, op. cit., 29 January 2009, pp.4-5.

...the FIG questions whether it is prudent to lower the equity beta at a time of heightened market volatility and risk aversion towards highly geared vehicles.<sup>70</sup>

The FIG considers that its finding of an increased cost of equity is consistent with the advice provided to the AEMC by S3 Advisory on the financing of future Australian energy sector investments in light of the Carbon Pollution Reduction Scheme (CPRS) and the Renewable Energy Target (RET). The FIG quotes directly from the S3 Advisory report, as follows:

...it is expected that the risk premium required on investments will increase, with those in the regulated energy sector being no exception...

...Given a number of international energy Market Participants have recently increased their hurdle rates it is hard to conceive of a reason for them to invest in regulated assets that will potentially have their economic returns reduced by the regulator... the cost of funds has increased for any providers of capital meaning that a reduction in the regulatory WACC and a significant increase in private funding are in obvious conflict.<sup>71</sup>

The FIG provides additional anecdotal evidence regarding the current cost of equity, including:

- Asset consultants suggest that Australian superannuation funds expect a return of 10 to 12 per cent over five to seven years from infrastructure, and
- In attempting to raise capital in the current market, a number of Australian regulated energy businesses have had to offer significant prospective returns to attract funds (e.g. Envestra, APA).<sup>72</sup>

Based on its analysis the FIG concludes that:

The evidence from the market suggests that both the market risk premium and the equity beta of energy network businesses have increased in recent times. This is evident from the market's performance as a whole and the performance of the regulated businesses in particular.

From the FIG's perspective, however, the most pragmatic way for the regulator to take this into account is likely to be to leave the equity beta unchanged.<sup>73</sup>

Elsewhere in its report the FIG suggests that in order to better reflect the prevailing cost of equity the AER could consider adopting:

- an MRP at the top end of its reasonable range, but to explicitly tie its use to prevailing market conditions, and

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<sup>70</sup> *ibid.*, p.33.

<sup>71</sup> S3 Advisory, *op. cit.*, pp.9-10, 50.

<sup>72</sup> FIG, *Submission in response*, *op. cit.*, 29 January 2009, p.38.

<sup>73</sup> *ibid.*, p.39.

- a risk-free rate that is more consistent with long term averages, rather than those currently observed in the market.<sup>74</sup>

## 2.5.3 Issues and AER's considerations

### 2.5.3.1 Impact of the proposed WACC parameters

As noted above, the JIA calculate the AER's proposed parameters reduced the cash compensation for the cost of equity by 19 per cent. The JIA calculate this as follows:

The total (including the value of imputation credits) estimated cost of equity under the existing NER in December would be 10.2% (risk-free rate of 4.2% + equity premium of 6%). However, in cash terms this must be reduced by the assumed value of imputation credits. At a gamma of 0.5 and a corporate tax rate of 0.3 this requires that 10.2% be divided by  $1 + 0.5 * 0.3 / 0.7 = 1.21$ . This gives cash compensation for the cost of equity of 8.4%. However, under the draft decision proposals the total cost of equity falls to 8.7% (risk-free rate of 3.9% based on 5 year CGS instead of 10 year CGS yields + equity premium of 4.8% which is 1.2% lower to reflect the reduction in beta from 1.0 to 0.8 while the MRP of 6% is retained). To convert this to a cash cost of equity this must be divided by 1.28 to reflect the proposed gamma of 0.65 ( $1.28 = 1 + 0.65 * 0.3 / 0.7$ ). This gives cash compensation for the cost of equity of 6.82%. The difference between 8.44% and 6.82% is 1.62 percentage points. As a percentage of 8.44% this is a 19% reduction.<sup>75</sup>

The FIG states in its submission that:

On any reasonable assumptions, therefore, the AER's proposals will reduce the real after tax return to equity that investors in Australian regulated energy network infrastructure can expect to receive by at least 20%. This is a very significant reduction.<sup>76</sup>

In support of this conclusion the FIG also refers to an analyst report from Macquarie Equities, which estimated that the AER's explanatory statement would reduce equity values by around 20 to 25 per cent if a stand-alone business were to undergo a regulatory reset today.<sup>77</sup>

The AER notes the suggestion from the FIG that the real after tax return on equity would reduce by around 20 per cent if the AER's proposed WACC parameters were implemented. The FIG based this estimate on a comparison with the real return provided by the Essential Services Commission of Victoria (ESCV) as part of its 2005 Electricity Distribution Price Review, as it states it could not replicate the impact directly from the AER's explanatory statement.

To clarify the impact of the explanatory statement on the return to equity, the AER has reproduced table A.1 from the explanatory statement below (Table 2.4).

<sup>74</sup> *ibid.*, p.4

<sup>75</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p.38.

<sup>76</sup> FIG, *Submission in response*, op. cit., 29 January 2009, p.4. The FIG derives the figure of around 20 per cent based on its comparison of the AER's proposed WACC parameters in its explanatory statement with those in the ESCV's 2005 Electricity Distribution Price Review.

<sup>77</sup> Macquarie Research Equities, *Regulated Utilities – WACCed*, 12 December 2008, p.60.

**Table 2.4—AER proposed cost of equity parameters – explanatory statement**

Parameter	Previously adopted (TNSPs – all (DNSPs – NSW, ACT, VIC)	Previously adopted (DNSPs – QLD, TAS, SA)	MEU and Energy Round Table	Joint Industry Associations	AER proposed
Nominal risk-free rate	10 year CGS <sup>(a)</sup>	10 year CGS <sup>(a)</sup>	10 year CGS <sup>(a)</sup>	10 year CGS <sup>(a)</sup>	CGS (Term matching the regulatory period) <sup>(b)</sup>
Market risk premium	6.0%	6.0%	5.5%	7.0%	6.0%
Equity beta	1.0	0.90	0.70	1.0	0.8
<b>Return on equity</b>	<b>11.32%</b>	<b>10.72%</b>	<b>9.17%</b>	<b>12.32%</b>	<b>9.79%</b>

Notes:

- (a) Calculated as the yield on 10 year CGS calculated over the three month period 25 August 2008 to 25 November 2008 (i.e. 5.32 per cent).  
(b) Calculated as the yield on five year CGS calculated over the three month period 25 August 2008 to 25 November 2008 (i.e. 4.99 per cent).

As table 2.4 indicates, the AER calculates that the impact of its explanatory statement was to reduce the return on equity from between 10.72 and 11.32 per cent, to 9.79 per cent. This translates to a reduction of between 8.7 and 13.5 per cent (depending on the previously adopted value for the equity beta).

Further, the AER notes that the statements from Macquarie Research referred to by the FIG relate to its estimate of the impact on the *value* of equity in the RAB rather than the *return* on equity.

### 2.5.3.2 Market reaction to explanatory statement

The FIG states that the market's response—as indicated from analysts' comments and share price movements—to the AER's explanatory statement demonstrates that it was both unexpected and unlikely to encourage capital investment. For example, the FIG quotes from a UBS analyst report released following the publication of the AER's explanatory statement, as follows:

The AER has sharply lowered prospective regulated equity returns. The permitted return on equity falls from 12 to 8.5%. We cannot see equity investors investing for such a paltry return and therefore expect a sharp fall in capital expenditure. Intuitively, it feels like the cost of equity has to be way higher than the 8.5% implied by the regulator and the textbook.<sup>78</sup>

The FIG states that the market's immediate and strong reaction is an important indicator of the propensity to invest given return expectations.

<sup>78</sup> UBS Investment Research, *Regulated Utilities – Capital strike?*, 11 December 2008; in FIG, op. cit., p.17.



The AER acknowledges that some of its proposed changes to the WACC parameters were unexpected by market analysts. For example, after the release of the explanatory statement Goldman Sachs JBWere (GSJBW) stated:

In aggregate, the AER's WACC parameters are below our expectations. The main surprise for us is the change in the assumed credit rating to A-, particularly given previous rulings have been BBB+. We also note the equity beta is at the lower end of our expectations and the gamma below our expectations.<sup>79</sup>

Similarly, Macquarie stated:

This is a negative surprise to us and the market... While the equity beta has been the bone of contention in the regulated market for some time, a reduction to 0.8 will be viewed as aggressive. From left field, we have also seen the pass-through of debt costs get squeezed, with the regulator passing through lower credit spreads on top of a lower risk-free rate (assuming a positive shaped yield curve).<sup>80</sup>

The AER also observes that there was a negative share price reaction immediately after the release of the explanatory statement.

Ed Prendergast of Pengana Capital states that the AER's explanatory statement has increased regulatory risk for the sector:

We believe the decision has raised the perceived risk in this sector (as shown by the share price reactions and increased volatility). This is a major negative as the sector is seen as a safe haven in a very tough market. This has now been reversed.<sup>81</sup>

The AER notes that this review is the first industry-wide review of the WACC parameters under the NER. The separation of the WACC review from the reset process has allowed for a comprehensive review of the WACC parameters than previously undertaken by regulators. The AER considers it is not unusual for there to be a degree of uncertainty in the market during the review process. However, the AER notes the outcome of the review process itself is designed to provide considerable certainty to network service providers and the market. That is:

- the WACC parameters are reviewed at the same time for all TNSPs and DNSPs rather than on a reset by reset basis for individual service providers
- Once that review is complete, the method or value for each parameter is 'locked-in' and applied without any possible amendment to all transmission determinations where the proposal is received after 1 May 2009 and prior to the next review (in 2014)
- For DNSPs a departure from the outcomes of this review is permitted, on a case-by-case basis, but only if there is persuasive evidence to do so.

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<sup>79</sup> GSJBW, *AER WACC review – Below our expectations*, 11 December 2008.

<sup>80</sup> Macquarie Research, *Regulated utilities – WACCed*, 12 December 2008, p.58.

<sup>81</sup> Ed Prendergast, Pengana Capital; in Equity Market Participants, *Submission to the AER – Equity market responses*, 30 January 2009.

The AER considers the nature of the ‘lock-in’ framework under which the WACC is determined will provide considerable certainty to investors going forward, and so will contribute to a stable and predictable investment environment.

Further, the AER considers that the evidence from equity analysts generally reflects a cautious but positive sentiment towards the regulated energy network businesses. For example, after conducting a thorough examination of the outlook for the sector, ABN Amro states that:

Given ongoing difficult credit markets and last year’s harsh AER decision, we have undertaken a thorough analysis of the regulated utilities. In our view, the banks are going to be comfortable lending to the sector and this means that current distribution levels are largely sustainable. Overweight stance maintained.<sup>82</sup>

Also, Andrew Preston of Aberdeen Asset Management provides useful commentary on the drivers of market appetite for regulated utilities, particularly during times of uncertainty and volatility:

From the investment point of view, because of their predictability of earnings and dividends, utility stocks are favoured investments when the broader economy begins to slow and the outlook for profits in the manufacturing sector becomes less clear...

...This will support the utility price as will the company policy on dividends. If the income stream is put at risk or the potential to pay dividends is constrained, the attraction of the investment will be diminished.<sup>83</sup>

In general the AER considers that the commentary in recent analyst reports indicates that while there remains uncertainty as to the potential outcomes of the AER’s final decision, the underlying fundamentals of the regulated energy network businesses remains strong. This is also noted by the Major Energy Users and Consumers Roundtable (MEU) in their submission to the AER’s explanatory statement.<sup>84</sup>

On this basis the AER considers that while the market may have reacted negatively to the AER’s proposed WACC parameters in December 2008, the outlook for regulated energy network businesses appears positive.

### **2.5.3.3 Cost of equity—forward looking and reflecting prevailing conditions**

The NER state that in undertaking a review of the WACC parameters (including the cost of equity parameters) the AER must have regard to the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds.

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<sup>82</sup> ABN Amro, *Utilities – Sustainability underestimated*, 17 February 2009.

<sup>83</sup> Andrew Preston, Aberdeen Asset Management; in Equity Market Participants, *Submission to the AER – Equity market responses*, 30 January 2009.

<sup>84</sup> MEU, *AER draft decision—A Submission from Major Energy Users Inc In conjunction with some members of National Consumers Roundtable on Energy*, Submission in response, op. cit., 30 January 2009, p.14.

As explained in chapter three, the requirement that the AER must have regard to the rate of return to be both forward looking and reflect prevailing conditions in the market for funds are not competing requirements. Rather, it is a requirement that the AER must have regard to the need for the rate of return to reflect forward looking expectations, as at the relevant point in time. That relevant point in time is at the time of the individual reset determinations, rather than at the time of the AER's WACC review.

Accordingly, the AER should determine each parameter, including the MRP, in such a way as it is relevant for a 10 year perspective (consistent with the term of the risk-free rate) from the commencement of the next regulatory control period for each service provider affected by this review. Notwithstanding this statement, current economic and financial conditions (i.e at the time of this WACC review) are relevant to the extent that these conditions are expected to prevail over the period to which the outcomes of this WACC review apply.

#### **2.5.3.4 Cost of equity—dividend yields**

The FIG states that a key characteristic of mature infrastructure investment vehicles is that their returns are yield-dominated. On this basis it is argued that an examination of current trading yields can provide some useful information about investor expectations. The FIG's forecast dividend yields are illustrated in table 2.5.

**Table 2.5: FIG analysis – Prospective trading yields (per cent p.a. based on dividend guidance / forecast)**

Sector	Oct-06	Dec-08	Movement
	FY07 Forecast yield	FY09 Forecast yield	
S&P / ASX200 Industrials	8.2%	9.0%	+0.8%
S&P / ASX200	6.7%	7.6%	+0.9%
AVERAGE	7.4%	8.3%	+0.9%

Investment vehicle	Oct-06	Dec-08	Movement
	FY07 Forecast yield	FY09 Forecast yield	
Envestra	8.2%	24.1%	+15.9%
APA	6.4%	11.7%	+5.3%
HDF	8.7%	13.2%	+4.5%
DUET	8.9%	16.6%	+7.7%
SP AusNet	8.7%	13.2%	+4.5%
Spark Infrastructure	9.7%	16.6%	+6.9%
<i>Average</i>	<i>8.4%</i>	<i>15.9%</i>	<i>+7.5%</i>

Source: FIG.<sup>85</sup>

The FIG suggests three possible reasons for the observed increase in forecast dividend yields for the businesses listed in table 2.5:

- The required cost of equity has increased and expected dividend yields have risen to reflect this market re-rating
- The required cost of equity has not increased but investors are now expecting to get a greater proportion or all of their required returns from dividends, with minimal or zero share price growth, or
- The cost of equity has not increased but investors are expecting a reduction in future earnings (and therefore dividends) such that currently observed yields will eventually adjust downwards towards what may be regarded as normal levels.

The FIG argues that the second scenario appears to be inconsistent with analysts' earnings forecasts, and some of the businesses' investment programs and expected demand growth.

Further, the FIG considers the third scenario is contradictory to the AER's view about the limited exposure to market volatility. On this basis the FIG argues that:

<sup>85</sup> FIG, *Submission in response*, op. cit., 29 January 2009, p.35.

This therefore leaves the first explanation – that the rise in dividend yields reflects, at least in part, a downward market re-rating based on a changed view about the cost of equity.

This could also reflect the negative sentiment towards highly geared stocks and the market's perception of the increased risk that equity holders in highly geared investments are bearing in the prevailing environment. If this is the case – and also taking into account lower interest rates in the present environment – it is difficult to reconcile the AER's proposed reduction in the equity beta with market observations (unless there is a compensating increase in the market risk premium).<sup>86</sup>

On the second scenario, the AER notes that there does not appear to be reason to suggest that regulated utilities are likely to significantly increase the proportion of profits paid out as dividends.

Also, the AER considers that the third scenario is not as unlikely as the FIG contend it to be. For example, ABN Amro has recently stated:

While we remain positive on the sector, we have made some adjustments to our distribution profiles, valuations and target prices. We assume flat DPS for each stock over the medium term. While this could prove overly harsh, especially if debt markets improve, we think management teams are likely to err on the side of conservatism until some of the uncertainty abates. As mentioned on the front page of this report, modest cuts are a possibility. However, we would argue that relatively deep cuts are being factored into current share prices.<sup>87</sup>

Similarly, prior to the release of the explanatory statement, GSJBW considered that the market was more than pricing in a negative outcome from the AER's WACC review:

Whilst we see some risk of "sticker shock" when the draft is released, we estimate current prices are implying an average equity beta of ~0.5 across all assets. This is highly unlikely in our opinion.<sup>88</sup>

In its submission, the FIG also provides anecdotal evidence regarding the current cost of equity for individual firms. In particular, the FIG presents two recent examples of rights issues made by regulated energy network businesses, the details of which are as follows:

- On 22 December 2008, Envestra announced a rights issue to raise \$111 million by issuing new securities at a price of \$0.30. Based on current dividends this implies a yield of over 25 per cent.
- APA recently raised \$647 million from the sale of interests in a new infrastructure fund and will use the funds to pay down debt.<sup>89</sup>

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<sup>86</sup> *ibid.*, p.36.

<sup>87</sup> ABN Amro, *Utilities – Sustainability underestimated*, 17 February 2009, p.1.

<sup>88</sup> GSJBW, *WACC review: Downside risk appears more than priced in*, 5 December 2008, p.1.

<sup>89</sup> FIG, *Submission in response*, op. cit., 29 January 2008, p.38.

Regarding the first example, the AER notes that a price of \$0.30 offered by Envestra is reflective of its share price around the time of the announcement. As figure 2.4 below indicates, Envestra's share price has fallen quite dramatically since November 2008, most likely reflecting the market's concerns about its debt levels.

**Figure 2.4: Envestra share price – November 2008 to April 2009**



Source: The Age<sup>90</sup>

Further, as table 2.5 above shows, Envestra's forecast yield of 24.1 per cent as at December 2008 is significantly higher than the yields for the other businesses in table 2.5. On this basis, notwithstanding the AER's general view that caution should be taken in interpreting on-the-day forecast dividend yields, this analysis suggests that Envestra's present situation is atypical and should not be relied upon in setting a benchmark cost of equity.

Regarding the second example, the AER notes that the APA Group provided a confidential submission to the AER which commented on its recent experience in raising capital. APA states that it has had to offer significant returns on equity to attract investors in the current market.<sup>91</sup> However, the AER notes that no information has been provided by APA to support the return on equity quoted in its submission.

In summary, the AER considers that caution should be exercised in interpreting dividend yields based on daily share prices.

<sup>90</sup> The Age, *Envestra – share price*, The Age Business, <<http://markets.theage.com.au/apps/qt/index.ac>>, Accessed on: 23 April 2009.

<sup>91</sup> APA Group, *Submission in response*, op. cit., 2 February 2009.

### 2.5.3.5 Cost of equity—relative to cost of debt

SFG argues that:

In the context of clear uncertainty in the estimation of beta, an important consideration when determining how much weight to apply to a particular empirical estimate of beta is whether the resulting required return is economically reasonable. That is, one would take the particular estimate of beta, determine the required return on equity implied by that estimate, and then ask whether investors would really be willing to commit equity capital to the benchmark firm if they expected to receive that level of return.<sup>92</sup>

SFG conducts this ‘economic reasonableness’ test by estimating the relative difference between the regulatory cost of equity under the explanatory statement and comparing that return to the prevailing yield on long dated debt.

SFG estimates the regulatory cost of equity with the AER’s proposed parameters to be 8.77 per cent, at a particular point in time (which appears to be 31 December 2008). SFG compares this to several yields taken from CBA Spectrum as at 31 December 2008 (corporate debt with credit ratings ranging from AA to BBB) leading to yield to maturity:

- ranging between 8.2 and 9.2 per cent for five-year debt, and
- ranging between 8.8 and 9.9 per cent for 10-year debt.

SFG concludes:

In my view, it is implausible that investors would require a lower return on their residual equity investment in the benchmark firm (which ranks behind the assumed 60% debt financing) than they could obtain in the form of fixed income payments from a very highly rated institution.<sup>93</sup>

The AER agrees that, given the residual risk resulting from greater uncertainty of cash flows borne by equity holders, economic reasonableness would imply that the cost of equity would be greater than the cost of debt. Accordingly, to ensure that service providers are provided with a reasonable opportunity to recover efficient costs the regulatory return on equity should be greater than the regulatory cost of debt (at least on average).

However, the AER has a number of issues with the analysis performed by SFG. Most significantly is that SFG has used CBA Spectrum to determine the cost of debt. The AER does not consider CBA Spectrum is an appropriate data source to estimate the cost of debt for a 10 year benchmark. The AER’s reasons on this issue can be found in its recent final decision for the NSW and ACT electricity distribution determinations. The AER considers that Bloomberg fair yields are a better predictor of observed yields than an average of Bloomberg and CBA Spectrum fair yields or CBA Spectrum

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<sup>92</sup> SFG, *The reliability of empirical beta estimates: Response to AER proposed revision of WACC parameters—Report prepared for ENA, APIA and Grid Australia*, 1 February 2009, p.13.

<sup>93</sup> SFG, *The reliability of empirical beta estimates: Response to AER proposed revision of WACC parameters—Report prepared for ENA, APIA and Grid Australia*, 1 February 2009, p.14.

fair yields alone. Consequently the AER’s approach is to estimate the cost of debt using Bloomberg.

This difference in data sources makes a significant difference. For example, on 31 December 2008 (the date of SFG’s analysis), the fair yield on a 10 year:

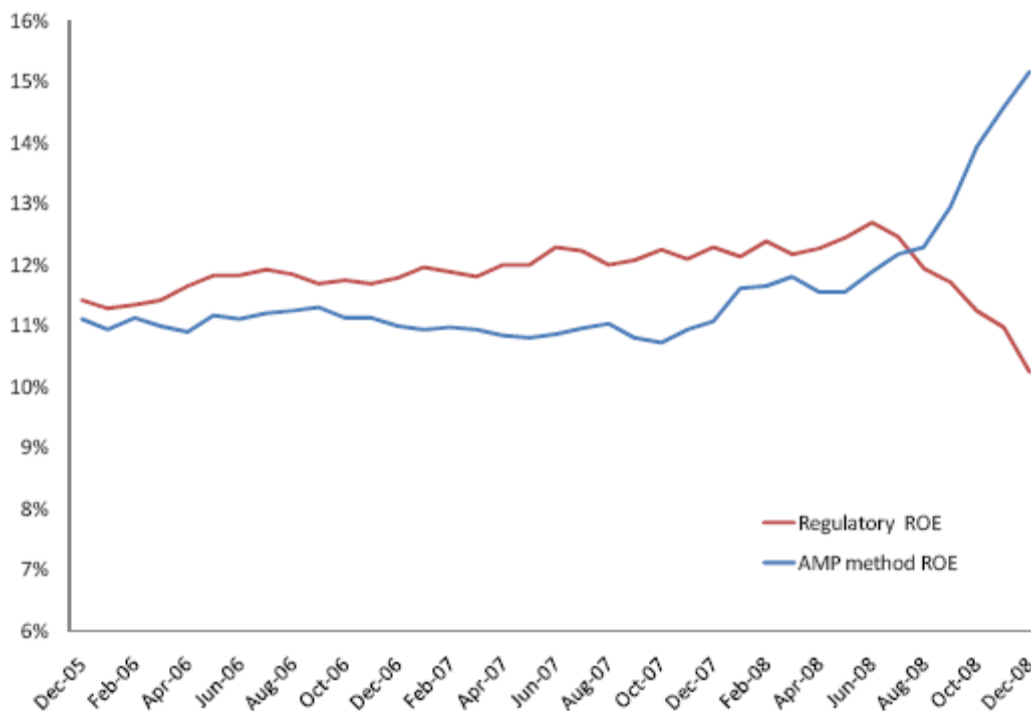
- Bloomberg BBB corporate bond was 7.4 per cent, whereas
- CBA Spectrum BBB+ corporate bond was 9.9 per cent

Accordingly, the regulatory cost of equity following the AER’s proposed parameters was above the regulatory cost of debt, as economic reasonableness would imply.

### 2.5.3.6 Cost of equity—structural break or long term deviation

Theoretically the MRP could also vary over time in line with different economic conditions. For example, CEG (in advice to the JIA on the overall cost of equity) considers the regulatory return on equity using the previously adopted WACC parameters (prevailing 10 year CGS yields as proxy for the risk-free rate, 6 per cent MRP, and 1.0 equity beta) which it names the ‘regulatory ROE’ and compares this over time with the cost of equity implied from cash flow measures following the ‘AMP method’. The variation in these returns is illustrated in figure 2.5.

**Figure 2.5 CEG—Comparison of the implied cost of equity and regulatory cost of equity (before AER explanatory statement)**



Source: CEG<sup>94</sup>

<sup>94</sup> CEG, op. cit., January 2009, p.22.



CEG consider that this downward trend in the regulatory ROE since mid-2008:

...is largely due to the fall in CGS yields in the latter half of 2008—a fall in yields that is demonstrably coincident with a rise in the actual cost of equity observed in the market. This inverse relationship between government bond yields and the return on equity is not surprising and is well documented in the finance literature. However, this is not reflected in the Australian regulatory approach.<sup>95</sup>

CEG argue that this is consistent with two possible explanations:

- the yield on CGS is currently a poor proxy for the risk-free rate used to estimate the cost of equity in the CAPM, or
- the yield on CGS is a good proxy for the risk-free rate used in the CAPM but the MRP has recently moved in the opposite direction to the yield on CGS.

In chapter six, the AER considers that there is not persuasive evidence to depart from adopting CGS yields as the proxy for the risk-free rate. Accordingly, the AER considers that the first explanation is unlikely.

However, to the extent that the second explanation is possible—that the risk-free rate (proxy) and MRP move in opposite directions—CEG provides no solution to address this issue through the MRP. Rather CEG argue this is a reason why the AER should not lower the equity beta, at this time, from the previously adopted value.

However, the AER considers that the integrity in the estimation of each individual WACC parameter is important. This integrity includes that the MRP is a measure of market-wide non-diversifiable risk, whereas the equity beta is a measure of the benchmark efficient NSP's exposure to non-diversifiable risk relative to that of the market. To the extent that the prevailing MRP (and the MRP into the foreseeable future) is above the long term MRP, the AER does not agree that it is appropriate to address this issue via the equity beta.

Accordingly, while theoretically the MRP could vary over time in line with different economic conditions, the view of the AER and the JIA's advisers (Professor Officer and Dr Bishop) is that, unlike for the nominal risk-free rate, there is no adequate method to automatically update the MRP at the time of each reset determination.

Yet the NER requires the AER to lock in either a value or method for each parameter. Given the lack of an appropriate method that could be used to update the MRP for each reset determination effected by this WACC review, the only alternative is that a value for the MRP be adopted.

In relatively stable market conditions, the adoption of a value for the MRP (which then applies for multiple reset determinations) is unlikely to be a significant issue, as the long term estimate is likely to be the best estimate of forward looking expectations prevailing at any particular point in time.

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<sup>95</sup> CEG, op. cit., January 2009, p.23.

However, due to the global economic and financial crisis, relatively stable market conditions do not currently exist. While it is conditions at the time of the reset, rather than at the time of the WACC review which are relevant, the AER has taken into account current conditions to the extent these conditions are expected to prevail over the time of reset determinations affected by this review. In other words, as the AER is reviewing the WACC parameters now—including ‘locking-in’ a value for the MRP—to the extent that current conditions (at the time of this review) are expected to be maintained until the time of the determinations effected by this review, then current conditions remain a relevant consideration in determining what value should be ‘locked-in’ for the MRP.

However, if the MRP varies over time, then by definition, the locking in of a value may not always completely reflect forward looking expectations prevailing at the time of each reset determination.

The requirement to lock-in a value or method for the MRP now (which for practical purposes can only be a value) and the requirement to have regard to the need for the rate of return to reflect forward looking expectations commensurate with prevailing conditions at the time of each reset determination compete, particularly where some reset determinations occur during relatively unstable market conditions. However, the manner in which these requirements can best be reconciled is to lock in a value for the MRP which is equally relevant for each reset determination to which the WACC review applies. Acknowledging that for some reset determinations the actual (unobservable) MRP may be somewhat above this value, though for other reset determinations the actual (unobservable) MRP maybe be somewhat below. In formulating this approach, the AER has been guided by the NEO.

Long term average historical excess returns currently fall between 5.7 and 6.2 per cent. However, in determining whether 6 per cent remains an appropriate estimate of the MPR, an issue to consider is whether or not there has been a structural break in the market, such that long term historical estimates would be less relevant to forward looking expectations.

The FIG argue that:

Unlike the AER, the FIG does not consider that there can be any certainty over the duration of the current downturn, the path that a recovery may take nor whether markets will return to more “normal” levels. In particular any return to more stable or “normal” conditions is unlikely to be at the level which preceded the global financial crisis.<sup>96</sup>

Further, Andrew Gatenby, Solaris Investment Management, comments on the limitations of historical data in estimating a forward-looking return on equity:

There is considerable reference in the Draft AER Report to various consultants and precedents to support the draft recommendations, however it is backward looking. The bottom line is that the market has changed dramatically in the last 6 months, risk has increased, debt/credit is not as freely available, confidence is at all time lows and the outlook appears very

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<sup>96</sup> FIG, *Submission in response*, op. cit., 29 January 2009, p.12.

ordinary. In light of this it would seem more appropriate to encourage investment through increased returns to equity holders.<sup>97</sup>

An alternative explanation to current market conditions may be that there has not been a structural break, but that the medium term MRP will be above the long term MRP into the foreseeable future. On this, the FIG argue:

FIG is well aware that business cycles exist. However, whether prevailing conditions are part of a normal business cycle or not cannot be determined at this point in time. In any event, even if they were part of a business cycle, the evidence suggests that those cycles can be very long and can incorporate significant deviations from the norm.<sup>98</sup>

The FIG contend that a mechanical application of the CAPM will not necessarily capture the prevailing cost of equity in the market. The FIG contend:

Resolving this dilemma would, at a minimum, require not changing the relevant parameters. This, however, would not capture the increase in the cost of equity. To address this, the FIG believes that the AER could give consideration to using a market risk premium that is at the top end of its reasonable range, but explicitly tie its use to prevailing market conditions. It may also be possible to adopt a risk-free rate that is more consistent with long term averages, than those currently observed in the market.<sup>99</sup>

As discussed in chapter three, the AER considers that it is not so much the requirement to use the CAPM which may compete with the ‘prevailing conditions’ and ‘forward looking’ requirements in the NER, as the requirement to lock in a value or method (which for the MRP is a value, due to the absence of an appropriate method). Additionally, the FIG appears to consider that ‘prevailing conditions’ refers to the time of the WACC review whereas the AER considers it refers to the time of the individual transmission or distribution determinations.

The AER considers that prior to the onset of the global financial crisis, an estimate of 6 per cent was the best estimate of a forward looking long term MRP, and accordingly, under relatively stable market conditions—assuming no structural break has occurred in the market—this would remain the AER’s view as to the best estimate of the forward looking long term MRP.

However, relatively stable market conditions do not currently exist and taking into account the uncertainty surrounding the global economic crisis, the AER considers two possible scenarios may explain current market conditions:

- that the prevailing medium term MRP is above the long term MRP, but will return to the long term MRP over time, or
- that there has been a structural break in the MRP and the forward looking long term MRP (and consequently also the prevailing) MRP is above the long term MRP that previously prevailed.

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<sup>97</sup> Andrew Gatenby, Solaris Investment Management; in Equity Market Participants, *Submission to the AER – Equity market responses*, 30 January 2009

<sup>98</sup> FIG, *Submission in response*, op. cit., 29 January 2009, p.24.

<sup>99</sup> *ibid.*, p.4.

Whilst it cannot be known which of these scenarios explain current financial conditions, both are possible, and both suggest a MRP above 6 per cent, at this time, may be reasonable. However, having regard to the desirability of regulatory certainty and stability, the AER does not consider that the weight of evidence suggests a MRP significantly above 6 per cent should be set.

Accordingly, the AER considers that a MRP of 6.5 per cent is reasonable, at this time, and is an estimate of a forward looking long term MRP commensurate with the conditions in the market for funds that are likely to prevail at the time of the reset determinations to which this review applies.

#### **2.5.4 AER's conclusion**

The AER's final decision on the cost of equity parameters will lead to the cost of equity for a particular reset determination being set as 520 bps above the prevailing 10 year CGS yields.

For the reasons outlined above, the AER considers that:

- In determining these parameters the AER has performed or exercised its discretion in a manner that will or is likely to contribute to the achievement of the NEO.<sup>100</sup>
- The AER also considers it has had regard to the need to achieve an outcome that is consistent with the NEO.<sup>101</sup>

Additionally, the AER has chosen to take into account the revenue and pricing principles in reviewing the cost of equity. The AER considers its final parameters are likely to lead to a regulatory cost of equity that will:

- provide service providers with a reasonable opportunity to recover at least efficient costs, and
- provide service providers with effective incentives to invest efficiently, and
- are appropriate having regard to the economic costs and risks of under and over investment.

## **2.6 Overall WACC return**

The overall regulatory rate of return is a weighted average of the cost of equity and the cost of debt. The previous weights applied were a 60 per cent weighting to the cost of debt and a 40 per cent weighting to the cost of equity. The AER has maintained these weights in this final decision.

The overall rate of return in accordance with the AER's final WACC parameters is outlined in table 2.6.

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<sup>100</sup> NEL, s. 16(1).

<sup>101</sup> NER, cls. 6.5.4(e)(4) and 6A.6.2(j)(4).

**Table 2.6: Revised WACC parameters – final decision**

Parameter	Previously adopted (TNSPs and NSW, ACT, VIC DNSPs)	Previously adopted (QLD, TAS, SA DNSPs)	MEU	JIA	AER proposed	AER final
Gearing	60%	60%	65%	60 %	60%	60%
Nominal risk-free rate	10 year CGS <sup>(a)</sup>	10 year CGS <sup>(a)</sup>	10 year CGS <sup>(a)</sup>	10 year CGS <sup>(a)</sup>	CGS (Term matching the regulatory period) <sup>(b)</sup>	10 year CGS <sup>(a)</sup>
Market risk premium	6.0 %	6.0 %	5.5 %	7.0 %	6.0%	6.5 %
Equity beta	1.0	0.90	0.56	1.0	0.8	0.8
Credit rating	BBB+	BBB+	A+	BBB+	A-	BBB+
Gamma <sup>102</sup>	0.50	0.50	0.90	0.20		0.65
<b>Return on equity</b>	<b>11.68%</b>	<b>11.08%</b>	<b>9.04%</b>	<b>12.68%</b>	<b>10.48%</b>	<b>10.88%</b>
Cost of debt	7.45% <sup>(c)</sup>	7.45% <sup>(c)</sup>	7.28 % <sup>(d)</sup>	7.45% <sup>(c)</sup>	7.12% <sup>(e)</sup>	7.45% <sup>(c)</sup>
<b>Nominal ‘vanilla’ WACC</b>	<b>9.14%</b>	<b>8.90%</b>	<b>7.28 %</b>	<b>9.54%</b>	<b>8.47%</b>	<b>8.82 %</b>

Notes:

- (a) Calculated as the yield on 10 year CGS calculated over the five year period 1 April 2004 to 1 April 2009 (i.e. 5.68 per cent).
- (b) Calculated as the yield on five year CGS calculated over the five year period 1 April 2004 to 1 April 2009 (i.e. 5.66 per cent).
- (c) Calculated as the yield on 10 year BBB rated bonds calculated over the five year period 1 April 2004 to 1 April 2009 (i.e. 7.45 per cent).
- (d) Calculated as the yield on 10 year A rated bonds calculated over the five year period 1 April 2004 to 1 April 2009 (i.e. 7.28 per cent).
- (e) Calculated as the yield on an average of five year BBB and A rated bonds calculated over the five year period 1 April 2004 to 1 April 2009 (i.e. 7.28 per cent).
- (f) Relative change in returns from previously adopted values to final decision (expressed as a percentage).

<sup>102</sup> As the rates of return displayed in table A are post-tax WACCs they do not incorporate the effect of gamma. However an overall pre-tax WACC has not been derived because it depends on tax related positions specific to an individual service provider. Accordingly, a pre-tax WACC, that would illustrate the effect of the change in gamma, is not displayed in table 2.6.

As discussed in section 2.5 in the context of the cost of equity, the AER considers that the rate of return provided in this final decision is sufficient to attract investment to the sector over the long term. While cognisant of current conditions in debt and equity markets, the AER has taken a longer term perspective in setting rates of return over the period 2010-2019. Moreover, the AER maintains its view that regulated energy network businesses are, at least in a relative sense, insulated from the current market volatility. As ABN Amro notes:

We believe there needs to be some sign of the debt market stabilising for a meaningful equity market rally. The longer a recovery takes, and the deeper the RBA cuts the cash rate in the meantime, the better the environment for the regulated utility sector to outperform.<sup>103</sup>

For the reasons outlined above, the AER considers that:

- In determining these parameters the AER has performed or exercised its discretion in a manner that will or is likely to contribute to the achievement of the NEO.<sup>104</sup>
- The AER also considers it has had regard to the need to achieve an outcome that is consistent with the NEO.<sup>105</sup>

Additionally, the AER has chosen to take into account the revenue and pricing principles in reviewing the overall cost of capital. The AER considers its final parameters are likely to lead to a regulatory cost of capital that will:

- provide service providers with a reasonable opportunity to recover at least efficient costs, and
- provide service providers with effective incentives to invest efficiently, and
- are appropriate having regard to the economic costs and risks of under and over investment.

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<sup>103</sup> ABN Amro, *Utilities – Sustainability underestimated*, 17 February 2009, p.7

<sup>104</sup> NEL, s. 16(1).

<sup>105</sup> NER, cls. 6.5.4(e)(4) and 6A.6.2(j)(4).

## 3 Regulatory framework

### 3.1 Introduction

This chapter sets out the regulatory framework in the National Electricity Law (NEL) and National Electricity Rules (NER) under which the AER is conducting this review. It also contains the AER's interpretation of the relevant provisions in the NEL and NER, and in relation to some provisions, an explanation as to how the AER has implemented the relevant NEL and NER provisions.

As part of its submission on the issues paper, the JIA submitted legal advice from Gilbert and Tobin, on its interpretation of the relevant NEL and NER provisions.<sup>106</sup> In the explanatory statement, the AER noted Gilbert and Tobin's advice on each issue, and stated whether the AER agreed or disagreed with Gilbert and Tobin, and the AER's reasons for this.

In response to the explanatory statement, the JIA have not included any additional advice from Gilbert and Tobin, however the JIA themselves have responded to the AER's interpretation of the relevant provisions. Subsequent to the JIA lodging its submission on the explanatory statement, the ENA (one of the three industry associations that constitute the JIA) provided a further submission to this review. This further submission substantially altered the ENA/JIA's position on several important issues.

In this final decision, the AER notes the JIA's position on each issue, and has stated whether the AER agrees or disagrees with the JIA (in relation to both their submission and the ENA's subsequent submission on the explanatory statement), and the AER's reasons for this.

### 3.2 National Electricity Law

The NEL provides that the AER must, in performing or exercising an AER economic regulatory function or power perform that function or power in a manner that will or is likely to contribute to the achievement of the National Electricity Objective (NEO).<sup>107</sup>

The NEO is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:

- price, quality, safety, reliability and security of electricity, and
- the reliability, safety and security of the national electricity system.<sup>108</sup>

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<sup>106</sup> Gilbert and Tobin, *Legal opinion 1*, 22 September 2008(a); Gilbert and Tobin, *Legal opinion 2*, 22 September 2008(b).

<sup>107</sup> NEL, s.16(1).

<sup>108</sup> NEL, s.7.

In addition, the NEL provides that the AER:

- must take into account the revenue and pricing principles when exercising a discretion in making those parts of a distribution determination or transmission determination relating to direct control network services, and
- may take into account the revenue and pricing principles when performing or exercising any other AER economic function or power, if the AER considers it appropriate to do so.<sup>109</sup>

The revenue and pricing principles are:

- a regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs in:
  - providing direct control services, and
  - complying with a regulatory obligation or requirement or making a regulatory payment.
- a regulated network service provider should be provided with effective incentives in order to promote economic efficiency with respect to the direct control network services the operator provides. The economic efficiency that should be provided includes:
  - efficient investment in a distribution system or transmission system with which the operator provides direct control network services
  - the efficient provision of electricity network services, and
  - the efficient use of the distribution system or transmission system with which the operator provides direct control network services.
- regard should be had to the regulatory asset base with respect to a distribution system or transmission system adopted:
  - in any previous:
    - as the case requires, distribution determination or transmission determination
    - determination or decision under the National Electricity Code or jurisdictional electricity legislation regulating the revenue earned, or prices charged, by a person providing services by means of that distribution system or transmission system, or
  - in the NER.

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<sup>109</sup> NEL, s. 16(2).



- a price or charge for the provision of a direct control network service should allow for a return commensurate with the regulatory and commercial risks involved in providing the direct control network service to which that price or charge relates
- regard should be had to the economic costs and risks of the potential for under and over investment by a regulated network service provider in, as the case requires, a distribution system or transmission system with which the operator provides direct control network services, and
- regard should be had to the economic costs and risks of the potential for under and over utilisation of a distribution system or transmission system with which a regulated network service provider provides direct control network services.<sup>110</sup>

### 3.3 National Electricity Rules

The NER provide that the rate of return for a TNSP or DNSP for a regulatory control period is the cost of capital as measured by the return required by investors in a commercial enterprise with a similar nature and degree of non-diversifiable risk as that faced by the transmission or distribution business of the provider (as the case may be).<sup>111</sup>

The NER also provide that the rate of return is to be calculated as a nominal post-tax WACC (of a specified formula), and that the return on equity is to be determined using the CAPM (also of a specified formula).<sup>112</sup>

The NER sets out several matters that the AER must have regard to in undertaking a review of the WACC parameters. These matters are:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing prescribed transmission services or standard control services (as the case may be)
- the need for the return on debt to reflect the current cost of borrowings for comparable debt
- the need for the credit rating levels or the values attributable to, or the methods of calculating, the parameters that vary according to the efficiency of the transmission or distribution network service provider to be based on a benchmark efficient transmission or distribution network service provider (as the case may be), and<sup>113</sup>

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<sup>110</sup> NEL, s. 7A.

<sup>111</sup> NER, cls. 6.5.2(b) and 6A.6.2(b).

<sup>112</sup> NER, cls. 6.5.2(b) and 6A.6.2(b).

<sup>113</sup> In relation to TNSPs, cl. 6A.6.2(j)(3) of the NER specifically lists the parameters for which this factor is relevant. Those parameters are the equity beta, the market value of debt as a proportion of the market value of debt and equity, the maturity period and bond rates of the nominal risk-free rate, and the credit rating level. In relation to DNSPs, cl. 6.5.4(e)(3) does not list specific

- where a value, method or credit rating level cannot be determined with certainty:
  - the need to achieve an outcome that is consistent with the NEO, and
  - the need for persuasive evidence before adopting a value, method or credit rating level that differs from the value, method or credit rating level that has previously been adopted for it.<sup>114</sup>

### 3.4 Interpretation of NEL and NER provisions

#### 3.4.1 National Electricity Objective

As noted above, the NEL provides that the AER must, in performing or exercising an AER economic regulatory function or power perform or exercise that function or power in a manner that will or is likely to contribute to the achievement of the NEO.<sup>115</sup>

In addition, and in specific relation to the AER's review of the WACC parameters, the NER provide that where a parameter cannot be determined with certainty, the AER must have regard to the need to achieve an outcome that is consistent with the NEO.<sup>116</sup>

As stated previously, the NEO is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:

- price, quality, safety, reliability and security of electricity, and
- the reliability, safety and security of the national electricity system.<sup>117</sup>

##### 3.4.1.1 Summary of position in explanatory statement

The AER considered that its review of the WACC parameters is an 'AER economic regulatory function or power', for the purposes of the NEL, and accordingly the relevant provision in the NEL applies.<sup>118</sup> In addition, as the 'true' value of each parameter cannot be observed, and must be estimated, it was unlikely that any parameter could be determined with certainty. Accordingly, the relevant provision in the NER applies also.<sup>119</sup>

The AER noted that the focus of the NEO is on efficiency. In particular, the promotion of the efficient investment in, and efficient operation and use of, electricity

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parameters but rather states that this factor is relevant to parameters that vary accordingly to the efficiency of the DNSP.

<sup>114</sup> NER, cls. 6.5.4(e) and 6A.6.2(j).

<sup>115</sup> NEL, s. 16(1).

<sup>116</sup> NER, cls. 6.5.4(e)(4) and 6A.6.2(j)(4).

<sup>117</sup> NEL, s.7.

<sup>118</sup> NEL, s. 16(1).

<sup>119</sup> NER, cls. 6.5.4(e)(4) and 6A.6.2(j)(4).

services in the long term interests of end consumers. The AER considered that as the WACC is the allowed rate of return on capital employed, the WACC pertains more to promoting the efficient investment in electricity services, rather than the efficient operation of electricity services. This position was supported by Gilbert and Tobin.<sup>120</sup>

Of particular relevance in relation to the rate of return, is that the WACC be set at a level expected to be sufficient to induce the efficient investment in electricity network infrastructure, while not set too high so as to induce the inefficient overinvestment in electricity network infrastructure. The AER considered that if it determined values and methods for individual WACC parameters that produce an overall regulatory rate of return that is expected to achieve this outcome, then the AER will have exercised its power in a manner that will or is likely to contribute to the achievement of the NEO. In doing so, the AER also considered that, in respect of each parameter, it would have also had regard to the need to achieve an outcome which is consistent with the NEO.

In reviewing the WACC parameters, the AER had regard to a range of theoretical and empirical considerations and evidence, including that presented in submissions to the issues paper, and contained in expert reports commissioned by stakeholders and the AER. Having had regard to these range of considerations and evidence in reviewing the WACC parameters, the AER considered it had achieved the appropriate balance discussed above.

#### **3.4.1.2 Summary of submissions in response to explanatory statement**

The JIA list some of the major reforms of the electricity market in Australia, and note in what it describes as the ‘second wave’ of reforms in 2006:

... a National Electricity Objective was inserted as the centre-piece of the whole structure with the purpose of guiding decision making across the whole market where previously there has been a host of economic principles found in different instruments. This is essentially the “objects clause” of the legislation, which is the primary guiding statement of purpose used by the Courts in interpreting the legislation.<sup>121</sup>

The JIA contend that subsequent amendments were made to ensure that Rule making and economic regulatory decisions were made in accordance with the stated objective, concluding that:

So there is a hierarchy of legislative provisions regulating the electricity network sector. Positioned at the apex of the hierarchy is the National Electricity Objective which informs the interpretation of all the other provisions<sup>122</sup>.

The JIA briefly discuss some key aspects of the decision of the Full Court of the Supreme Court of Western Australia in the case of *Re Michael*, and consider:

A similar situation applies in the case of the AER’s WACC Review. The JIA submit that every time there is uncertainty requiring discretion of judgement

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<sup>120</sup> Gilbert and Tobin, op. cit., 22 September 2008(a), pp.6-7.

<sup>121</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p.25.

<sup>122</sup> *ibid.*, p.26.

as to which level or value to adopt for a parameter ... the AER must determine that question in accordance with the requirements higher in the regulatory hierarchy (i.e. ultimately by reference to the National Electricity Objective).<sup>123</sup>

### 3.4.1.3 Issues and AER's considerations

For the reasons stated above, the AER maintains its view that the NEO is relevant to the AER's review under both the NEL and NER.<sup>124</sup> This position does not appear to be in dispute.

The AER also maintains its view that the element of the NEO which is of most relevance to the AER's WACC review is the promotion of the efficient investment in electricity services, rather than the efficient operation and use of electricity services, as the WACC is the allowed regulatory return on capital invested. This position does not appear to be in dispute either.

The JIA's submission references the case of *Re Michael*, the regulator was faced with the situation where there were competing objectives in section 8.1 of the *National Third-party Access Code for Natural Gas Pipeline Systems 1997* (the 'Gas Code'). Section 8.1 of the Gas Code provided that to the extent that the objectives in s. 8.1 of the Gas Code are in conflict, the regulator may determine the manner in which the competing objectives can best be reconciled or which of them should prevail. In resolving a conflict in the s. 8.1 objectives, the Court determined that the regulator must consider the s. 2.24 objectives to guide the manner in which the regulator is to exercise its discretion in reconciling the competing s. 8.1 objectives.

The extent to which *Re Michael* is relevant to the current context is open to debate. A difference between the Gas Code example and the WACC review under the NEL and NER is that neither the s.8.1 nor s.2.24 objectives in the Gas Code are placed above the other in terms of 'hierarchy' (as the JIA appear to imply they are). Nonetheless, it is reasonable to conclude that the NEO in the NEL takes precedence to the specific requirements in the NER which apply to the WACC review. The precedence which NEL takes over the requirements in the NER is discussed further in section 3.4.2

The NER requirements in the context of the AER's WACC review are set out in cls. 6.5.2, 6.5.4, 6A.6.2 and 6A.6.4. The AER does not consider that there are any requirements in these sections of the NER that cannot be reconciled with the NEO.

As for the individual NER requirements, the AER considers that to the extent that there may be competing objectives or requirements in these provisions of the NER, the AER's discretion in reconciling these or determining which should prevail should be guided by the NEO.

Under relatively stable market conditions, the AER notes that the individual NER requirements do not appear to be competing. However, under market conditions such as those currently prevailing, the requirement to lock-in each of the WACC parameters (as either a value or a method), and in particular the requirement to lock in

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<sup>123</sup> *ibid.*, p.37.

<sup>124</sup> NEL, s. 16(1); NER, cls. 6.5.4(e)(4) and 6A.6.2(j)(4).

the MRP parameter (which in the absence of any appropriate method, is a value) may compete with the requirement that in undertaking a review the AER must have regard to the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds. This issue is further discussed in section 3.4.5.

In addition, where there is a single objective or requirement in the NER which is ambiguous or open to different interpretations, the AER considers that the selection of the preferred interpretation should be guided by the NEO. In particular, there may be different interpretations concerning the NER requirement that the cost of equity be determined using the CAPM. For example, the JIA's interpretation is that the NER requires only the use of the "functional form" of the CAPM in determining the cost of equity is at odds with the AER's interpretation. This matter is also considered further in section 3.4.3.

To the extent that the requirements in the NER compete, the AER has determined the manner in which these competing requirements can best be reconciled, and in doing so has been guided by the NEO. Similarly, to the extent that there are requirements in the NER that are ambiguous, or open to different interpretations, the AER has in resolving any ambiguity or question of interpretation been guided by the NEO.

In particular, the AER has been guided by the objective of promoting efficient investment in electricity services for the long term interests of consumers of electricity with respect to price, quality, safety, reliability and security of electricity, and the reliability, safety and security of the national electricity system. In this sense, the NEO has been used as an overarching provision to guide the implementation of the NER requirements.

#### **3.4.1.4 AER's conclusion**

In reviewing the WACC parameters, the AER must:

- under the NEL, perform or exercise that function or power in a manner that will or is likely to contribute to the achievement of the NEO, and<sup>125</sup>
- under the NER, have regard to the need to achieve an outcome that is consistent with the NEO.<sup>126</sup>

In the AER's opinion:

- No NER requirement pertaining to the review of the WACC parameters is irreconcilable with the NEO, nor do the NER contain requirements which are necessarily competing under relatively stable market conditions.
- Where there are NER requirements that are open to different interpretations, the interpretation adopted by the AER should be guided by the NEO. Similarly, under circumstances where NER requirements are potentially competing, the AER may

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<sup>125</sup> NEL, s. 16(1).

<sup>126</sup> NER, cls. 6.5.4(e)(4) and 6A.6.2(j)(4).

determine the manner in which to best reconcile the requirements or determine which requirements should prevail, and in doing so must be guided by the NEO

- The element of the NEO which is of most relevance to the WACC review is the promotion of the efficient investment in electricity services for the long term interests of consumers of electricity. Under the NEL in performing or exercising its function or power in the WACC review, the AER should exercise its function or power in a manner that will or is likely to contribute to the achievement of this outcome. Under the NER, the AER is also required to have regard to the need to achieve an outcome that is consistent with the NEO, where the values, credit ratings or methods for the WACC parameters cannot be determined with certainty.

### **3.4.2 Revenue and pricing principles**

As noted above, the NEL provides that the AER:

- must take into account the revenue and pricing principles when exercising a discretion in making those parts of a distribution determination or transmission determination relating to direct control network services, and
- may take into account the revenue and pricing principles when performing or exercising any other AER economic function or power, if the AER considers it appropriate to do so.

#### **3.4.2.1 Summary of AER's position in explanatory statement**

As the WACC review is not a distribution or transmission determination, the AER considered it was arguable that the first clause did not apply, and that the AER is not required to take into account the revenue and pricing principles in reviewing the WACC parameters.

Nonetheless, the second clause permits the AER to take into account the revenue and pricing principles in undertaking this review, if the AER considers it appropriate. As a matter of good regulatory practice, the AER considered it was appropriate to take into account the revenue and pricing principles.

However, the AER considered that not all of the revenue or pricing principles are directly relevant to this review, or relevant to the same degree. In particular, as the WACC is distinct from the regulatory asset base (RAB) the principle concerning the RAB did not appear to have a direct impact on this review (principle 7A(4)). Additionally, the principle concerning the costs and risks of under and over utilisation did not appear of particular relevance, because as noted above, the WACC relates more to investment incentives than utilisation incentives (principle 7A(7)).

The AER summarised three principles which all appeared directly relevant to the WACC review as follows:

- providing a service provider with a reasonable opportunity to recover at least efficient costs (principle 7A(2)),

- providing a service provider with effective incentives to invest efficiently (principle 7A(3))<sup>127</sup>, and
- having regard to the economic costs and risks of under and over investment (principle 7A(6)).

The AER considered that it would have taken into account these principles if it determined values and methods for individual WACC parameters that produce an overall regulatory rate of return that is expected to be set at a level sufficient to induce the efficient investment in electricity network infrastructure, while not set too high so as to induce inefficient overinvestment in electricity network infrastructure.

The remaining principle is that regulated prices should allow for a return that is commensurate with the regulatory and commercial risks of providing regulated services (principle 7A(5)). As is consistent with CAPM theory and the wording of the NER, the WACC is only intended to compensate for the non-diversifiable risk. Accordingly, it is only the non-diversifiable element of these regulatory and commercial risks that would be relevant to the WACC review. To the extent that compensation for the diversifiable element of these risks is appropriate, the AER considered that this compensation should not be provided through the WACC but through other mechanisms.

#### **3.4.2.2 Summary of submissions in response to explanatory statement**

The JIA agree that it is at the discretion of the AER whether or not to take the revenue and pricing principles into account in reviewing the WACC parameters. The JIA state:

The AER WACC Review process is one to which section 16(2)(b) applies and the AER has a discretion whether to apply the Revenue and Pricing Principles. In this process the AER, therefore, has a decision to make: will it apply the principles?<sup>128</sup>

The JIA consider the explicit requirement is to make a decision whether to apply the principles or not, and then, if the decision is made to apply them, the implicit requirement is to do so. However, after noting that applying or not applying the principles is discretionary for the AER, the JIA state ‘the only reasonable decision to make is to apply the principles’.<sup>129</sup>

Of the six revenue and pricing principles, the JIA list two as ‘key principles’. The JIA do not comment on the relevance or interpretation of the remaining four principles. Summarised those two principles are:

- providing a service provider with a reasonable opportunity to recover at least efficient costs (principle 7A(2)), and

<sup>127</sup> The efficient utilisation aspect of this principles is less relevant to the WACC, for the same reasons as given regarding principle 7A(7).

<sup>128</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p.27.

<sup>129</sup> *ibid.*

- having regard to the economic costs and risks of under and over investment (principle 7A(6)).

On the first principle, the JIA state:

This effectively sets a minimum for the return to be permitted.<sup>130</sup>

On the second principle, the JIA contend that there has been no evidence of overinvestment—even at the current higher WACC parameters—as is indicated by the significant increases in investment the AER is approving in current determinations. Rather, the JIA contend that this indicates that there has been a significant underinvestment in necessary network infrastructure.

With respect to setting the incentives going forward, the JIA reiterates its position from its submission on the issues paper that there is a significant asymmetry to the costs of under and over investment.

The JIA state that:

...ensuring reliability and security cannot be left wholly to the compulsion of licensing obligations and NER obligations and network operators must be given an incentive to undertake network improvements. Otherwise, network operators are left in the invidious position of having to comply with the regulatory obligations and lose money.<sup>131</sup>

In what appears to be an overall statement reflecting both principles, the JIA state:

Therefore, the AER must err on the side of ensuring that adequate infrastructure is present—even if there is a possibility that it may not be fully or immediately used.

This consideration, then, is unequivocally a consideration that links closely with the National Electricity Objective’s focus on reliability and security...<sup>132</sup>

The JIA also list what it considers to be the ‘hierarchy’ of the regulatory framework as it relates to the WACC review. They consider that the revenue and pricing principles sit below the NEO but above the NER requirements.

#### **3.4.2.3 Issues and AER’s considerations**

The JIA argue that the ‘hierarchy’ of the regulatory framework in decreasing order of importance, as it relates to the WACC review is:

- the National Electricity Objective
- the revenue and pricing principles
- the NER requirements on the definition of the rate of return, such as that the cost of equity is determined using the CAPM, and

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<sup>130</sup> *ibid.*

<sup>131</sup> *ibid.*, p.28.

<sup>132</sup> *ibid.*



- the NER requirements that the AER must have regard to in reviewing the WACC parameters, such as the prevailing conditions and persuasive evidence factors.

The AER agrees that the NEO is of most importance and that in reviewing the WACC parameters, the AER must perform that function in a manner that will or is likely to contribute to the achievement of the NEO.<sup>133</sup>

The JIA consider there is a conflict between the revenue and pricing principles and the NER requirements, and the JIA further considers that the revenue and pricing principles take precedence. However, in contrast to the JIA, the AER considers there is no conflict between the revenue and pricing principles and NER requirements. Accordingly, there is no need to determine which would take precedence if there was a conflict.

The AER notes that it has taken into account both the revenue and pricing principles, along with the NER requirements, in reviewing the individual WACC parameters.

Additionally, in chapter two the AER has compared the regulatory return on equity, return on debt and overall rate of return derived using the WACC parameters with the revenue and pricing principles. For the reasons outlined in that chapter, the AER considers that the rate of return derived from the individual WACC parameters is consistent with the revenue and pricing principles.

The AER's maintains its position that the three principles which all appear directly relevant to the WACC review can be summarised as follows:

- providing a service provider with a reasonable opportunity to recover at least efficient costs (principle 7A(2)),
- providing a service provider with effective incentives in order to promote efficient investment (principle 7A(3))<sup>134</sup>, and
- having regard to the economic costs and risks of under and over investment (principle 7A(6)).

#### **3.4.2.4 AER's conclusion**

Whether or not to take into account the revenue and principles in reviewing the WACC parameters is discretionary for the AER. Notwithstanding this statement, the AER has:

- decided to take into account the revenue and pricing principles in reviewing each of the individual parameters, and

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<sup>133</sup> Additionally, under the NER, where a parameter cannot be determined with certainty the AER must have regard to the need to achieve an outcome that is consistent with the NEO

<sup>134</sup> The efficient utilisation aspect of this principles is less relevant to the WACC, for the same reasons as given regarding principle 7A(7).

- compared the regulatory return on equity, return on debt and overall rate of return derived from the AER's individually determined WACC parameters with the revenue and pricing principles.

### 3.4.3 Use of the Sharpe CAPM

The NER provide that the return on equity is to be determined using the capital asset pricing model (CAPM), calculated in accordance with the following formula:

$$k_e = r_f + \beta_e \times MRP$$

where:

$r_f$  = the nominal risk-free rate of return

$\beta_e$  = the equity beta

MRP = the market risk premium.<sup>135</sup>

#### 3.4.3.1 Summary of AER's position in explanatory statement

The AER stated that whilst the NER does not name the version of the CAPM that is to be used to determine the return on equity, the formula specified in the NER is that of the version known as the Sharpe-Lintner CAPM (or simply, the Sharpe CAPM). This was acknowledged by Gilbert and Tobin.<sup>136</sup>

Gilbert and Tobin suggested options the AER should follow if use of the Sharpe CAPM conflicted with other elements of the regulatory framework.

The AER acknowledged that use of the Sharpe CAPM could be problematic if this requirement was in conflict with other requirements of the NEL or NER. However, considering the JIA's submission (including the report from CEG), the AER did not consider that there was a conflict with the use of the Sharpe CAPM and the other requirements of the regulatory framework.

#### 3.4.3.2 Summary of submissions in response to explanatory statement

The JIA note:

The JIA has acknowledged that the AER is bound to apply the CAPM. However, a key objection that the JIA has with the explanatory statement is that key information which goes to the robustness of the CAPM in producing an appropriate overall return (such as the CEG material discussed in the quote above) has been given little or no weight in the Proposed Statement because the AER has conceived too narrowly of its task.<sup>137</sup>

The JIA note that the NEL is necessarily a high-level document enshrined in legislation, and that stakeholders require more detailed clarity and certainty for the

<sup>135</sup> NER, cls. 6.5.2(b) and 6A.6.2(b).

<sup>136</sup> Gilbert and Tobin, *op. cit.*, 22 September 2008(a), p.13.

<sup>137</sup> JIA, *Submission in response*, *op. cit.*, 2 February 2009, p.23.

NEO's aim of promoting efficient investment to be met. In referring to the NER, the JIA state:

On the other hand provisions at this level of detail need to be developed by a process of close consultation with stakeholders and must be capable of change over time.

The relevant rules seek to achieve the National Electricity Objective through the adoption of the CAPM. The CAPM is widely acknowledged as simultaneously:

- the best available tool to analyse market returns on capital,
- having limitations that must be taken into account when used to determine a rate of return that meets the requirements of the NEL.<sup>138</sup>

The JIA acknowledge that the requirement to adopt the CAPM in determining the cost of equity is binding on the AER, but consider the requirement is limited to using the “functional form” of the CAPM, following the advice of CEG. CEG states:

In our opinion as professional economists the NER mandates, at most, the use of the Sharpe CAPM functional form, but makes no mention of how the AER should populate this formula other than requiring the AER to have regard to:

*...the need for the rate of return calculated for the purposes of clause 6.5.2(b) to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing standard control services.<sup>139</sup>*

The Financial Investors Group (FIG) consider that the CAPM is a useful theory and tool to assist in estimating the cost of capital. The FIG argue, however, that setting a regulated return that is consistent with the NEO must ultimately be guided by commercial and practical considerations—even if this is theoretically incorrect—as this is the perspective that investors take in making investment decisions.

The FIG contend that this is the manner in which the CAPM is widely utilised by stockbroker analysts and other sectors of the market. The FIG argue:

The way in which the AER applies the CAPM, however, seems to lead to outcomes which are markedly at odds with market practice. This observation suggests that the AER is not in fact constrained by having to utilise the CAPM, but has constrained itself by the way it has chosen to apply it.<sup>140</sup>

The FIG contend that:

Market practitioners often use their commercial judgement in applying the CAPM to ensure that the outcomes accord with market reality.<sup>141</sup>

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<sup>138</sup> *ibid.*, p.28.

<sup>139</sup> CEG, *Estimating the NER equity beta based on stock market data—a response to the AER draft decision*, A report for the JIA, January 2009(d), p.15.

<sup>140</sup> FIG, *Submission in response*, op. cit., 29 January 2009, p.31.

<sup>141</sup> *ibid.*

According to the FIG, some specific examples of this approach are:

- Grant Samuel has adopted equity betas for energy network businesses above the empirical estimates. Specifically, in 2006, in valuing AGL's then energy network assets Grant Samuel adopted a range of 0.8 to 0.9 for the equity beta. In 2007, it also adopted a similar range for SP AusNet.
- In 2004, when 10 year CGS yields were at historic lows, Grant Samuel "used its judgement" to derive a risk-free rate based on a mix of 10 and 30 year securities
- Grant Samuel has "judgementally increased" the WACC from a "theoretically pure approach" when it considered these were lower than discount rates used by real world potential acquirers.
- Deloitte often adds a "specific company risk premium" to its valuations.

The FIG also note that the obligation to meet the NEO should prevail over the obligation to apply the CAPM, if the AER believes the two may be in some conflict.

Envestra argues that:

Theory of the CAPM and practical application of the CAPM differ, with many of theoretical assumptions relaxed when applied in the 'real world'. To a large degree, investors do not concern themselves with esoteric arguments about 'systematic risk' and whether the MRP should be based on 30 or 50 years of historical data.<sup>142</sup>

In separate submissions, the Queensland Government and Queensland Treasury Corporation state that they are concerned that the AER's conclusion with respect to the term of the risk-free rate is not consistent with the application of CAPM to determine the cost of equity. Specifically, they consider that the AER's conclusion on the risk-free rate has been determined only in the context of the cost of debt and not in the context of the cost of equity.<sup>143</sup>

United Energy considers the AER has misapplied the CAPM by adopting an overly narrow and mechanistic approach which is precluded by the overarching objectives in the NEL and NER. United Energy states:

United Energy considers that the AER's conclusions on WACC reflect an overly narrow and mechanistic approach to the WACC review, and has examined the individual WACC parameters in isolation from the broader objectives mandated by the Law and Rules. It is widely acknowledged, for example, that idiosyncrasies within CAPM must be recognised in its application, especially where the empirical data does not accord with theory. For example, the AER employs empirical data from dividend drop-off studies

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<sup>142</sup> Envestra, *Submission in response*, op. cit. 28 January 2009, p.3.

<sup>143</sup> Queensland Government, *Submission in response*, op. cit., 30 January 2009, pp.3-6; QTC, *QTC submission to AER proposed statements*, Submission in response, 2 February 2009, pp.5-6.

to inform the choice of gamma even though the standard CAPM in the Rules employs tax assumptions that are inconsistent with the real world.<sup>144</sup>

In the further submission provided by the ENA/JIA, they state:

If the AER cannot reconcile CAPM outcomes with market conditions, any response should, as a minimum in these circumstances, not change the WACC parameters even though this would not capture increases in the capital already evidence.<sup>145</sup>

### 3.4.3.3 Issues and AER's considerations

The AER and JIA agree that the NER requires the use of the Sharpe CAPM formula to determine the cost of equity. However, the JIA argue this provision only requires the use of the formula itself. It would appear that the JIA are arguing that the NER does not require the determination of the parameters which populate this formula to be guided or influenced by CAPM theory. Rather that the determination of the individual WACC / CAPM parameters should be guided solely by other provisions in the NEL and NER, such as those relating to the NEO, revenue and pricing principles, the prevailing conditions factor and related factors.

The AER considers this is an interpretation of this requirement, but is not the preferred interpretation. Rather, the AER considers that the preferred interpretation, which is reasonably open to the AER is to apply the CAPM in the conventional way, as is established regulatory practice. The AER's opinion as to what constitutes applying the CAPM in the conventional way is outlined below.

For example, in the matter of *Application by GasNet*, the Australian Competition Tribunal noted that GasNet chose to use the CAPM in its second access arrangement, as it was open to do under the Gas Code. Having done so, the Tribunal found that there was no occasion for the ACCC to be satisfied that that approach was not consistent with the s 8.1 objectives. This case bears some similarities to the AER's WACC review, in that the NER require that the cost of equity be determined using the CAPM. Having done so, it is not open to the AER to use a model other than the CAPM, and potentially, it is not open to the AER to use the model in other than the conventional way. The Tribunal found:

The ACCC erred in concluding that it was open to apply the CAPM in other than the conventional way to produce an outcome which it believed better achieved the objectives of s 8.1. In truth and in reality, the use of different values for a risk-free rate in the working out of a Rate of Return by the CAPM formula is neither true to the formula nor a conventional use of the CAPM. It is the use of another model based on the CAPM with adjustments made on a pragmatic basis...<sup>146</sup>

The issues of the use of the CAPM also arose in the appeal by the Victorian gas distributors against the Essential Services Commission's (ESC's) decision to draft and

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<sup>144</sup> United Energy, *United Energy's submission to the AER's review of the WACC parameters*, Submission in response, 2 February 2009.

<sup>145</sup> ENA, *AER review of the weighted average cost of capital*, Submission in response, 19 March 2009, p.2.

<sup>146</sup> *Application by GasNet Australia (Operations) Pty Ltd [2003] AcomPT 6*, pp.17-18.

approve its own amendments to the distributors' third access arrangement. The Essential Services Commission Appeal Panel distinguished this matter from *Application by GasNet*, in that the matter in dispute was not the misapplication of the basic CAPM methodology, but rather what was, effectively, the choice of inputs to the CAPM. This matter also appears to have some relevance to the WACC review, as it involves the issue of whether the CAPM should be applied in the conventional way.

The Appeal Panel noted that the gas distributors had argued that if the equity beta was to be set at a level lower than 1.0, there was evidence that the CAPM model, initially devised by Sharpe, would produce a downward bias. In an attempt to address this tendency, two refinements to the model had been made by, respectively, Black and Merton. The gas distributors maintained that the ESC had wrongly declined to implement either of these refinements and allowed the CAPM to be applied in its original form. The Appeal Panel noted:

In response, the Commission argued that, on the basis of a report from Allen Consulting Group, there was doubt about the soundness of the contention of under estimation in the Sharpe model and that it was entitled, on this evidence, to apply the Sharpe model without adjustment. It also submitted that the unadjusted Sharpe model remains the conventional and usual method of assessing CAPM and that it was entirely proper for it to rely on this model.

The Appeal Panel found:

Whilst there are arguments in favour of either approach in differing circumstances the Panel is not satisfied that the approach adopted by the Commission constituted an error or incorrect exercise of discretion on its part. There was sufficient evidence in support of the original Sharpe model to enable the Commission to reasonably apply that model without adjustment.

The conventional way of applying the CAPM is to recognise that the model is a reasonable, but perhaps not the best predictor of returns on equity. Applying the CAPM in the conventional way:

- does not mechanically adopt empirical estimates for each of the parameters (which at any rate, are only an estimate of each of the unobservable 'true' parameters)
- recognises the importance of consistency between parameters. For example, while the CAPM is a single period model of unspecified length, for consistency, once a term has been adopted for one parameter that same term should be adopted for all other parameters
- recognises the importance of integrity in the individual parameters. That is, the risk-free rate should only compensate for a risk-free rate of return, the MRP should only compensate for market risk, and the equity beta should only represent the relative risk of the asset compared to the market
- is to only compensate for systematic (i.e. non-diversifiable) risk through the WACC (with compensation for other forms of risk, if appropriate, not through the WACC but through other mechanisms)

- is to have regard to both theoretical considerations and empirical estimates in informing each of the WACC parameters, but to exercise a level of judgment in determining the final parameters, taking account of the limitations evident in the empirical and other information used.

In response to the FIG's statement of the application of the CAPM adopted by market practitioners, the AER notes:

- the AER has adopted a point estimate for the equity beta above the empirical estimates—there does not appear to be a difference in approach here
- the AER considers that, given the importance of consistency between the parameters (which appears to be almost universally acknowledged), it would not be appropriate to depart from the term of the risk-free rate for a particular determination to some judgmentally determined risk-free rate of an unspecified term, simply because prevailing CGS yields at that time are historically low (or high)
- the AER does not consider that a specific company risk premium for diversifiable risk is appropriate—compensation through the WACC for such risks would be a departure from the Sharpe CAPM

The remaining comment from the FIG, comments from United Energy and the further submission from the ENA/JIA appear to be focused on the belief that in applying the CAPM, the AER must ensure that the overall WACC is sufficient. The AER does not consider there is a conflict between applying the CAPM in the conventional way (as specified above) and obtaining a WACC that is consistent with the NEO and revenue and pricing principles.

#### **3.4.3.4 AER's conclusion**

The NER mandate that the cost of equity is to be determined using the CAPM of a specified formula—the specified formula being that of the Sharpe CAPM. The AER considers it is reasonably open to it to apply the Sharpe CAPM in the conventional way, which includes providing compensation only for systematic risk and does not adopt empirical estimates of individual parameters 'mechanistically'.

#### **3.4.4 Matters the AER must have regard to in undertaking a review**

As noted above, the NER sets out four matters that the AER must have regard to in undertaking a review, which are:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing prescribed transmission or distribution standard control services (as the case may be)
- the need for the return on debt to reflect the current cost of borrowings for comparable debt
- the need for the credit rating levels or the values attributable to, or the methods of calculating, the parameters that vary according to the efficiency of the

transmission or distribution network service provider to be based on a benchmark efficient transmission or distribution network service provider (as the case may be), and<sup>147</sup>

- where a value, method or credit rating level cannot be determined with certainty:
  - the need to achieve an outcome that is consistent with the NEO, and
  - the need for persuasive evidence before adopting a value, method or credit rating level that differs from the value, method or credit rating level that has previously been adopted for it<sup>148</sup>.

In this section, the AER sets out which parameters the AER considers are most relevant to each of the requirements above. The AER's interpretation of the salient components of these requirements is set out in the following sections under the headings:

- forward looking, prevailing conditions and the current cost of borrowings (section 3.4.5)
- benchmark efficient network service provider (section 3.4.6)
- persuasive evidence (section 3.4.7), and
- previously adopted value, method or credit rating (section 3.4.8)

#### **3.4.4.1 Summary of position in explanatory statement**

With one qualification, the AER agreed with Gilbert and Tobin that the first and fourth factors are relevant to all of the parameters.<sup>149</sup>

As the AER must have regard to the need for the (overall) rate of return to be forward looking and commensurate with prevailing conditions in the market for funds, the AER should have regard to the need for each of the individual parameters to be forward looking and commensurate with prevailing conditions in the market for funds to achieve this outcome. However, the AER considered that having regard to the need for the rate of return to be commensurate with the risk of providing regulated services appeared to relate only to the equity beta and MRP (which combined comprise the risk premium component of the regulatory return on equity), rather than apply to all the WACC parameters as implied by Gilbert and Tobin.

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<sup>147</sup> In relation to TNSPs, cl. 6A.6.2(j)(3) of the NER specifically lists the parameters for which this factor is relevant. Those parameters are the equity beta, the maturity period and bond rates of the nominal risk-free rate, and the credit rating level. In relation to DNSPs, cl. 6.5.4(e)(3) does not list specific parameters but rather states that this factor is relevant to parameters that vary according to the efficiency of the DNSP.

<sup>148</sup> NER, cls. 6.5.4(e) and 6A.6.2(j).

<sup>149</sup> Gilbert and Tobin, op. cit., 22 September 2008(a), p.5.



As no parameter can be observed, and must be estimated, it is unlikely that any parameter can be determined with certainty, and so the fourth factor applies to all parameters as well.

The AER also agreed with Gilbert and Tobin's opinion on the applicability of the second factor. Gilbert and Tobin considered this was relevant to the nominal risk-free rate method, bond maturity and credit rating parameters in the debt risk premium.<sup>150</sup>

On the third factor, the AER agreed with Gilbert and Tobin's general interpretation of when the provision would apply, but did not completely agree with Gilbert and Tobin's application. Gilbert and Tobin's general interpretation was:

The third factor, that is the need for the credit rating levels, values attributable to or the methods of calculating the rate of return parameters that vary according to the efficiency of the service provider, be based on a benchmark efficient NSP, applies in all situations where the relevant input value may be influenced by a service provider's decisions, and requires that in these situations the effect of the service provider's actual decisions should not be decisive and instead the parameter or method for deriving a parameter that results in an input value that is consistent with the decisions of a 'benchmark efficient' service provider should be used.<sup>151</sup>

As the equity beta, level of gearing and credit rating level of an actual service provider is affected by the decisions of an actual service provider, the AER considered that this provision applied to these parameters. In contrast, as the market risk premium is a market-wide parameter, the AER considered that this provision did not apply to this parameter. Gilbert and Tobin agreed with these positions.

However, Gilbert and Tobin considered that this provision also applies to the assumed utilisation of imputation credits, particularly the payout ratio of imputation credits.<sup>152</sup> The AER considered that the other aspect of this parameter, that is the utilisation rate, is a market-wide parameter and so this provision does not apply. It appeared that Gilbert and Tobin may have agreed with this view. On the payout ratio, the AER noted that, in general, the payout ratio for an individual business is influenced by that business, in any one year. However, for consistency with the Officer framework, which is embodied in the building block and rate of return framework in the NER, the AER considered the payout ratio should not be considered to be influenced by an individual service provider. Accordingly, the AER did not consider that this provision applies to either element of the assumed utilisation of imputation credits. Additionally, chapter 6A explicitly lists the parameters for which the AER, in reviewing the parameter, must have regard to the need to base the parameter on a benchmark efficient network service provider (NSP). The assumed utilisation of imputation credits is not one of the listed parameters.

While chapter 6A explicitly lists the parameters for which the AER must have regard to the need to base the parameter on a benchmark efficient NSP in reviewing the parameter, chapter 6 states that the AER must have regard to this factor for those

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<sup>150</sup> *ibid.*, p.5.

<sup>151</sup> *ibid.*, p.5.

<sup>152</sup> *ibid.*, p.6.

parameters that vary according to the efficiency of the service provider. The three parameters explicitly listed in chapter 6A are the equity beta, level of gearing and the credit rating. The AER also considered that the equity beta, level of gearing and credit rating of an actual service provider can vary according to the efficiency of the service provider. Therefore, in reviewing these parameters, the AER must have regard to the need to base these parameters on a benchmark efficient NSP, under both chapter 6 and 6A.

Chapter 6A lists the maturity period and bond rates of the nominal risk-free rate under particular circumstances (cl. 6A.6.2(d)) as parameters for which the AER must, in reviewing them, have regard to the need to base such parameters on a benchmark efficient NSP.<sup>153</sup> The AER had regard to this factor in reviewing the maturity period and bond rate of the nominal risk-free rate referred to in cl. 6A.6.2(d). However, the AER gave this factor little weight as it considered that the nominal risk-free rate is a market-wide parameter that is not affected by the decisions of an actual service provider. Accordingly, the AER considered that having regard to the need to base these parameters on a benchmark efficient NSP had little meaning in the context of the maturity period and bond rates of the nominal risk-free rate referred to in cl. 6A.6.2(d).

#### **3.4.4.2 Summary of submissions in response to explanatory statement**

The JIA comment on the applicability of some of the factors to the WACC parameters, in particular the prevailing conditions factor and the benchmark efficient NSP factor.

On the prevailing conditions factor, the JIA state:

This consideration is primarily focused on establishing the risk-free rate and the market risk premium but is also relevant to all the other parameters that collectively build up to determine the WACC.<sup>154</sup>

On the benchmark efficient NSP factor, the JIA state:

The benchmark efficient firm is of primary relevance in determining all of the parameters that distinguish the regulated business from all other firms in the economy—those being the beta, the gamma, the credit rating and the time horizon over which the CAPM should be applied.<sup>155</sup>

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<sup>153</sup> The AER notes that the nominal free rate method in cl. 6A.6.2(c) is not one of the explicitly listed parameters that the AER, in reviewing the parameter, must have regard to the need to base the parameter on a benchmark efficient NSP. Chapter 6A sets out the previously adopted nominal risk-free rate method under cls. 6A.6.2(c) and (d). Clause 6A.6.2(c) sets out the general method for the nominal risk-free rate, whereas cl. 6A.6.2(d) sets out the method for the nominal risk-free rate when bonds maturing at the relevant term are not available, and a bond rate of the relevant term must be interpolated.

<sup>154</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p.29.

<sup>155</sup> *ibid.*, p.30.

### 3.4.4.3 Issues and AER's considerations

The AER maintains its position that the first and fourth factors are relevant to the AER's review of all of the WACC parameters<sup>156</sup>, and that the second factor is relevant to the nominal risk-free rate, bond maturity and credit rating level.

In the explanatory statement, the AER noted one exception to position. The AER noted that having regard to the need for the overall rate of return to be commensurate with the risk of providing regulated services may only relate to the equity beta and market risk premium (which combined comprise the risk premium component of the regulatory return on equity). The AER did not receive any objections in response to this position. However, the provision is unclear as to whether the particular 'risk' referred is confined to equity risk (i.e. the equity beta and MRP) or whether this refers to risk on the debt side as well. On reflection, the AER considers this provision may apply to all of the parameters as well. The AER notes that this position is consistent with Gilbert and Tobin's advice submitted by the JIA in response to the issues paper.

This comment aside, no new information was contained in submissions on the explanatory statement that has given the AER cause to depart from its position in the explanatory statement on the remainder of these provisions.

The remaining factor is that the AER must have regard to the need for certain parameters to be based on a benchmark efficient NSP. The AER maintains its position, for the reasons stated above and as supported by the JIA, that this factor is relevant to the AER's review of the equity beta, gearing and credit rating level under chapter 6 as these parameters vary according to the efficiency of the service provider. This factor is also relevant to the AER's review of these parameters under chapter 6A as the NER specifically list these parameters.

Of contention is whether the benchmark efficient NSP factor is relevant to the review of the gamma (i.e. assumed utilisation of imputation credits) or the nominal risk-free rate.

As quoted above, the JIA maintain that the benchmark efficient NSP factor is relevant to the review of the gamma, however the JIA do not appear to justify this statement and have not responded to the arguments to the contrary put forward by the AER in its explanatory statement. As no new information was contained in submissions on the explanatory statement that has given the AER cause to depart from its position in the explanatory statement, the AER maintains its position on this issue. In summary, the benchmark efficient NSP factor is not relevant to the AER's review of the assumed utilisation of imputation credits under chapter 6 as:

- the utilisation rate component is a market-wide parameter and not affected by an individual business, and

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<sup>156</sup> In the explanatory statement, the AER noted one exception to this. The AER noted that having regard to the need for the overall rate of return to be commensurate with the risk of providing regulated services may only relate to the equity beta and market risk premium (which combined comprise the risk premium component of the regulatory return on equity). The AER did not receive any objections in response to this position.

- the payout ratio component should not be considered to be affected by an individual business for consistency with the Officer framework embodied in the NER

Nor is the benchmark efficient NSP factor relevant to the AER's review of the assumed utilisation of imputation credits under chapter 6A as it is not one of parameters which is listed.

In regards to the nominal risk-free rate, in its explanatory statement the AER stated:

Chapter 6A lists the maturity period and bond rates for particular circumstances (cl. 6A.6.2(d)) as parameters for which the AER must, in reviewing them, have regard to the need to base such parameters on a benchmark efficient NSP. The AER has had regard to this factor in reviewing the maturity period and bond rate of the nominal risk-free rate referred to in cl. 6A.6.2(d). However, the AER has given this factor little weight as the nominal risk-free rate is a market-wide parameter that is not affected by the decisions of an actual service provider. Accordingly, having regard to the need to base these parameters on a benchmark efficient NSP has little meaning in the context of the maturity period and bond rates of the nominal risk-free rate referred to in cl. 6A.6.2(d).

On reflection, the AER considers that it is important to consider the degree of relevance of the benchmark efficient NSP factor separately for each component of the nominal risk-free rate. The two major components of the risk-free rate are:

- the proxy for the risk-free rate asset, and
- the term of the risk-free rate

The AER maintains its view that as the nominal risk-free rate is a market-wide parameter the benchmark efficient NSP factor has little meaning in the context of the proxy for the nominal risk-free rate. That is, the benchmark efficient NSP has little relevance to the proxy for the risk-free rate asset. However, the AER considers that as refinancing risk influences a service provider's financing strategy, the benchmark efficient NSP factor is relevant to the AER's review under chapter 6 of the term component of the nominal risk-free rate.

#### **3.4.4.4 AER's conclusion**

The AER considers that the need to base certain parameters on that of a benchmark efficient NSP is relevant to the AER's review of the term of the nominal risk-free rate. With this addition, the AER maintains its position in the explanatory statement as to the relevance of the other factors listed above to the AER's review of each WACC parameter.

In its review of each WACC parameter the AER must have regard to:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing prescribed transmission services or standard control services (as the case may be),

- the need to achieve an outcome that is consistent with the NEO, and
- the need for persuasive evidence before adopting a value, method or credit rating level that differs from the value, method or credit rating level that has previously been adopted for it.

In its review of the nominal risk-free rate and credit rating level the AER must have regard to:

- the need for the return on debt to reflect the current cost of borrowings for comparable debt.

And in its review of the equity beta, term of the nominal risk-free rate, gearing and credit rating level the AER must have regard to:

- the need for parameter to be based on a benchmark efficient transmission or distribution network service provider (as the case may be).

### **3.4.5 Forward looking, prevailing conditions and current cost of borrowings**

Among other factors, the NER provide that in undertaking a review of the WACC parameters the AER must have regard to:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds, and
- the need for the return on debt to reflect the current cost of borrowings for comparable debt.<sup>157</sup>

#### **3.4.5.1 Position in explanatory statement**

The AER did not go into detail over the meaning of ‘forward looking’ and ‘prevailing conditions’. However, the AER did note that for the majority of service providers, the outcomes of this review will not apply until after 2011, and the last year in which the outcomes will apply will be 2019.<sup>158</sup> Accordingly, while cognisant of the current volatility in financial markets, the AER considered it important to take a long term perspective in setting rates of return applicable over the 2010 to 2019 period.

On the other hand, the AER was more specific over the meaning of ‘current cost of borrowing’. The AER agreed with Gilbert and Tobin that this provision emphasised the need for debt risk premium parameters (nominal risk-free rate and credit rating) to be capable of reflecting current conditions at the time of each reset.<sup>159</sup>

<sup>157</sup> NER, cls. 6.5.4(e) and 6A.6.2(j).

<sup>158</sup> The first NSPs affected (Energex, Ergon and ETSA Utilities) will not be officially subject to the outcomes of this review until the commencement of their respective regulatory control periods, on 30 June 2010.

<sup>159</sup> *ibid.*, p.5.

### 3.4.5.2 Summary of submissions in response to explanatory statement

The JIA state:

It is apparent from the proposed Statement that the AER has, in section 2.5 considered, but given no weight to, the Global Financial Crisis on the basis that it must take a “long term view”.<sup>160</sup>

The JIA’s more specific comments, which are ambiguous, are discussed in the following section. In addition, on an issue related to the ‘forward looking’ requirement of the NER, the JIA state that:

The AER’s Issues Paper introduced a “Present Value Principle” and the Explanatory Statement proceeded to consider and apply that Principle. There is, however, no explicit legislative authority for the AER to use the Present Value Principle as described in the Issues Paper in this decision making process. The JIA considers that there is a high risk that applying such a principle will lead the AER into error.<sup>161</sup>

The JIA recommend the AER cease applying that principle and rely instead only on the explicit provisions in the NEL and NER. Though the JIA also consider if such a principle were used carefully (as a “lower order cross check”) it could assist in assessing whether proposed WACC parameters comply with the revenue and pricing principles in the NEL<sup>162</sup>

The FIG note the AER’s comments in the explanatory statement that it is important not to overreact to current market conditions as it is determining WACC parameters that will affect prices over the 2010 to 2019 period. In response, the FIG state:

The FIG is highly concerned about the AER’s failure to take into account the impact of prevailing market conditions in its assessment of the regulated cost of capital. Looking beyond prevailing market conditions is neither within the AER’s power, nor within its capacity. Looking beyond current conditions diminishes the significance of the change in financial market conditions which is widely considered as being unprecedented.<sup>163</sup>

In a similar statement, Envestra argue:

No-one knows when the current conditions in the capital markets will subside, and it would be imprudent to set the cost of capital based on the unsubstantiated comments made by unknown parties. Moreover, this framework is contradictory to the AER’s obligations set out in clause 6.5.4(e)(1) of the National Electricity Rules...<sup>164</sup>

Finally, in a further submission on the explanatory statement, the ENA/JIA state:

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<sup>160</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p.29.

<sup>161</sup> *ibid.*, p.28.

<sup>162</sup> *ibid.*

<sup>163</sup> FIG, *Submission in response*, op. cit., 29 January 2009, p.22.

<sup>164</sup> Envestra, *Submission in response*, op. cit. 28 January 2009, p.2.

While the Rules require a rate of return to be set which is both forward looking and commensurate with market conditions, these requirements cannot be reconciled in the midst of a financial crisis.<sup>165</sup>

### 3.4.5.3 Issues and AER's considerations

The AER notes that there are two substantive components in these NER requirements that need to be interpreted:

- the interaction between the requirement for the rate of return to be 'forward looking' and at the same time reflect 'prevailing conditions' and 'current costs', and
- which point in time 'prevailing conditions' and 'current costs' refers to—the time of this WACC review or the time of the individual reset determinations to which the outcomes of this WACC review apply

On the first issue, the AER continues to agree with the view of Gilbert and Tobin in its advice submitted on the issues paper. This view is that the requirement for the rate of return to be both 'forward looking' and reflect 'prevailing conditions' (and 'current costs') are not competing requirements. Rather, it is a requirement for the rate of return to reflect forward looking expectations, that are prevailing as at the relevant point in time. Gilbert and Tobin stated:

The requirement for the rate of return to be commensurate with 'prevailing conditions in the market for funds' at first sight appears to contradict the requirement for the rate of return to be forward looking—the anticipated rather than prevailing conditions should be most relevant to a forward looking rate of return. However, what this clause appears to require is that where inputs into the forecast rate of return are based on the conditions in the market for funds at the start of the period which is, at the time, the best available information on the expectations of the market going forward and so has been a typical method for determining the risk-free rate and cost of debt.<sup>166</sup>

In their further submission, the ENA/JIA have departed from this view, stating the 'forward looking' and 'prevailing conditions' provisions are irreconcilable in the midst of a financial crisis. However, the ENA/JIA has not substantiated this statement. The AER continues to agree with the previous view of the JIA and that of its legal advisers. That is, these two requirements are not competing, as when read together they refer to the need for the rate of return to reflect forward looking expectations that are prevailing as at the relevant point in time.

As outlined in chapter six, the AER does not consider there is persuasive evidence to depart from a 10-year term for the risk-free rate. Consistency between WACC parameters is an issue that has long been held as of the utmost importance. For example, in the matter of *Application by GasNet*, the Australian Competition Tribunal stated that:

While it is no doubt true that the CAPM permits some flexibility in the choice of the inputs required by the model, it nevertheless requires that one remain

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<sup>165</sup> ENA, *Submission in response*, op. cit., 19 March 2009, p.2.

<sup>166</sup> Gilbert and Tobin, op. cit., 22 September 2008(a), p.11.

true to the mathematical logic underlying the CAPM formula. In the present case, that requires a consistent use of the value of  $r_f$  in both parts of the CAPM equation where it occurs so that the choice was either a five year bond rate or a ten year bond rate in both situations.<sup>167</sup>

Given the importance of consistency between parameters, this means that for each parameter, the ‘forward looking’ provision refers to a forward looking 10 year perspective.

On an issue related to the ‘forward looking’ provision, as noted above, the JIA reject the AER’s use of the present value principle on the basis that it is not explicitly mentioned in the NEL or NER. The AER does not consider that this principle is in conflict with any explicit provision in the NEL or NER. Rather, the AER considers that it is reasonably open to the AER to take into account the present value principle in guiding the interpretation of what term or length of time is appropriate in the context of the NER requirement that the AER must have regard to need for the rate of return to be ‘forward looking’. This issue is further discussed in chapter six on the risk-free rate.

Moving to the issue of the point in time to which the words ‘prevailing conditions’ and ‘current costs’ refer to. The JIA’s submission in response to the explanatory statement is unclear. For example, the JIA state:

Here the relevant time at which the “prevailing market conditions” are observed is the time of the decision.<sup>168</sup>

However, it is unclear which ‘decision’—the WACC review or the reset determination—the JIA are referring to in the above statement.

In contrast, it is apparent from the extracts from the FIG’s and Envestra’s submissions above that they consider the prevailing conditions factor refers to prevailing conditions at the time of the WACC review. Though neither submission substantiates why this should be the preferred interpretation.

The AER considers that ‘prevailing conditions’ refers to prevailing at the time of the reset determination (or more specifically, the start of the regulatory period to which the reset determination refers), rather than at the time of the WACC review. Similarly, ‘current costs’ refer to current at the time of the reset determination. This is consistent with the legal advice submitted by the JIA in their submission on the issues paper. Gilbert and Tobin stated:

The second factor relates to the cost of borrowings for comparable debt and, in our view, emphasises the need (consistent with the first factor) for a methodology for the assessment of the risk-free rate and bond maturity and

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<sup>167</sup> *Application by GasNet Australia (Operations) Pty Ltd [2003] AcompT 6*, p.24.

<sup>168</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p.29. However, Gilbert and Tobin’s view in the advice submitted on the issues paper is clearer, and as the JIA have not stated that their view has changed, the AER presumes that this position still reflects that of the JIA.



credit rating parameters in the debt risk premium **which is current at the time of the relevant network determination.**<sup>169</sup> (emphasis added)

Accordingly, the AER should determine each parameter in such a way as it is relevant for a 10 year perspective from the commencement of the next regulatory control period for each service provider affected by this review. Notwithstanding this statement, current economic and financial conditions (i.e at the time of this WACC review) are relevant to the extent that these conditions are expected to prevail over the period to which the outcomes of this WACC review apply.

For parameters such as the nominal risk-free rate, the adoption of a method—rather than a value—enables this parameter to be updated at the time of each reset determination and therefore produce a rate which reflects the forward looking risk-free rate prevailing at the time of that reset determination. That is, the risk-free rate varies over time and the adoption of a method—rather than a value—for this parameter enables individual reset determinations to adopt either a higher or lower risk-free rate depending on the forward looking expectations prevailing in the market for funds at the time of the reset.

Theoretically the MRP could also vary over time in line with different economic conditions. However, the view of the AER and the JIA's advisers (Professor Officer and Dr Bishop) is that, unlike for the nominal risk-free rate, there is no adequate method to automatically update the MRP at the time of each reset determination.

Yet the NER requires the AER to lock in either a value or method for each parameter. Given the lack of an appropriate method that could be used to update the MRP for each reset determination effected by this WACC review, the only alternative is that a value for the MRP be adopted.

In relatively stable market conditions, the adoption of a value for the MRP (which then applies for multiple reset determinations) is unlikely to be a significant issue, as the long term estimate is likely to be the best estimate of forward looking expectations prevailing at any particular point in time.

However, due to the global economic and financial crisis, relatively stable market conditions do not currently exist. While it is conditions at the time of the reset, rather than at the time of the WACC review which are relevant, the AER has taken into account current conditions to the extent these conditions are expected to prevail over the time of reset determinations effected by this review. In other words, as the AER is reviewing the WACC parameters now—including 'locking-in' a value for the MRP—to the extent that current conditions (at the time of this review) are expected to be maintained until the time of the determinations effected by this review, then current conditions remain a relevant consideration in determining what value should be 'locked-in' for the MRP.

However, if the MRP varies over time, then by definition, the locking in of a value may not always completely reflect forward looking expectations prevailing at the time of each reset determination.

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<sup>169</sup> Gilbert and Tobin, op. cit., 22 September 2008(a), p.5.

The requirement to lock-in a value or method for the MRP now (which for practical purposes can only be a value) and the requirement to have regard to the need for the rate of return to reflect forward looking expectations commensurate with prevailing conditions at the time of each reset determination compete, particularly where some reset determinations occur during relatively unstable market conditions. However, the manner in which these requirements can best be reconciled is to lock in a value for the MRP which is equally relevant for each reset determination to which the WACC review applies. Acknowledging that for some reset determinations the actual (unobservable) MRP may be somewhat above this value, though for other reset determinations the actual (unobservable) MRP may be somewhat below. In formulating this approach, the AER has been guided by the NEO.

#### **3.4.5.4 AER's conclusion**

The requirement that the AER must have regard to the rate of return to be both forward looking and reflect prevailing conditions in the market for funds (and current costs of borrowings for comparable debt) are not competing requirements. Rather, it is a requirement that the AER must have regard to the need for the rate of return to reflect forward looking expectations, as at the relevant point in time. That relevant point in time is at the time of the individual reset determinations, rather than at the time of the AER's WACC review.

Accordingly, the AER should determine each parameter in such a way as it is relevant for a 10 year perspective (consistent with the term of the risk-free rate) from the commencement of the next regulatory control period for each service provider affected by this review. Notwithstanding this statement, current economic and financial conditions (i.e at the time of this WACC review) are relevant to the extent that these conditions are expected to prevail over the period to which the outcomes of this WACC review apply.

#### **3.4.6 Benchmark efficient network service provider**

Among other factors, the NER provide that in undertaking a review of the WACC parameters the AER must have regard to the need for the credit rating levels or the values attributable to, or the methods of calculating, the parameters that vary according to the efficiency of the transmission or distribution network service provider to be based on a benchmark efficient transmission or distribution network service provider (as the case may be)<sup>170</sup>

In this section, the AER focuses on the conceptual definition of the benchmark efficient NSP. The AER's approach to its practical application, including issues such as the selection of comparable firms to the purposes of analysing market evidence, is addressed in section 4.4

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<sup>170</sup> NER, cls. 6.5.4(e) and 6A.6.2(j). In relation to TNSPs, cl. 6A.6.2(j)(3) of the NER specifically lists the parameters for which this factor is relevant. Those parameters are the equity beta, the maturity period and bond rates of the nominal risk-free rate, and the credit rating level. In relation to DNSPs, cl. 6.5.4(e)(3) does not list specific parameters but rather states that this factor is relevant to parameters that vary according to the efficiency of the DNSP.

### 3.4.6.1 Position in explanatory statement

The AER considered that a benchmark efficient NSP is a ‘pure play’<sup>171</sup> regulated electricity network business operating within Australia without parent ownership.<sup>172</sup>

### 3.4.6.2 Submissions in response to explanatory statement

The JIA in their response now argue that prior to the AER’s WACC statement, the benchmark efficient NSP was a settled concept. That is, it is a large, stock market listed network service provider.<sup>173</sup>

The JIA contend that this concept has a very long lineage traceable back to the AEMC’s Chapter 6A review, the establishment of the NEM, intergovernmental agreements that implemented National Competition Policy and to the Hilmer Report.<sup>174</sup> The JIA consider that the concept of a benchmark efficient NSP and its meaning cannot now be changed in the course of the WACC review.<sup>175</sup>

The JIA also note, in 1999, the ACCC, in its first regulatory reset for TransGrid under the nationalised regime for economic regulation of electricity transmission, referred to Schedule 6.1 (1) of the National Electricity Code. This schedule provided that the WACC is designed to ensure:

...that government-owned networks operate under the same financial conditions as networks which are privately owned. That is, it will ensure the returns in the public sector are equal to the opportunity cost of capital in the private sector.<sup>176</sup>

The JIA observe that under the COAG Competition Principles Agreement, achieving competitive neutrality is a key concern. Therefore, the JIA argue that the non-discrimination requirement set out in the ACCC’s first TransGrid revenue determination is likely to still apply.<sup>177</sup>

The JIA also observe that the AEMC held that:

...a principle of good regulatory design is the nature of ownership (i.e. whether public or private) should not affect the outcome of regulatory determinations.<sup>178</sup>

In relation to the TransGrid draft decision, the JIA note that while the AER appears to accept the above propositions on a benchmark efficient NSP, the AER may have been

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<sup>171</sup> A ‘pure play’ business is a business that offers a suite of services. For the conceptual definition this means that a benchmark efficient NSP provides only regulated electricity network services.

<sup>172</sup> Although the AER did not include the term ‘regulated’ and the phrase, ‘operating in Australia without parent ownership’, the AER implicitly took this approach, as the AER did not consider that businesses such as ElectraNet, Spark Infrastructure and overseas businesses met with the conceptual definition.

<sup>173</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 30.

<sup>174</sup> *ibid.*

<sup>175</sup> *ibid.*

<sup>176</sup> *ibid.*

<sup>177</sup> *ibid.*

<sup>178</sup> *ibid.*

misinformed or has made incorrect assumptions as to whether data used in their analysis removed conglomerate or ownership effects.<sup>179</sup>

The JIA observe the concept of a benchmark efficient business has been litigated, not in the electricity industry, but in the telecommunications industry. In that industry there are both stand alone mobile operators (e.g. Vodafone) and conglomerate operators (e.g. Optus and Telstra) with a range of different service offerings. The JIA note that when regulating mobile service provision, the Australian Competition Tribunal (the Tribunal) has found that the benchmark business is one with a reasonable share of Australia's mobile subscribers and does not impute to the benchmark business support or advantage from its portfolio of other activities.<sup>180</sup>

Envestra submits that the AER's own definition of a benchmark energy network business, is a large listed business (based upon the NSW draft distribution determination).<sup>181</sup>

### 3.4.6.3 Issues and AER's considerations

The AER observes that the JIA has changed its position from its response to the issues paper and to the explanatory statement. In the issues paper the JIA submitted that the conceptual definition of a benchmark efficient NSP is a conceptual construction which is an efficient standalone business that provides prescribed transmission or distribution services.<sup>182</sup> It now considers that a benchmark efficient NSP is a business that:

- is a large, stock market listed NSP, and
- does not impute support or advantage from its portfolio of other activities.<sup>183</sup>

The AER considers that these criteria are more specific than the JIA's previous position. The AER notes that in addition to the JIA previously considering that a benchmark efficient NSP is a standalone business (criterion two above), the conceptual business is a stock market listed network service provider (criterion one above). It is noteworthy in this respect that ElectraNet, the ACG's best comparator in relation to its credit rating analysis, is not stock market listed and would therefore not meet the JIA's new criterion.

The AER noted in its explanatory statement, in response to the JIA's submission<sup>184</sup>, the JIA's view that the AER may have confused the meaning of a benchmark efficient NSP and the use of market data to estimate business specific WACC parameters. The AER observes that the position taken in response to the issues paper<sup>185</sup> is different

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<sup>179</sup> *ibid.*, p. 32.

<sup>180</sup> *ibid.*

<sup>181</sup> Envestra, *Submission in response*, op. cit., 28 January 2009, p. 9.

<sup>182</sup> JIA, *Submission in response*, op. cit., September 2008, p. 26.

<sup>183</sup> *ibid.*, pp. 30-31.

<sup>184</sup> JIA, *Submission in response*, op. cit., September 2008, p.31.

<sup>185</sup> *ibid.*

from the position put in their most recent submission<sup>186</sup> and therefore the AER considers that the conceptual definition is far from being a ‘settled concept’.

In its explanatory statement the AER clarified its position that the AER considers that the WACC parameter estimates of a benchmark efficient NSP could be derived from a first principles approach (i.e from a theoretical perspective where no reliance is placed on market evidence) and/or the use of market evidence. The AER also in its explanatory statement recognised that there are no perfect comparator businesses that represent a benchmark efficient NSP. Accordingly, the AER acknowledges that there are no perfect businesses that reflect the ‘conceptual definition of a benchmark efficient NSP’. That said, there are a number of businesses that the AER considers to be sufficiently close comparators such that market evidence can be used to estimate the WACC parameters of the benchmark efficient NSP. It appears to the AER that the JIA have failed to follow its own position in response to the explanatory statement and now confound the conceptual definition with the use of market data.

The JIA note the AER’s draft decision for the NSW distribution businesses on equity raising costs, where the AER states that the benchmark efficient NSP is a large listed firm.<sup>187</sup> The AER considers that the JIA has now confounded the conceptual definition of a benchmark efficient NSP with the practical application of the conceptual definition. The AER has now clarified its position in this decision and has applied the same approach going forward in other decisions.

In the past, for the purposes of obtaining a benchmark for equity raising costs, the only publicly available information on dividend yields is from businesses that trade on the stock market. Therefore, to obtain sufficient data large publicly listed businesses were examined. However, the AER notes that this approach is no longer relevant as the NSW draft decision derived a payout ratio based upon the gamma defined in the NER rather than relying upon dividend yields to estimate dividends in its cash flow modelling.

The JIA outline in its submission the issue of competitive neutrality principles, where the neutrality fee is based upon the rate a business would be required to borrow if it were operating as a private sector organisation.<sup>188</sup> Under the JIA’s criteria this would exclude any business that does not trade on the stock market. The AER has reviewed the Competitive Neutrality Principles Agreement and notes that this Agreement does not explicitly state that a private sector organisation is a stock market listed business. Nor does the Agreement define the nature of private ownership. That said, the AER does and has recognised the presence of supportive parents (includes both government and private parents) is likely to lower business risks, all other things being equal. This view is consistent with the ACCC’s position in the formulation of the Statement of Principles for the regulation of electricity transmission revenues.<sup>189</sup>

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<sup>186</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 30.

<sup>187</sup> *ibid.*, p. 129.

<sup>188</sup> *ibid.*, p. 31.

<sup>189</sup> ACCC, *Statement of Principles for the regulation of electricity transmission revenues – Background paper*, Draft decision, 18 August 2004, pp. 160-161.

The AER acknowledges that previously the ACCC noted that the concept of a benchmark efficient business was a privately owned business which abstracts away from government ownership.<sup>190</sup> However, the AER has further refined this approach by acknowledging that privately owned businesses may have parent ownership (e.g. SP AusNet) and that the presence of parent ownership should not be included in the conceptual benchmark. The AER considers that this refined position is consistent with other conceptual benchmarks. Further, the AER considers that separating the conceptual benchmark from the practical application of benchmark results in an outcome that will not confound theoretical construct with issues relating to data limitations. This approach recognises that analysis which uses actual businesses is based upon businesses that are close but not perfect comparators. Therefore it is important to consider deviations from the conceptual benchmark when forming views based upon empirical results which use actual businesses.

The AER notes that the JIA have implied that the concept of a benchmark efficient business had been decided by the Australian Competition Tribunal.<sup>191</sup> The AER notes that the reference given relates to a decision on the issue of modelling standalone costs for an entrant into the mobiles industry (providing a mobile terminating access service). The concept of standalone costs examines the costs of providing a specific service in isolation of the other services a business also provides (e.g. cost of connecting users assuming that a business only provides connections but not other services).<sup>192</sup> In relation to the WACC, the AER considers that it is more appropriate to consider a business which provides multiple, but related, regulated services as a 'pure play' regulated electricity network business. Further, the AER observes that the Tribunal did not form a view on the benchmark efficient mobile network operator as the Tribunal states:

Having regard to the conclusions we have reached in relation to other aspects of Vodafone's cost models and in relation to the Pass Through Safeguard, it is not necessary for us to reach a concluded view on what is the benchmark of an efficient operator by reference to which an MNO's costs are to be assessed for their efficiency.<sup>193</sup>

The AER is aware that the ACCC's position on the conceptual definition of a benchmark efficient NSP is a standalone business. The discussion in the litigation reflects this position. Further, the AER observes the term standalone was used in the context of providing services and not ownership issues which might be implied by the JIA's submission:

Unlike its two main competitors, **Telstra and Optus** – which **supply both fixed line and mobile services**, Vodafone is a **standalone mobile operator**. It operates a 2G/2.5G GSM network and a 3G network. Its GSM network covers 93% of the Australian population. Vodafone was awarded the third

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<sup>190</sup> ACCC, *Victorian Gas Transmission Access Arrangements*, Draft decision, 28 May 1998, p. 44.

<sup>191</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 32.

<sup>192</sup> For the Tribunal decision, the standalone (total service long-run incremental) cost of the mobile termination access service was being estimated in the PriceWaterhouseCoopers cost model in isolation of other services that a mobile operator provides such as origination services, data services, SMS services, etc.

<sup>193</sup> Australian Competition Tribunal, *Application by Vodafone Network Pty Ltd and Vodafone Australia Limited [2007] ACompT1*, 11 January 2007 [84].

Australian mobile telecommunications carrier licence in December 1992. By March 2004, Vodafone's share of the Australian mobile telecommunications market was almost 17%, the rest of the market at that time being held as to 45.7% by Telstra, 35.4% by Optus and 3.1% by Hutchison. (Emphasis added)<sup>194</sup>

The AER notes that the Tribunal decision does not discuss Vodafone's relationship with its parent companies. Vodafone Australia is part of an international conglomerate with a parent that is located in the United Kingdom and may not be considered as a standalone business under the JIA's criteria, as Vodafone Australia may receive support from its owner.<sup>195</sup> The AER considers that the concept of the benchmark efficient NSP is a 'pure play' regulated electricity network business operating within Australia without parent ownership.

#### **3.4.6.4 AER's conclusion**

In response to submissions discussing the conceptual definition of a benchmark efficient network service provider, the AER:

- has maintained the 'conceptual definition of a benchmark efficient NSP' and the practical application of a benchmark efficient NSP as separate issues, and
- does and has recognised the presence of supportive parents is likely to lower business risks, all other things being equal. This view is consistent with the AEMC and ACCC positions in previous regulatory processes.

The AER considers that the concept of a benchmark efficient NSP is a 'pure play' regulated electricity network business operating within Australia without parent ownership.

#### **3.4.7 Persuasive evidence**

As also noted above, the NER provide that where a parameter cannot be determined with certainty, the AER must have regard to the need for persuasive evidence before adopting a value, method or credit rating level that differs from the value, method or credit rating level previously adopted.

##### **3.4.7.1 Summary of position in explanatory statement**

In advice submitted by the JIA in response to the AER's issues paper, Gilbert and Tobin stated that this provision is sometimes referred to as incorporating an 'inertia principle', to reflect the proposition that an existing value, method or credit rating that has been adopted should not be departed from unless there is persuasive evidence.<sup>196</sup>

Gilbert and Tobin considered that the practical application of this provision requires consideration of the following:

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<sup>194</sup> Australian Competition Tribunal, Application by Vodafone Network Pty Ltd and Vodafone Australia Limited [2007] ACompT1, 11 January 2007 [22].

<sup>195</sup> Vodafone Australia, *Company overview*, 25 February 2009, <<http://www.vodafone.com.au/personal/aboutvodafone/companyinfo/companyoverview/index.htm>>, Accessed on: 25 February 2009.

<sup>196</sup> Gilbert and Tobin, op. cit., 22 September 2008(a), p.3.

- whether the relevant WACC parameter can or cannot be determined with certainty
- when a relevant WACC parameter will have been ‘previously adopted’
- the meaning of the concept of ‘persuasive evidence’, and
- the standard against which the decision maker must be persuaded.<sup>197</sup>

The AER considered the matters and order of considerations set out by Gilbert and Tobin to be logical, and an appropriate approach to interpreting this clause.

On the first consideration, the AER considered no parameter can be determined with certainty. This is because as each of the ‘true’ WACC parameters are unobservable, and therefore can only be estimated. Accordingly, the persuasive evidence test applies to each parameter. Gilbert and Tobin and the AER agreed on this point.

The second consideration, involved identifying the previously adopted value, method or credit rating. For the most part, the AER and Gilbert and Tobin agreed on what constitutes the ‘previously adopted’ parameter. However there was one significant difference, in relation to equity beta, and a minor difference in relation to the nominal risk-free rate method. This is discussed in section 3.4.8.

The third and fourth considerations are related, and involve consideration of the concept of persuasive evidence, and the threshold that this test implies. Gilbert and Tobin noted that the term ‘persuasive evidence’ had not generally been judicially considered. However, Gilbert and Tobin considered that:

In this context the evidence would need to establish, more likely than not, that a previously adopted value was incorrect.<sup>198</sup>

The AER was not aware of the term persuasive evidence being interpreted in case law.<sup>199</sup> Accordingly, the AER considered an ordinary plain English meaning was appropriate. In this respect, the AER did not consider that Gilbert and Tobin’s relatively narrow interpretation of the term persuasive evidence appeared appropriate in this context. That is, the AER did not agree with Gilbert and Tobin’s view that persuasive evidence should be limited to evidence that proves a previously adopted parameter was ‘incorrect’.

The AER considered that persuasive evidence is likely to include objective and verifiable empirical market evidence and theoretical reasons, so long as they are well founded, which when relied upon suggest one particular conclusion should be adopted over other competing conclusions. The AER considered this may include expert empirical analysis, and expert theoretical reasoning, so long as any expertise given is not outside the expert’s areas of expertise. However, the AER further noted that

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<sup>197</sup> *ibid.*, pp.15-16.

<sup>198</sup> *ibid.*, p.18.

<sup>199</sup> Subsequent, to the explanatory statement the AER has become aware of the term ‘persuasive evidence’ appearing in case law. However the cases found do not appear to provide much insight into the meaning of this term.



persuasive evidence is not limited to evidence presented by experts (in this sense referring to academics and economic consultants). Persuasive evidence can also be presented by industry stakeholders, consumer stakeholders and the regulator. It is the quality of the evidence not the source which is of relevance.

In its explanatory statement, the evidence the AER considered was relevant included:

- the use of the latest empirical information to the extent it is objective, available, robust and replicable over time, and<sup>200</sup>
- regard to the latest academic empirical research and theory, particularly research conducted in an Australian regulatory context.

The AER noted that the use of empirical evidence in estimating WACC parameters was discussed at some length at the AER's WACC review experts' group round-table discussion.<sup>201</sup> At the forum, Professor Stephen Gray (of SFG), representing the JIA, outlined a number of key criteria for empirically estimating WACC parameters in a consistent manner. At a high level Professor Gray stated that it was important to consider:

- all relevant data
- different econometric techniques, and
- market practice.

It was argued that a considered approach, taking into account all of these aspects, will inevitably apply different weights to the various pieces of empirical evidence available. In doing so, Professor Gray stated as relevant considerations:

- statistical precision and reliability of the empirical estimates
- availability of data (cross-sectional and across time)
- consistency of empirical estimates (over time, across businesses, across empirical methods)
- internal consistency within an economic framework
- market practice, and
- economic reasonableness or the plausibility of the estimates.

The AER supported these key objective criteria for estimating WACC parameters as outlined by Professor Gray. The AER noted that its application of these criteria was

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<sup>200</sup> Robust in this context refers to statistically stable.

<sup>201</sup> AER, *Australian Energy Regulator review of WACC parameters for electricity transmission and distribution*, Transcript of proceedings, Melbourne, 10 October 2008, pp.3-9

parameter-specific and detailed considerations were contained in the chapters discussing individual WACC parameters.

That said, the AER stated that its approach in reviewing each WACC parameter was to take a balanced approach to the application and interpretation of evidence from market data. The AER stated that may involve:

- not changing a parameter where the market data is not materially different to the previously adopted value, and
- not moving as far as the market data would suggest (or not relying solely on the market data) even where the market data is substantially different to the previously adopted value.

In a practical sense, this meant that WACC parameters should not be ‘mechanistically’ derived from empirical estimates. Importantly, this approach was consistently adopted across the various WACC parameters subject to review. For example, the AER did not mechanistically adopt a point estimate for the equity beta consistent with the recent market data. Likewise, the AER was cautious in adopting a point estimate for the MRP and, in particular, in interpreting the results from long-term historical estimates when generating a forward-looking MRP estimate.

The AER noted that this approach was supported in principle by Grid Australia in its submission, with three key reasons cited:

- WACC parameters cannot be determined with certainty.
- Statistical analysis of historical capital market data can only reasonably be used to inform judgements on the forward-looking WACC parameter values rather than be determinative.
- The linkages between WACC parameters must be recognised.<sup>202</sup>

The Major Energy Users Inc. (in conjunction with some members of the National Consumers Roundtable on Energy) (MEU) submitted that:

...the AER’s analysis needs to be more than purely a mechanistic exercise in assessing each element in isolation. It needs to take a holistic approach. To assess the parameters in isolation has the potential (and risk) of building into the outworkings of the WACC multiple conservative factors.<sup>203</sup>

The AER considered that its approach to using market data balanced the views raised in all submissions to the issues paper. While caution was exercised with respect to market data, the AER undertook a detailed analysis of all the available evidence from submissions and expert consultants, and generated a ‘best estimate’ or range of

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<sup>202</sup> Grid Australia, *Review of the WACC parameters for electricity transmission and distribution – Response to AER issues paper*, Submission in response, 24 September 2008, p.5

<sup>203</sup> MEU, *AER Review of Parameters for Weighted Average Cost of Capital – AER Issues Paper – A submission from Major Energy Users Inc in conjunction with some members of National Consumers Roundtable on Energy*, Submission in response, September 2008, p.7

estimates for each of the individual WACC parameters subject to review, taking into account conceptual considerations. Consideration was then given to broader issues (e.g. efficient investment incentives, regulatory certainty, etc.) in determining the extent to which these individual estimates for each of the WACC parameters are relied upon in generating the overall rate of return.

The AER's approach to this review led to a departure from a previously adopted value where there was persuasive evidence to justify doing so. That approach also has regard to the desirability of regulatory certainty, which the AER considered was an important factor in achieving an outcome which was consistent with the National Electricity Objective.

### **3.4.7.2 Summary of submissions in response to explanatory statement**

While noting a couple of specific areas that the MEU considered still needed to be addressed, the MEU stated:

We agree that the AER's approach in this WACC review is correct and we consider that the AER has made very significant improvements to the hitherto traditional mechanistic approach in calculating the WACC parameters.<sup>204</sup>

The JIA note that its submission on the issues paper attached advice from Gilbert and Tobin on the interpretation and requirements for the persuasive evidence test. The JIA continue to support the advice of Gilbert and Tobin in this regard.

They claim that the AER rejected the JIA's and Gilbert and Tobin's interpretation of the persuasive evidence test but "proposed no concrete alternative explanation of how the standard applied".<sup>205</sup> The JIA claim that the AER's lack of clarity over the interpretation of the persuasive evidence test resulted in:

...an inconsistent basis for, and hence application of, the persuasive evidence test.<sup>206</sup>

Claimed examples of this are:

- Professor Gray's report on the empirical estimation of the gamma (commissioned by the JIA) was not given substantial weight for lack of transparency and verifiability, while Professor Henry's work on the empirical estimation of the equity beta (commissioned by the AER) was given substantial weight even though core aspects were obscure
- Professor Grundy and Dr Hird's report on the low stock market beta businesses underestimating the cost of equity is uncontested yet the AER concludes this evidence is not persuasive

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<sup>204</sup> MEU, *Submission in response*, op. cit., 30 January 2009, p.8.

<sup>205</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 22.

<sup>206</sup> *ibid.*, p.33.

- on the MRP the AER ‘inverts’ the persuasive evidence test by changing the definition of the MRP yet concluding that there is not persuasive evidence to depart from this changed definition, and
- the AER has misunderstood how to take into account empirical evidence in the persuasive evidence test. A parameter can be adopted based on a range of evidence from a variety of sources. There is direct observation, empirical estimation work based on statistical regressions or theory.

The Energy Supply Association of Australia (ESAA) considers that the requirement to have regard to the need for persuasive evidence before departing from a previously adopted parameter reflects the policy intention that the AER should give weight to the need for predictability and stability in an area in which there are inherent uncertainties.<sup>207</sup>

NSW Treasury considers that the task of demonstrating persuasive evidence for a change to previously adopted WACC parameters is challenging given:

- the wide range of often conflicting academic advice and market evidence presented to the AER,
- the previously adopted parameters were determined with reference to well established regulatory precedence and academic empirical research and theory, and
- it is unlikely that any of the parameters can be determined with certainty (as acknowledged by the AER).

NSW Treasury supports Gilbert and Tobin’s view that “persuasive evidence” means that the evidence would need to establish, more likely than not, that the previously adopted parameter was “incorrect”. NSW Treasury considers that:

In many areas, the AER rejected the expert advice submitted, based both on its own analysis and alternative academic advice received. NSW Treasury is not in a position to undertake a detailed evaluation of the relative merits of the often-conflicting expert advice presented. However, in order to satisfy the ‘persuasive evidence’ test, NSW Treasury strongly contends that in the absence of greater consensus between academic experts for change, or evidence that proves a previously adopted parameter was ‘incorrect’, the AER should use values previously adopted.<sup>208</sup>

It argues that this “consensus” approach would create a more certain investment climate that would promote efficient investment (consistent with the NEO).

In its further submission on the explanatory statement, the ENA/JIA state:

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<sup>207</sup> ESAA, *Response to AER WACC review—draft statements*, Submission in response, 3 February 2009, p.2

<sup>208</sup> NSW Treasury, *WACC—Response to the AER review of electricity transmission and distribution WACC parameters*, Submission in response, 28 January 2009, p.5.

Persuasive evidence is difficult to establish in stable markets, and this difficulty is accentuated in periods of high uncertainty, causing theoretical application of the CAPM to derive parameters that are clearly not in evidence in the market. Evidence to move parameters commensurate with market conditions has been provided in submissions.

As a minimum, given the significant uncertainty in markets, it is open to the AER to declare that there is insufficient evidence to persuade it to move in either direction and meet the need to establish a forward looking rate of return commensurate with prevailing market conditions.<sup>209</sup>

### 3.4.7.3 Issues and AER's considerations

The JIA did not accurately reflect the AER's position from the explanatory statement in its submission. The AER agreed with and continues to support the approach proposed by Gilbert and Tobin in relation to the order of relevant considerations. These are:

- whether the relevant WACC parameter can or cannot be determined with certainty
- when a relevant WACC parameter will have been 'previously adopted'
- the meaning of the concept of 'persuasive evidence', and
- the standard against which the decision maker must be persuaded.

The AER considers that as each of the 'true' WACC parameters cannot be directly observed and must be estimated, it is reasonable to conclude that no parameter can be determined with certainty. Accordingly the first limb of Gilbert and Tobin's approach is met.

The next limb is to consider what should be the 'previously adopted' value, method or credit rating for each service provider on each parameter. There remains one substantial difference of opinion between the AER and JIA, which is over the previously adopted equity beta for some service providers. This is discussed in section 3.4.8.

The third and fourth limbs are related and concern the meaning of what constitutes evidence and then the threshold upon which a body of evidence becomes 'persuasive'. On this issue there also remains a substantial difference in opinion between the AER and the JIA and some other stakeholders.

On what constitutes persuasive evidence and the threshold this is associated with, the AER notes the substantive issues raised in submissions are:

- whether persuasive evidence is limited to evidence that proves the previously adopted parameter is 'incorrect'
- whether unanimous consensus is required among experts before the evidence can be considered persuasive

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<sup>209</sup> ENA, *Submission in response*, op. cit., 19 March 2009, p.2.

- whether persuasive evidence is limited to ‘new’ evidence, and
- whether the upper or lower 95 per cent confidence interval (as the case may be) is the threshold test that determines whether empirical evidence is persuasive or not

The AER continues to consider that the threshold proposed by the JIA, that persuasive evidence is evidence that proves the previous value or method to be ‘incorrect’, is too high and not appropriate.

Furthermore, the JIA have not been consistent in the application of their proposed interpretation:

- In the JIA’s initial submission, the JIA attempted to prove that the previously adopted MRP of 6 per cent was ‘incorrect’ (which justified a departure to 7 per cent). However, the AER disproved the basis of the JIA’s claim in its explanatory statement. In response, the JIA no longer argue that the previously adopted MRP of 6 per cent is ‘incorrect’ yet the JIA still argue for a MRP of 7 per cent (for different reasons).
- The JIA do not claim, in either the JIA’s initial or its revised submission, that the previously adopted gamma of 0.5 was ‘incorrect’. Yet in both the JIA argue for a gamma of 0.2. The JIA attempt to justify a departure to 0.2 (or zero) on what they consider to be the latest information and best methodology for determining gamma.

In addition, the AER does not agree with the NSW Treasury’s position that ‘persuasive evidence’ requires a consensus view across experts. While the AER acknowledges this would be desirable, it is the merits of the particular expert advice, and the weight of the evidence overall, that determines whether the evidence collectively is or is not persuasive.

The AER also notes that the ACG (one of the JIA’s consultants on the equity beta and other parameters) provides the following interpretation:

A key difference between the AER’s and our analysis is how the Rules’ requirement for persuasive evidence is interpreted. We interpreted this as requiring the new evidence to demonstrate that the previously adopted values were incorrect, whereas the AER has decided that this is met if the new information justifies a different value for beta. However, we note that the majority of issues addressed in this report remain relevant irrespective of how the need for ‘persuasive evidence’ is interpreted.<sup>210</sup>

The AER does not consider, and has not previously stated, that the relevant evidence must be new. Both new and old evidence (so long as the old evidence is still relevant) should be combined to determine whether the evidence collectively is persuasive or not persuasive.

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<sup>210</sup> ACG, *Australian Energy Regulator’s draft conclusions on the weighted average cost of capital parameters—Commentary on the AER’s analysis of the equity beta—Report to ENA, Grid Australia and APLA*, January 2009(a), p.1.

The ACG further argues:

First, irrespective of how the requirement for ‘persuasive evidence’ is to be interpreted, the AER is wrong to ignore measures of statistical precision (of which a confidence interval is a representation). A confidence interval (in broad terms) shows the limit that the true value reasonably could have in either direction given the data that is being analysed. It is standard practice to consider point estimates obtained from statistical precision because such measures tell us how much faith we can place in a particular point estimate (and the bounds of that faith). Accordingly, measures of statistical precision are relevant for informing the degree of ‘persuasiveness’ of the empirical evidence.

Secondly, the AER’s suggestion that it will look at both the upper and lower end of confidence intervals displays a lack of understanding of the relevance of confidence intervals for the AER’s purposes. As virtually all of the point estimates of beta are below 1, the question is whether the data nonetheless could be consistent with the true value being 1. Only the upper end of the confidence interval is relevant to this question.<sup>211</sup>

The AER acknowledges that confidence intervals are a measure of statistical precision, and accepts that confidence intervals (standard practice of which is to use 95 per cent confidence intervals) are a relevant consideration in the context of the persuasive evidence test where empirical data is being considered. The AER also accepts that as the test relates to the need for persuasive evidence to depart from the previously adopted value, there is nothing asymmetric or inconsistent in:

- considering the upper 95 per cent confidence interval where the point estimates from the empirical data are below the previously adopted value, and
- considering the lower 95 per cent confidence intervals where the point estimates from the empirical data are above the previously adopted value

However, the ACG appear to equate the 95 per cent confidence interval associated with empirical data as ‘the’ persuasive evidence test. That is, one must be 95 per cent or more confident (in the sense of a ‘mechanistic’ application of the statistical measure) that the ‘true’ parameter is not the previously adopted value. The AER does not agree with this very high threshold nor does the AER agree with this mechanistic application of only one aspect of the empirical evidence. Rather the AER considers that it is the weight of the evidence overall that determines whether or not the evidence is persuasive to depart from the persuasive adopted parameter. In relation to empirical evidence, this includes consideration of:

- the statistical precision and reliability of the empirical estimates (of which confidence intervals are one element thereof)
- the availability of data (cross-sectional and across time)
- the consistency of empirical estimates (over time, across businesses, across empirical methods), and

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<sup>211</sup> *ibid.*, pp.5-6.

- the economic reasonableness or the plausibility of the estimates.

In addition, the AER notes that the JIA themselves have not applied this threshold consistently across parameters. For example, 6 per cent is well within the 95 per cent confidence interval of average historical excess market returns, yet the JIA consider there is persuasive evidence to depart from a MRP of 6 per cent.

The AER also considers that the threshold it considers is embodied in the persuasive evidence test is higher than the ACG's characterisation of the AER's threshold. For example the AER continues to consider that:

- where the empirical estimates of a parameter is materially different to the previously adopted parameter, it is more likely that there is persuasive evidence to depart from the previously adopted parameter, and
- where the empirical estimates of a parameter are not materially different to the previously adopted parameter, it is less likely that there is persuasive evidence to depart from the previously adopted parameter.

The AER also maintains its support for the key objective criteria for estimating WACC parameters and assessing persuasive evidence as promoted by Professor Gray at the AER WACC review experts' round table discussion, and outlined above. Consideration of the empirical evidence, while of significant importance, is not the only consideration as to whether the persuasive evidence threshold has been met.

The AER maintains that persuasive evidence is likely to include objective and verifiable empirical market evidence. Persuasive evidence is also likely to include theoretical reasons, so long as they are well founded. This may include expert empirical analysis, and expert theoretical reasoning, so long as any analysis or reasoning given is not outside the expert's areas of expertise. However, persuasive evidence is not limited to evidence presented by experts (in this sense referring to academics and economic consultants). Persuasive evidence can also comprise factual evidence and material from any relevant source including, by way of obvious example, industry stakeholders, consumer stakeholders and the regulator.

The AER's view is that persuasive evidence refers to material which is of sufficient substance to justify a departure from the previously adopted value, method or credit rating. In order to form a view as to whether persuasive evidence exists the AER has considered all of the relevant material before it.

Further, the AER considers that the ENA/JIA have not substantiated their (revised) position that current market conditions lead to an inability to form persuasive evidence to depart from any parameter in either direction.

#### **3.4.7.4 AER's conclusion**

The AER considers that no parameter can be determined with certainty and accordingly the persuasive evidence test applies to the AER's review of each parameter.

Persuasive evidence is likely to include objective and verifiable empirical market evidence, and theoretical reasons, so long as they are well founded.



The AER's view is that persuasive evidence refers to material which is of sufficient substance to justify a departure from the previously adopted value, method or credit rating. In order to form a view as to whether persuasive evidence exists the AER has considered all of the relevant material before it.

### **3.4.8 Previously adopted value, method or credit rating**

The NER provides that where a value, method or credit rating level cannot be determined with certainty, the AER must have regard to the need for persuasive evidence before departing from the value, method or credit rating level that has previously been adopted for it.

#### **3.4.8.1 Position in explanatory statement**

In its explanatory statement, the AER stated that as each of the 'true' WACC parameters are unobservable, they must be estimated, and accordingly, cannot be determined with certainty. Correctly identifying the previously adopted value, method or credit rating is therefore important as the persuasive evidence test applies.

The AER and Gilbert and Tobin agreed that:

- for TNSPs in all jurisdictions, the previously adopted value, method or credit rating for the purposes of the AER's first review, are those set out in chapter 6A of the NER, and
- for DNSPs in NSW and ACT, the previously adopted value, method or credit rating, for the purposes of the AER's first review, are those set out in the transitional provisions in chapter 11 of the NER.

The AER noted that the previously adopted parameters for the above service providers are easily identifiable as they are fully specified in the NER.

The AER also noted that identifying the previously adopted parameters for the remaining DNSPs, being those in Queensland, Victoria, Tasmania and South Australia, was more difficult. This difficulty arose as, for the parameters that the AER may review, a previous method, value or credit rating level is not set out in chapter 6 of the NER—with the exception of the method for the nominal risk-free rate.

Gilbert and Tobin's preferred opinion appeared to be that the previously adopted value, method or credit rating is that adopted in the previous jurisdictional determinations. The AER agreed with this approach with one exception. A fully specified method for the nominal risk-free rate already appears in chapter 6 of the NER. Accordingly, the AER considered this method should be taken as the previously adopted nominal risk-free rate method.<sup>212</sup>

The previous jurisdictional determinations for DNSPs in Queensland, Victoria, Tasmania and South Australia adopt the same value for the gearing, market risk

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<sup>212</sup> With a minor exception, this method is the same as that currently set out in chapter 6A of the NER, and is substantially the same as that adopted in previous jurisdictional determinations, meaning the AER's and Gilbert and Tobin's difference in opinion on this point was of little material importance.

premium, credit rating level and gamma—Gilbert and Tobin and the AER agreed that these values should be considered to be the previously adopted value. These parameters are also the same as those currently set out in chapter 6A for TNSPs, and set out in chapter 11 for the DNSPs in NSW and ACT.

In contrast, there is a difference in the equity beta adopted in previous jurisdictional determinations. The previous determination for DNSPs in Queensland, Tasmania and South Australia adopted an equity beta of 0.9, whereas the previous determination for the Victorian DNSPs adopted a value of 1.0. A value of 1.0 is also the equity beta currently set out in chapter 6A for TNSPs, and set out in chapter 11 for the DNSPs in NSW and ACT.

Gilbert and Tobin argued that to have different previously adopted values is inappropriate, and considered that the most common equity beta, being 1.0, should be taken as the previously adopted equity beta for all DNSPs. The AER did not consider this position justified, and considered that the previously adopted value for each of the DNSPs in Queensland, Victoria, Tasmania and South Australia should be as set out in the previous jurisdictional determination.

Table 3.1 outlines what the AER considered to be the previously adopted value, method or credit rating. As is illustrated, the AER considered that the previously adopted value, method or credit rating is the same for all services providers, across all parameters, with the exception of the equity beta.

**Table 3.1: AER’s explanatory statement—previously adopted WACC parameters**

Parameter	TNSPs (all jurisdictions)	DNSPs (QLD, TAS, SA)	DNSPs (NSW, ACT, VIC)
Gearing	60 %	60 %	60 %
Nominal risk-free rate	10 year CGS	10 year CGS	10 year CGS
Market risk premium	6 %	6 %	6 %
Equity beta	1.0	0.9	1.0
Credit rating	BBB+	BBB+	BBB+
Gamma	0.5	0.5	0.5

Source: AER<sup>213</sup>

### 3.4.8.2 Submissions in response to explanatory statement and AER’s considerations

The JIA has not raised any objections to what the AER set out in its explanatory statement as the previously adopted WACC parameters for service providers in each jurisdiction, with the exception of:

<sup>213</sup> AER, *Explanatory statement*, op. cit., 11 December 2008, p.47.

- the previously adopted equity beta for DNSPs in Queensland, Tasmania and South Australia, and
- the previously adopted MRP for service providers in all jurisdictions, given the AER's effective change in the definition of the MRP (caused by the change in the term of the risk-free rate).

The AER maintains its position that—as for the previously adopted MRP, gearing and gamma—the previously adopted equity beta for DNSPs in Queensland, Victoria, Tasmania and South Australia is the value specified in the last jurisdictional determination.

The JIA and Gilbert and Tobin agree with this position as a general principle, as it is the ‘plain reading’ of the provision.<sup>214</sup> However, they depart from this position for the equity beta, where the value in the previous jurisdictional decision was 0.9. The JIA argue that there ‘must’ be a single previously adopted equity beta as:

- this was the intent of the drafters of the NER, and
- different equity betas across jurisdictions would distort investment incentives which would be contrary to the NEO.

The AER addresses these points in turn.

The JIA note the wording in the NER specifies the need for persuasive evidence before adopting a value, method or credit rating level that differs from ‘the’ value, method or credit rating level that has previously been adopted for it. The JIA argue that this wording:

...highlights the understanding by the drafters that there is a single previously adopted value for each parameter.<sup>215</sup>

The AER disagrees with this statement. The rules of interpretation in the NER specify that unless the context otherwise requires:

words importing the singular include the plural and vice versa<sup>216</sup>

The AER considers it is clear that the drafters of chapter 6 of the NER did not consider that there would be a single previously adopted value for each parameter. In explaining why it did not deem initial WACC parameters in chapter 6 of the NER, the Ministerial Council on Energy Standing Committee of Officials (MCE SCO) states:

SCO considers that given the different parameters adopted by jurisdictions to date, it is appropriate not to replicate the AEMC transmission rules and allow distribution to converge, should the AER consider it appropriate, over time.<sup>217</sup>

<sup>214</sup> Gilbert and Tobin, *Legal opinion 1*, 22 September 2008(b), p.3

<sup>215</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p.35.

<sup>216</sup> NER, cl.1.7.1.

<sup>217</sup> Standing Committee of Officials (SCO), *Response to stakeholders comments on the exposure draft of the NER for distribution revenue and pricing—chapter 6*, p.16.

The AER considers from this that it was not the intent of the NER that there must be a single previously adopted value. Accordingly, the AER maintains its view that the previously adopted value, method or credit rating level for DNSPs in Queensland, Victoria, Tasmania and South Australia is that set out in the last jurisdictional determination, with the exception of the nominal risk-free rate.

The AER notes that the JIA state that different equity betas across different jurisdictions would be distortionary to investment, and therefore inconsistent with the NEO, concluding:

The only correct approach is to adopt a single “previously adopted” equity beta and, for the reasons raised in the JIA’s previous submissions, this must be an equity beta of 1.0.<sup>218</sup>

At any rate, the AER this is an argument over what the outcome of the AER’s review should be, rather than what the previously adopted value ‘must’ or ‘ought’ to be deemed to be. As discussed in chapter eight on the equity beta, the AER’s final decision on the equity beta achieves a single industry wide outcome. That is, among other matters, the AER considers:

- that there is persuasive evidence to depart from 1.0 and adopt 0.8, and
- that there is persuasive evidence to depart from 0.9 and adopt 0.8.

Therefore a singular industry-wide outcome is achieved, without having to ‘deem’ a particular previously adopted value that is contrary to what the previous value actually was in the last jurisdictional determination.

Additionally, the AER considers that the value of the previously adopted MRP actually found in the NER and previous jurisdictional determinations (being 6 per cent) is the relevant previously adopted value. The JIA’s proposition is that a change in the definition of the MRP requires a change in what ought to be considered the previously adopted value. The JIA argue that if the AER changes the term of the risk-free rate (and consequently the term of the risk-free rate that the MRP is defined as being relative to) then the AER ought to consider that the previously adopted MRP is 6.2 per cent (as 20 bps is approximately the average historical difference between 5 year and 10 year CGS yields). However the JIA have not established the case that the NER was intended to be interpreted in this manner. The AER considers that an ordinary, natural meaning of the words is to be preferred. Accordingly, the AER considers the ‘previously adopted’ MRP is that MRP that was actually specified in the NER or previous jurisdictional determinations (as the case may be).

While the JIA’s interpretation is not how the AER considers this provision is intended to be applied, the AER’s retention of a 10-year term for the risk-free rate in this final decision means the JIA’s argument is no longer relevant in relation to the MRP.

The AER has also departed from the previously adopted gamma of 0.5 and adopted 0.65. The AER considers this does not mean that the previously adopted MRP ‘ought’ to be considered higher than the actual MRP specified in the NER and previous

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<sup>218</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p.35.

jurisdictional determinations (as the case may be). Rather, an ordinary, natural meaning to ‘previously adopted’ is to be preferred, and this would lead to the previously adopted MRP being 6 per cent.

### 3.4.8.3 AER’s conclusion

The AER maintains its position on what constitutes the previously adopted value, method or credit rating level for each service provider in each jurisdiction.

That is, for the purposes of the AER’s first review:

- for TNSPs in all jurisdictions, the previously adopted value, method or credit rating are those set out in chapter 6A of the NER
- for DNSPs in NSW and ACT, the previously adopted value, method or credit rating are those set out in the transitional provisions in chapter 11 of the NER
- for DNSPs in Queensland, Victoria, Tasmania and South Australia, the previously adopted method for the nominal risk-free rate is that set out in chapter 6 of the NER, and
- for DNSPs in Queensland, Victoria, Tasmania and South Australia, the previously adopted value or credit rating level are those set out in the previous jurisdictional determination.

Table 3.2 outlines what the previously adopted value, method or credit rating. As is illustrated, the previously adopted value, method or credit rating is the same for all services providers, across all parameters, with the exception of the equity beta.

**Table 3.2: AER’s final decision—previously adopted WACC parameters**

Parameter	TNSPs (all jurisdictions)	DNSPs (QLD, TAS, SA)	DNSPs (NSW, ACT, VIC)
Gearing	60 %	60 %	60 %
Nominal risk-free rate	10 year CGS	10 year CGS	10 year CGS
Market risk premium	6 %	6 %	6 %
Equity beta	1.0	0.9	1.0
Credit rating	BBB+	BBB+	BBB+
Gamma	0.5	0.5	0.5

Source: AER analysis

## **4 Multi-parameter considerations**

### **4.1 Introduction**

A particular feature and advantage of conducting a full review of all WACC parameters simultaneously is that the linkages and inter-relationships between each WACC parameter can be considered. In particular, this highlights the importance of consistency in approach in terms of methodologies applied to consideration of each parameter. The AER has been guided by past regulatory practice in its approach to estimating each WACC parameter and where there may be some departures from previous approaches, the AER will be informed by the views of interested parties and the recent empirical and academic research.

This chapter discusses a number of broad issues related to consistency across WACC parameters, as follows:

- consistency between parameters in estimation
- form of the CAPM (domestic or international), and
- definition of the benchmark efficient NSP and how the definition is applied.

### **4.2 Consistency between parameters in estimation**

In the explanatory statement the AER agreed with the JIA that a number of the WACC parameters subject to review are likely to be inter-related, including that:

- the assumed utilisation of imputation credits ( $\gamma$ ) affects the estimate of the MRP
- the gearing ratio adopted affects the credit rating and the equity beta and
- the term of the risk-free rate affects the term of the debt risk premium and the estimate of the MRP.

The AER has taken each of these consistency issues into account in the relevant chapters discussing individual WACC parameters in both its explanatory statement and this final decision.

### **4.3 Form of the CAPM (domestic or international)**

The AER in its issues paper acknowledged that one of the key areas of debate in the Australian regulatory literature is the extent to which foreign investors should be recognised when estimating WACC parameters. The choice of whether to adopt a domestic CAPM or an international CAPM is likely to influence the estimation of the following WACC parameters:

- the nominal risk-free rate
- the expected DRP

- the expected MRP
- the equity beta, and
- the assumed utilisation of imputation credits (gamma).<sup>219</sup>

The AER proposed to continue with the Officer WACC framework as it is consistent with past regulatory practice and is accepted by finance practitioners. In doing so it was recognised that, from a practical and empirical point of view, the information that is commonly used to inform the estimates of the ‘domestic’ risk-free rate, equity beta and MRP parameters inevitably includes the presence of foreign investors in the Australian capital market.<sup>220</sup> This would also mean that, for consistency, it is appropriate to recognise the presence of foreign investors in the estimation of the gamma parameter.

In response to the issues paper the JIA submitted that

It would not be appropriate, feasible or practical for regulators to adopt a fully segmented version of the CAPM, because it would ignore the strong evidence that Australian equity markets are, to a significant degree, integrated with world equity markets. To assume a fully segmented CAPM would prohibit the use of any empirical evidence as it would not be possible to observe the behaviour of domestic investors independent of international investors.

It is also not appropriate, feasible or practical for regulators to adopt a fully integrated model of the CAPM (international CAPM).<sup>221</sup>

In addition, the JIA submitted that the appropriate perspective from which to view the market for funds is the domestic capital market, in the full knowledge that domestic data will reflect the presence of both domestic and foreign investors. The JIA therefore stated that the use of domestic data implies that the CAPM currently applied by regulators does not presuppose either a fully segmented or a fully integrated capital market:

That is, any empirical domestic data on the risk-free rate, MRP, equity beta and gamma parameters have, or will certainly continue to be influenced by, both domestic and international investors.<sup>222</sup>

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<sup>219</sup> The assumptions underpinning the use of a fully segmented (domestic) CAPM is that the domestic capital market is completely segregated from international capital markets, and therefore domestic investors hold a combination of the domestic risk-free rate and the domestic market portfolio. Under this framework, only domestic systematic risk is priced for determining the WACC and the appropriate measure of an asset’s non-diversifiable risk is the beta of the asset in the domestic market portfolio. In contrast, the fully integrated (international) CAPM assumes that global capital markets are fully integrated, and that therefore investors hold a fully diversified global portfolio of assets. Under this approach, the non-diversifiable risk is the beta of the asset to the global market portfolio and the appropriate market risk premium and risk-free rate will be that which is relevant to the global market portfolio.

<sup>220</sup> It is noted that the NER requires the AER to have regard to prevailing conditions in the market for funds in estimating the WACC parameters where applicable.

<sup>221</sup> JIA, *Submission in response*, op. cit., September 2008, p.28.

<sup>222</sup> *ibid.*, p.24.

In its explanatory statement the AER agreed with the JIA that the CAPM adopted for regulatory purposes is neither a fully segmented or fully integrated CAPM. On this basis the AER proposed to continue with the use of a domestic CAPM framework, with foreign investors recognised consistent with their presence in the Australian domestic capital market.

The AER noted that the adoption of a domestic CAPM framework has implications for the all of the WACC parameters estimated from domestic market data, in particular the assumed utilisation of imputation credits (gamma).

### **Submissions in response to issues paper**

In response to the explanatory statement the JIA does not provide further specific comment in relation to the form of the CAPM.

However in the context of the gamma parameter, the JIA submit that the AER's proposed market definition – a domestic capital market with foreign investors recognised to the extent they invest in that market – is theoretically incorrect. The JIA states that:

Both Associate Professor Handley and NERA agree that the value of theta in “the market” will depend on the value that the representative investor places on imputation credits. The representative investor has characteristics that are a wealth weighted-average of the characteristics of all investors...

...the NERA paper explains that in the CAPM framework assumed by the AER, the representative investor is most likely to resemble a foreign investor. This is because foreign investors have much greater “weight” in terms of portfolio allocation decisions, because they possess aggregate wealth that greatly exceeds the wealth of domestic investors.<sup>223</sup>

In summary, while the JIA appears to support the continued use of a domestic CAPM framework, it argues that the investors within the domestic capital market should be weighted according to their global (rather than domestic) wealth.

### **Consultant's review**

In a further report prepared for the AER, Associate Professor John Handley examines the arguments put forward by the JIA and its consultants regarding the market definition. Handley reiterates from his previous report that:

...once you choose the market portfolio, you define the set of assets that are relevant for pricing purposes and define the set of investors that are relevant for pricing purposes...

...So whilst it is true that the aggregate wealth of domestic investors compared to the aggregate wealth of foreign investors is small on a global scale, the choice of a domestic market portfolio means that the weighting should be based only on the wealth invested in the domestic market portfolio

i.e. the equilibrium value of franking credits should reflect a weighted average of the value of franking credits across all investors in the domestic

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<sup>223</sup> JIA, *Submission in response*, op. cit., 1 February 2009, pp.143-144.



market, including foreign investors but only to the extent that they invest domestically.<sup>224</sup>

Handley argues that NERA's suggested characterisation of the representative investor is only relevant in the context of an international version of the CAPM. Accordingly if a domestic CAPM framework is to be maintained, Handley considers that:

...foreign investors should be recognised but only to the extent that they invest in the domestic market i.e. the weighting given to foreign investors should be based on their domestic level of wealth and not on their global level of wealth.<sup>225</sup>

### **Issues and AER's considerations**

Consistent with the position in its explanatory statement, the AER concludes that a domestic CAPM framework is appropriate for the purposes of this review. It is consistent with past regulatory practice and the Officer WACC framework. The JIA and its consultants support the use of domestic market data to estimate the WACC parameters, and understand that this approach explicitly recognises the presence of foreign investors in the domestic capital market.

While this approach may represent a departure from the strict 'full segmentation' assumption often associated with the Officer WACC framework, it appears appropriate and reasonable given past regulatory practice and the reality of cross-border capital flows. The alternative 'full integration' assumption implies the adoption of an international CAPM, with the domestic market containing mainly foreign investors and unrestricted capital flows. The assumptions relating to an international CAPM are also not considered appropriate given that these conditions have not been observed in the Australian market to date.

Although the form of the CAPM is not mentioned explicitly in the JIA's submission to the explanatory statement, the AER notes that the JIA continues to support the continued use of domestic market data in the estimation of the WACC parameters subject to review (i.e. MRP, equity beta, nominal risk-free rate), which implicitly recognises the presence of foreign investors. Despite this, the JIA objects to the AER's recognition of foreign investors in the context of the gamma parameter.

In the AER's view, there appears to be a fundamental inconsistency in the JIA's position on this matter. As Handley points out, the JIA's position on gamma – to weight foreign investors according to their global (rather than domestic) wealth position – is only relevant in the context of an international CAPM framework. This is because under a domestic CAPM framework, the aggregate amount of 'wealth' is that invested in the domestic market portfolio – wealth invested outside of the domestic market is outside the model and therefore plays no role in the pricing of domestic assets.

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<sup>224</sup> J. C. Handley, *A note on the valuation of imputation credits*, Report prepared for the AER, 12 November 2008(d), pp.20-21.

<sup>225</sup> J. C. Handley, *Further comments on the valuation of imputation credits*, Report prepared for the AER, 15 April 2009 (a), p.17.

Given that the AER has maintained the use of a domestic CAPM framework for the purposes of this review, the JIA's position on the recognition of foreign investors in the context of gamma is not considered relevant. This is discussed further at section 10.5.3.

### **AER's conclusion**

The AER maintains its position from the explanatory statement with respect to the market definition. Under a domestic CAPM framework, foreign investors in the Australian market will be recognised in defining the representative investor, but only to the extent they invest in the domestic capital market. This has important implications for the estimation of the WACC parameters from domestic market data, in particular the MRP, the equity beta, the nominal risk-free rate, and the assumed utilisation of imputation credits (gamma).

## **4.4 Definition of a benchmark efficient NSP**

The definition of a benchmark efficient NSP is an important issue as it informs the AER of the businesses that can be used to provide guidance on the level of gearing, the appropriate equity beta and the appropriate credit rating for a benchmark efficient NSP. The NER (cls. 6.5.4(e)(3) and 6A.6.2(j)(3)) require that the AER must, in undertaking its review, have regard to a benchmark efficient DNSP and TNSP. However, the NER do not define a 'benchmark efficient' service provider.

It is common regulatory practice for regulators to use a benchmark approach rather than a business specific approach in estimating the WACC parameters, as this:

- is consistent with the general approach of incentive regulation (a view adopted by other regulators and generally accepted by the businesses)<sup>226</sup>
- means that customers are less likely to bear the cost associated with inefficient decisions (e.g. financing structures), and
- improves the comparability of regulatory decisions.

As noted in its explanatory statement the AER also considers that the same sample of businesses may not always be used to estimate each WACC parameter (e.g. an industry specific sample is commonly used to estimate the equity beta, while a market wide sample is used to measure the utilisation rate of imputation credits).

### **Position in the explanatory statement**

#### ***Conceptual definition of a benchmark efficient network service provider***

The AER considered that a benchmark efficient network service provider (NSP) is a 'pure play' electricity network business and agreed with the JIA that there are no businesses that will perfectly reflect this benchmark.

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<sup>226</sup> This is required under the capital expenditure (capex) and operating expenditure (opex) criteria under the NER cls. 6.5.6(c), 6.5.7(c), 6A.6.6(c), and 6A.6.7(c).

### ***Practical application of a benchmark efficient network service provider***

The AER considered that for the purposes of estimating WACC parameters ideally the same sample of businesses would be preferable. However, the MEU's position, which involved excluding gas transport businesses from the sample, was not practical given the nature of the data required to obtain reliable estimates of the different WACC parameters differs.

The AER considered the following factors when selecting sample businesses:

- the nature of the WACC parameter (i.e. market wide or industry specific)
- the size of the sample and the likelihood that a robust estimate can be obtained
- how closely the selected businesses resemble the conceptual definition of a hypothetical benchmark efficient NSP (e.g. operational and ownership differences)
- the availability of data (e.g. historical data, market and book valuations, unlisted businesses), and
- the reliability of data (i.e. presence of outlier observations and events).

The AER considered that in some circumstances where the primary sample is small, a secondary sample (e.g. foreign comparators) or an expanded sample may be required (e.g. gas businesses) for the purposes of checking the reliability of the estimates obtained using the primary sample.

### ***Gas transmission and distribution***

The AER recognised that gas networks are likely to have some differences that may affect their underlying business risks compared to individual electricity networks. Ideally for the purposes of estimating the WACC parameters, it is preferable to examine the same sample businesses that have similar business risks. However, the AER recognised that this position is likely to be impractical given the combination of:

- the limited number of electricity networks that do not also include gas networks in Australia
- the nature of the WACC parameters being estimated (i.e. industry specific or market wide), and
- the differing operating environments of the Australian energy networks (e.g. differences in geography, weather conditions).

Given the limitations of the available Australian data, the AER considered that gas network businesses could be considered as a reasonable but not perfect comparator to electricity network businesses given that both industries involve the transportation of energy.

## Submissions in response to explanatory statement

The MEU notes that the AER clearly states that the review applies only to electricity transport. The MEU criticises the AER for moving far too readily between the electricity transport and energy transport industries as a whole (i.e. between electricity and gas). The MEU argues that the AER has biased a number of its assessments to reflect a gas transportation industry.<sup>227</sup>

The JIA argue that prior to the AER's WACC statement, a benchmark efficient business was a settled concept. That is, it is a large, stock market listed network service provider.<sup>228</sup>

The JIA contend that this concept has a very long lineage traceable back to the AEMC's Chapter 6A review, the establishment of the NEM, intergovernmental agreements that implemented National Competition Policy and the Hilmer Report.<sup>229</sup>

The JIA consider that the concept of a benchmark efficient NSP and its meaning cannot now be changed in the course of this WACC review.<sup>230</sup>

The JIA note that the benchmark cost of debt (for a competitive neutrality fee) requires obtaining a credit rating as though the business were not owned by the government, which is then used to establish the rate at which the business would be required to borrow, if it were operating as a private sector organisation.<sup>231</sup>

The JIA also note, in 1999, the ACCC, in its first regulatory reset decision for TransGrid under the nationalised regime for economic regulation of electricity transmission, referred to schedule 6.1 (1) of the National Electricity Code. This schedule provided that the WACC is designed to ensure 'that government-owned networks operate under the same financial conditions as networks which are privately owned. That is, it will ensure the returns in the public sector are equal to the opportunity cost of capital in the private sector.'<sup>232</sup>

The JIA observe that under the COAG Competition Principles Agreement, achieving competitive neutrality is a key concern. Therefore, the JIA argue that the non-discrimination requirement set out in the ACCC's first TransGrid revenue is likely to still apply.<sup>233</sup>

The JIA also observe that the AEMC held that 'a principle of good regulatory design is the nature of ownership (i.e. whether public or private) should not affect the outcome of regulatory determinations.'<sup>234</sup>

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<sup>227</sup> MEU, *Submission in response*, op. cit., 30 January 2009, p. 10.

<sup>228</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 30.

<sup>229</sup> *ibid.*

<sup>230</sup> *ibid.*

<sup>231</sup> *ibid.*, p. 31.

<sup>232</sup> *ibid.*

<sup>233</sup> *ibid.*

<sup>234</sup> *ibid.*

In relation to the recent AER TransGrid draft decision, the JIA note that while the AER appears to accept the above propositions on a benchmark efficient NSP, the AER may have been misinformed or has made incorrect assumptions as to whether data used in their analysis removed conglomerate or ownership effects.<sup>235</sup>

The JIA contend by including subsidiaries that have strong parents the AER has introduced observations that introduce spurious information.<sup>236</sup>

## **Issues and AER's considerations**

### ***Conceptual definition of a benchmark efficient network service provider***

The AER considers that a benchmark efficient NSP is a business that provides 'pure play' regulated electricity network services operating in Australia without parent ownership.<sup>237</sup>

The AER has addressed submissions and provided its reasoning relating to the conceptual benchmark in the regulatory framework chapter of this final decision (see section 3.4.6)

### ***Practical application of a benchmark efficient network service provider***

The AER agrees with the JIA's previous position that there are no actual businesses that will perfectly reflect a benchmark efficient NSP.<sup>238</sup> The AER also agrees with the JIA's previous position that the selection of sample businesses used to inform the estimated WACC parameters will depend on judgement as to how closely the selected businesses reflect the efficient benchmark business.<sup>239</sup> To be clear, the JIA stated in its previous submission:

...the Issues Paper confuses the meaning of a benchmark efficient regulated electricity network service provider and the use of market data to estimate firm specific cost of capital parameters.

A benchmark efficient regulated electricity network service provider is a conceptual construction...

...as a conceptual construction no actual business will perfectly reflect a benchmark efficient regulated electricity network service provider.

...the use of actual market data to determine firm specific WACC parameters necessitates the judicious use of a sample of companies that to a greater or lesser extent reflect the hypothetical benchmark.<sup>240</sup>

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<sup>235</sup> *ibid.*, p. 32.

<sup>236</sup> *ibid.*, p. 129.

<sup>237</sup> Although the AER did not include the term 'regulated' and the phrase, 'operating in Australia without parent ownership', the AER implicitly took this approach in its explanatory statement, as the AER did not consider that businesses such as ElectraNet, Spark Infrastructure and overseas businesses met with the conceptual definition.

<sup>238</sup> JIA, *Network industry submission – AER issues paper – Review of the weighted average cost of capital (WACC) parameters for electricity transmission and distribution*, Submission in response, September 2008, p.

<sup>239</sup> JIA, *Submission in response*, op. cit., September 2008, p. 27.

<sup>240</sup> *ibid.*, p. 26.

The AER notes the JIA's changed position in response to the explanatory statement regarding the definition of a benchmark efficient NSP which requires that businesses:

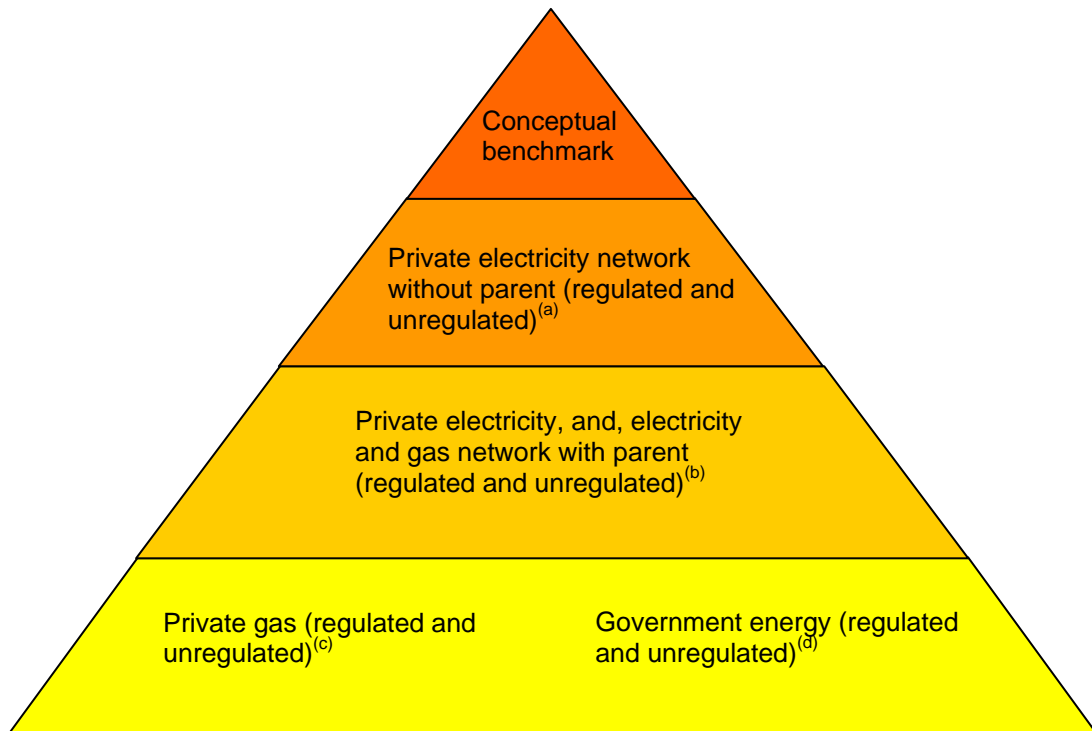
- be large, stock market listed NSPs, and
- that do not impute support or advantage from its portfolio of other activities.

As discussed in section 3.4.6, the AER does not agree that a benchmark efficient NSP be defined as a large, stock market listed NSP and is a settled concept. For the reasons given in its discussion of a conceptual benchmark in section 3.4.6, the AER considers such criteria are not appropriate. The AER considers that for the purposes of examining WACC parameters ideally the same sample of businesses would be preferable. The AER observes that the JIA's own consultants, the ACG, use three different samples for its gearing, equity beta and credit rating analyses. The AER considers that the JIA's rigid interpretation in its selection of the appropriate comparator businesses for credit rating (noting the businesses selected by the ACG do not meet with the JIA's criteria) and to relax this selection criteria for the other parameters appears to be inconsistent.

As the AER has previously noted, where non-energy businesses are included in estimating the relevant WACC parameters for a benchmark efficient NSP (i.e. in estimating an industry benchmark), there is greater scope for argument that these businesses are less comparable for estimating a benchmark efficient NSP. This is also likely to be the case where regulated businesses in overseas markets are included in sample of comparator businesses to estimate a benchmark efficient NSP.

Figure 4.1 illustrates the AER's approach to selecting comparator businesses assumed in its explanatory statement and this final decision.

**Figure 4.1 – Selection of comparator businesses**



Notes:

- (a) Private ownership includes businesses that provide regulated and unregulated electricity network services and can be unlisted (i.e. ElectraNet) or listed on the stock exchange.
- (b) Same as (a) except businesses are influenced by parent owners (i.e. Spark Infrastructure) and may operate and/or own gas networks in conjunction with the electricity network.
- (c) A privately owned (listed or unlisted) business that operates and/or own gas networks.
- (d) A government owned business that operates and/or own a gas and/or electricity network.

The AER considers a conceptual benchmark NSP is a business that provides ‘pure play’ regulated electricity network services operating in Australia without parent ownership.<sup>241</sup> The AER observed that no business satisfies this definition of a benchmark efficient NSP and therefore examined businesses that are considered to most closely reflect the benchmark.

The JIA note the samples of comparator businesses used by the AER in its explanatory statement include businesses which have supportive parents (e.g. SP AusNet and Spark Infrastructure).<sup>242</sup> The AER recognises that all businesses included in the samples with the exception of ElectraNet are subject to parent ownership. In considering the selection of sample businesses, the AER also had regard to the following factors:

- how closely the characteristics of selected businesses resemble the conceptual definition of hypothetical benchmark efficient NSP (i.e. operational and ownership differences)

<sup>241</sup> This conceptual definition was implicitly assumed in the explanatory statement. See footnote 240.

<sup>242</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 129.

- the size of the sample businesses and the likelihood that a robust estimate can be obtained
- the availability of data (e.g. historical data, market and book valuations, unlisted businesses), and
- the reliability of data (e.g. presence of outlier observations and unrepresentative events).

In estimating the gearing and equity beta parameters, where the market value of equity or stock prices is required, no data was available for privately listed businesses (i.e. ElectraNet) and government owned businesses. Accordingly, the AER selected businesses that satisfied the criteria in the ‘third tier’ in figure 4.1 (i.e. Spark Infrastructure). Given that the sample of comparator businesses selected in the ‘third tier’ was not considered sufficiently large, businesses that operated gas networks from the ‘last tier’ in figure 4.1 were also selected and included in the sample; (e.g. the APA Group).

In estimating the level of gearing and the credit rating, the AER did not exclusively rely on privately listed and stock exchange listed electricity businesses as the sample size was not considered to be sufficiently large. The AER was aware that support from government ownership was likely to provide an upwardly biased credit rating of a benchmark NSP. However, the AER was also aware that gas network businesses may be exposed to higher business risk than electricity network businesses leading to a downwards bias in the credit rating relative a benchmark NSP. Accordingly, the AER considered that given its preferred the methodology for estimating the gearing and credit rating (i.e. median analysis), any bias would be minimised to the extent that of the number of upwardly biased businesses was offset by the number of downwardly biased businesses in the sample (see section 9.6.3). Therefore, gas and government owned businesses (i.e. the last tier in figure 4.1) were included into the sample in order to obtain a sufficient number of businesses.

In estimating the nominal risk-free rate the AER in its explanatory statement included government owned businesses from the sample to estimate the term of the risk-free rate. However, for this final decision the AER has excluded government owned businesses on the grounds that these businesses are unlikely to face the same refinancing risk as private businesses (see section 6.5.2.).

In summary, the AER has maintained a similar approach for this final decision, but has amended its selection of comparator businesses for some of the WACC parameters based on submissions from interested parties. In particular, the AER has:

- excluded of the Rowville Transmission Facility from the gearing and credit rating samples,
- included AGL, Alinta and GasNet into a number of samples used to inform the average of individual business estimates of the equity beta, and
- excluded government owned businesses in determining the term of the nominal risk-free rate.



In general, the AER maintains its position in its explanatory statement that in the circumstances where the primary sample is small, the sample could be expanded (e.g. businesses with supportive parents and gas network businesses) and a secondary sample (foreign network businesses) could be selected for the purposes of checking the reliability of the estimates obtained using the primary sample.<sup>243</sup> The AER considers that the nature of the businesses in the secondary sample is likely to differ considerably from the primary sample and therefore the two samples should not be pooled.

In estimating the equity beta for a benchmark efficient NSP, the AER has considered a secondary sample (estimated equity betas derived from United States data) to assess the reasonableness of the estimates derived from domestic businesses) given the number of listed Australian businesses. In contrast, given that data is available for listed and unlisted network businesses in estimating the gearing and credit rating levels, the AER considers there is no need to have regard to foreign comparators as a cross check on the reasonableness of these estimates. As previously discussed, the inclusion of gas network businesses are considered to be a sufficiently close comparator, as these businesses exhibit:

- stable cash flows
- natural monopoly characteristics, and
- inelastic demand with respect to price.

#### ***Gas transmission and distribution***

The MEU notes the impact of including gas network businesses in the sample of comparator businesses to the credit rating and equity beta estimates (e.g. Envestra and DUET).<sup>244</sup> The AER has previously acknowledged in its explanatory statement that gas businesses may have a higher business risk than electricity businesses due greater volatility in cash-flows from relatively higher volume risk compared to electricity network businesses. That said, the AER continues to consider gas businesses as close but not perfect comparators as these businesses exhibit relatively stable cash flows; natural monopoly characteristics and inelastic demand. However, gas network businesses may not be as close as private electricity networks that have parent ownership. Accordingly, the AER considers that gas networks could be used for the purpose of informing the WACC parameters for a benchmark efficient NSP.

As discussed in the issues paper and its explanatory statement the outcome of the AER's WACC review applies only to electricity determinations, and has no direct or formal applicability to gas access arrangements. While the AER's current WACC review will be informative to its future consideration of gas WACC matters, the determination of the WACC for access arrangements is subject to requirements under the National Gas Law (NGL) and National Gas Rules (NGR), which are not being considered in this review.

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<sup>243</sup> For the purposes of the WACC review the AER has not used non-energy businesses in its sample of comparator businesses on the basis that the sample size of energy businesses is considered to be adequate.

<sup>244</sup> MEU, *Submission in response*, op. cit., 30 January 2009, p. 10.

When considering issues relating to gas access arrangements the AER will continue to examine all available information, including any differences between gas and electricity networks and the samples used to inform the AER on its consideration of WACC issues in future gas access arrangement reviews.<sup>245</sup>

## **AER's conclusions**

### ***Conceptual definition of a benchmark efficient network service provider***

The AER considers that the concept of a benchmark efficient NSP is a business that provides 'pure play' regulated electricity network services operating in Australia without parent ownership.

### ***Practical application of a benchmark efficient network service provider***

In response to submissions discussing the conceptual definition of a benchmark efficient NSP, the AER:

- Considers that there is a need to weigh up several factors when considering the selection of sample businesses, such as:
  - how closely the selected businesses resemble the conceptual definition of hypothetical benchmark efficient NSP (i.e. operational and ownership differences)
  - the size of the sample businesses and the likelihood that a robust estimate can be obtained
  - the availability of data (e.g. historical data, market and book valuations, unlisted businesses), and
  - the reliability of data (i.e. presence of outlier observations and unrepresentative events).
- Considers that in some circumstances where the primary sample is small, a secondary sample (e.g. foreign comparators) or an expanded sample may be required (e.g. gas businesses and businesses with supportive parents) for the purposes of checking the reliability of the estimates obtained using the primary sample.

### ***Gas transmission and distribution***

In response to submissions discussing the use of gas network businesses, the AER continues to consider that gas networks could be considered as a close but not perfect comparator to a benchmark efficient NSP and used for the purpose of informing the WACC parameters for a benchmark efficient NSP.

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<sup>245</sup> The National Gas Rules specifies that a well accepted approach that incorporates the cost of equity and debt; such as the WACC, is to be used; and a well accepted financial model such as the CAPM is to be used.

As discussed in the issues paper, the outcome of the AER's WACC review applies only to electricity determinations under the NER, and has no direct or formal applicability to gas access arrangements under the NGL and the NGR.

## 5 Gearing

### 5.1 Introduction

Gearing is defined as the ratio of the value of debt to total capital (i.e. debt and equity), and is used to weight the costs of debt and equity when formulating a WACC. A businesses's gearing, also referred to as its capital structure, will have a significant bearing on the expected required return on debt and the expected required return on equity (although notionally, it is unlikely to affect the cost of capital).<sup>246</sup>

In theory, the optimal debt-equity ratio is the point at which firm value is maximized, where the marginal costs of debt just offset the marginal benefits.<sup>247</sup> However, while an optimal capital structure theoretically exists, the actual optimal value of debt and equity for any given firm is dynamic and dependent on a number of business specific factors.

For the purposes of determining a level of gearing of a benchmark efficient network service provider (NSP), the AER considers that in the long-run firms tend towards an efficient level of gearing.

Apart from being used to weight the expected required return on debt and equity to derive the WACC, the level of gearing of a benchmark efficient NSP may be used:

- to re-lever asset betas for the purposes of analysing the level of systematic risk across businesses; and
- as a factor in determining a credit rating for deriving the debt risk premium (DRP).

The equity beta and credit rating are discussed in chapters eight and nine, respectively. This chapter outlines the NER requirements, past regulatory practice, the issues raised in responses to the explanatory statement and the AER's conclusions.

### 5.2 Regulatory requirements

#### 5.2.1 Matters the AER must have regard to under the NER

The NER provide that the rate of return of a service provider is to be determined as the weighted average of the cost of equity and the cost of debt. The weight applied to the cost of debt is to be the market value of debt as a proportion of the market value of

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<sup>246</sup> The cost of capital is invariant over a broad range of gearing possibilities under the assumptions of perfect information, no taxes and no transaction costs. See F Modigliani, and M H Miller, 'The Cost of Capital, Corporation Finance and theory of Investment', *American Economic Review*, Vol.48, No. 3, 1958, pp. 261-297.

<sup>247</sup> M. Jensen, Agency Costs of Free Cash Flow, Corporate Finance and Takeovers, *American Economic Review*, Vol.76, No.2, 1986, pp.323-329

debt and equity.<sup>248</sup> This is known as the level of gearing. The weight applied to the cost of equity is to be one minus the level of gearing.<sup>249</sup>

In undertaking a review of the WACC parameters, the NER sets out several matters that the AER must have regard to. Of particular relevance to the review of the level of gearing are:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing regulated transmission or distribution services (as the case may be)
- the need for the level of gearing to be based on a benchmark efficient transmission or distribution network service provider (as the case may be)
- the need to achieve an outcome that is consistent with the NEO, and
- the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it<sup>250</sup>.

The AER's reasoning as to why these matters appear particularly relevant, while the other matter listed in the NER appears to be of lesser value to the review of the level of gearing, is discussed in chapter three on the regulatory framework.

In addition, as discussed in chapter three, the AER has decided to take into account the revenue and pricing principles. The revenue and pricing principles which are directly relevant to this review are:

- providing a service provider with a reasonable opportunity to recover at least the efficient costs
- providing a service provider with effective incentives in order to promote efficient investment, and
- having regard to the economic costs and risks of the potential for under and over investment.

### **5.2.2 Previously adopted value**

As noted above, the NER provides that where a value, method or credit rating level cannot be determined with certainty, the AER must have regard to the need for persuasive evidence before departing from the value, method or credit rating level that has previously been adopted for it.

Each of the 'true' WACC parameters is unobservable, and therefore must be estimated. Accordingly, it is unlikely that any of the WACC parameters, including the

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<sup>248</sup> Chapter 6A refers to the market value of debt as a proportion of the market value of equity and debt, whereas chapter 6 refers to the value of debt as a proportion of the value of equity and debt.

<sup>249</sup> NER, cls. 6.5.2(b) and 6A.6.2(b).

<sup>250</sup> NER, cls. 6.5.4(e) and 6A.6.2(j).

level of gearing, can be determined with certainty. Therefore, in addition to the other relevant factors, the AER must have regard to the need for persuasive evidence before departing from the previously adopted level of gearing.

The NER deemed the initial value of the market value of debt as a proportion of the market value of debt and equity (D/V) to be 60 per cent for TNSPs in all jurisdictions and the DNSPs in NSW and the ACT.<sup>251</sup> For the remaining DNSPs, the NER did not deem an initial value and the previously adopted value in these jurisdictions are those from the most recent distribution determination.

The AER notes that the proportion of debt to debt and equity in the NER originates from the ACCC's Statement of Regulatory Principles (SRP) for transmission. In adopting a 60 per cent gearing ratio, the ACCC had regard to previous regulatory decisions and the book value of gearing taken from a Standard and Poor's Industry Report Card.<sup>252</sup>

As illustrated in table 5.1, for the purposes of the NER, the previously adopted market value of debt as a proportion of the market value of equity and debt for TNSPs and DNSPs in all jurisdictions is 0.60.

**Table 5.1: Previously adopted value – level of gearing**

Service provider	Source	Level of gearing
Transmission (all jurisdictions)	NER	0.60
Distribution (NSW)	NER	0.60
Distribution (ACT)	NER	0.60
Distribution (Tasmania)	OTTER (2007)	0.60
Distribution (Victoria)	ESC (2006)	0.60
Distribution (Queensland)	QCA (2005)	0.60
Distribution (South Australia)	ESCOSA (2005)	0.60
<b>Overall range</b>		<b>0.60</b>

Source: NER,<sup>253</sup> OTTER,<sup>254</sup> ESC,<sup>255</sup> QCA,<sup>256</sup> ESCOSA<sup>257</sup>

<sup>251</sup> NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

<sup>252</sup> ACCC, *Statement of principles for the regulation of electricity transmission revenues—background paper*, Final decision, 8 December 2004, pp. 115-116.

<sup>253</sup> NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

<sup>254</sup> OTTER, op. cit., September 2007, p.152.

<sup>255</sup> ESC, op. cit., October 2006, p.332.

<sup>256</sup> QCA, op. cit., April 2005, p.106.

<sup>257</sup> ESCOSA, op. cit., April 2005, p.55.

### 5.3 Summary of position in explanatory statement

Having regard to the submissions and available data, the AER reached the following conclusions in the explanatory statement regarding the level of gearing of a benchmark efficient NSP:

- The AER agreed with the JIA that consideration of the ratio of the market value of debt to the market value of debt and equity is required in estimating gearing levels. However, both the AER and JIA recognised that calculating the market value of debt is difficult as debt is not frequently traded. Accordingly, the AER considered that the book value of debt is likely to be a valid proxy for the market value of debt. This led to a hybrid approach for evaluating leverage, whereby the market value of equity and the book value of debt are used to determine the ‘market valuation’ of gearing.<sup>258</sup>
- Furthermore, the AER and the JIA agreed that in times of interest rate volatility, market values of debt may diverge from the book values of debt. Under such circumstances, the AER considered whether the book valuation of gearing is likely to be a valid proxy for the market valuation of gearing.
- The AER agreed with the JIA that an average of gearing outcomes over a period of time reduces the likelihood that any recent events may distort recorded gearing outcomes. The AER also agreed that increasing the frequency of the observations to greater than semi-annual is unlikely to have a material impact on the average gearing ratio.
- For the purposes of examining gearing ratios, the AER agreed with the JIA that businesses which do not own or operate either a gas or electricity network, have significant mergers and acquisition activities, or are involved in substantial unregulated activities, should be excluded from the sample.

In considering a number of different sources and measurements of the gearing ratio, the AER observed that:

- The average level of gearing across a number of different methods of calculating the gearing ratio ranged from 60.5 to 76.8 per cent over 2002-2006.
- The generally accepted approach for calculating gearing ratios used the book value of debt as a proxy for the market value of debt and used the market value of equity. This hybrid approach was adopted by Bloomberg as one method for determining gearing ratios of publicly listed companies.
- The Allen Consulting Group (the ACG) suggested that the hybrid approach utilised by Bloomberg should be adjusted for ‘double leveraging’ and stapled securities. The ACG approach resulted in an average level of gearing in the range of 60.3 to 65.0 per cent over 2002 to 2007.

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<sup>258</sup> This ‘hybrid’ approach is referred to throughout the explanatory statement, and throughout this paper as the Bloomberg ‘market valuation’ approach.

- The AER considered the ACG approach to be inappropriate for the purposes of calculating the level of gearing of a benchmark efficient NSP as it used the concept of ‘net debt’, as opposed to ‘gross debt’.
- Bloomberg also publishes a measure of book gearing (i.e. book value of debt and equity), which provided a higher average level of gearing. The AER considered that this approach is likely to represent an upper bound on the estimate as no adjustments are made for market valuations, stapled securities or double leveraging.
- The Standard and Poor’s measure of gearing (book value of debt and book value of equity) provided an average gearing ratio of 64.7 per cent from 2002 to 2006, supporting the conclusion that a 60 per cent gearing ratio is an appropriate benchmark for an efficient service provider.

Having regard for the data provided, primarily the measures of gearing provided by Bloomberg’s market valuation approach and Standard and Poor’s book value appraisals, the AER did not consider there was persuasive evidence to depart from the currently adopted level of gearing of 60 per cent of a benchmark efficient NSP.

In accordance with the NER, the AER considered that the current level of gearing:

- is supported by the most recently available and reliable empirical evidence, which the AER considered is persuasive in support of no change to the existing value; and
- generated a forward looking rate of return that is commensurate with prevailing conditions in the market for funds.

On this basis, the AER considered that its proposed value would achieve an outcome that is consistent with the National Electricity Objective.<sup>259</sup>

## **5.4 Summary of submissions in response to explanatory statement**

In response to the explanatory statement, the AER received submissions that specifically commented on the AER’s proposed position on the level of gearing of a benchmark efficient NSP from:

- the MEU
- CitiPower, ETSA Utilities and Powercor
- EnergyAustralia
- equity market participants

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<sup>259</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).



- Grid Australia
- Integral Energy
- SP AusNet
- the ENA
- the JIA, and
- the FIG

The MEU submission contends that the results presented in the explanatory statement constitute persuasive evidence required to increase the level of gearing of a benchmark efficient NSP from 60 to 65 per cent.<sup>260</sup> The MEU also argue that an inherent level of conservatism exists in the AER's conclusion.<sup>261</sup>

Contrary to this, the JIA support the AER's conclusion that there is no persuasive evidence to depart from the currently adopted benchmark gearing level. However, the JIA raise several issues regarding aspects of the methodology applied by the AER in forming its conclusion.<sup>262</sup>

Citipower, ETSA Utilities and Powercor, EnergyAustralia, the ENA, Grid Australia, Integral Energy, and SP AusNet all support the positions taken in the JIA submission.

Brook Asset Management suggests that a gearing level of 50 per cent should be adopted in light of the proposed credit rating increase from BBB<sup>+</sup> to A.<sup>263</sup>

The FIG believes the AER estimate of the gearing level of a benchmark efficient NSP is appropriate.<sup>264</sup>

## 5.5 Issues and AER's considerations

### 5.5.1 Valuation and definition of debt and equity

Chapter 6A of the NER defines gearing for transmission businesses as the market value of debt as a proportion of the market value of debt and equity.<sup>265</sup> Whereas Chapter 6 of the NER simplifies gearing as the value of debt to the value of debt and equity (market values are not specified).<sup>266</sup> To ensure a consistent approach, the AER assumes that gearing for distribution businesses is the market value of debt as a proportion of the market value of debt and equity.

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<sup>260</sup> MEU, *Submission in response*, op. cit., January 2009, p.22.

<sup>261</sup> *ibid.*, p.26.

<sup>262</sup> JIA, *Submission in response*, op. cit., January 2009, p.47.

<sup>263</sup> Macquarie Research Equities, *Submission in response*, op. cit., January 2009, p.4.

<sup>264</sup> FIG, *Submission in response*, op. cit., January 2009, p.41.

<sup>265</sup> NER, cl. 6A.6.2(b).

<sup>266</sup> NER, cl. 6.5.2(b).

### **5.5.1.1 Position in explanatory statement**

The AER considered that in having regard to persuasive evidence and the NEO to determine whether the efficient benchmark level of gearing for electricity distribution and transmission businesses differs from the existing value of 60 per cent, consideration should be given to market values of debt and equity provided by Bloomberg and book values provided by Standard and Poor's.

The AER also had regard to the 'see through' gearing analysis and the treatment of stapled securities provided by the ACG, though considered this analysis to be a cross check to estimates derived from Bloomberg and Standard and Poor's data.

The AER also considered that, as per the Standard and Poor's approach, the book value of loan notes should be subtracted from the book value of debt when estimating levels of gearing.

The AER considered the use of net debt to be inappropriate for the purpose of estimating the level of gearing of a benchmark efficient NSP.

### **5.5.1.2 Submissions in response to explanatory statement**

The JIA disagree with the AER's use of 'gross debt' when determining the level of gearing of a benchmark efficient NSP, and consider that the application of the 'net debt' concept is more appropriate.<sup>267</sup>

The JIA also contend that the ACG's 'see through' gearing approach is essential to ensure that differing layers of debt are taken into account. Consequently, the JIA argue that the AER's reliance on Bloomberg's market gearing is a concern unless the structure and nature of the securities which underpin Bloomberg's reported numbers are also investigated.<sup>268</sup>

The JIA support the ACG's recommendation that the AER make a statement to clarify its position on loan notes. Namely, whether the AER considers the book value of loan notes should be removed from the book value of total debt, for the purposes of determining the level of gearing of a benchmark efficient NSP.<sup>269</sup>

In estimating the level of gearing, the JIA argue that the book value of equity should not be used as a proxy for market values where market values can be readily observed.<sup>270</sup>

### **5.5.1.3 Issues and AER's considerations**

#### **Net debt versus gross debt**

The AER maintains its view held in the explanatory paper, that it considers the use of net debt to determine the level of gearing of a benchmark efficient NSP is inappropriate.<sup>271</sup>

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<sup>267</sup> JIA, *Submission in response*, op. cit., January 2009, p.48.

<sup>268</sup> *ibid.*, p.48.

<sup>269</sup> *ibid.*, p.49.

<sup>270</sup> *ibid.*, p.50.

The utilisation of net debt in estimating gearing levels requires the total amount of cash and cash equivalents subtracted from total debt to be reallocated as equity. However, as detailed in the explanatory paper, this is likely to be inappropriate given cash could be funded by either debt and/or equity. As a result, the maximum gearing ratio possible under this approach is less than 100 per cent.<sup>272</sup>

The JIA oppose this view, and maintain that the net debt concept should be applied to estimate the benchmark gearing.<sup>273</sup> This view though is at odds with comments made in the ACG report, commissioned by the JIA. The ACG states that:

[T]he net debt concept is a better measure of the underlying gearing. However, the AER is correct that the formula we applied is wrong when the task is to derive a benchmark gearing level. Rather, it is appropriate to assume that the cash is used to retire debt – which requires the value of cash to be removed both from the equity value and book value of debt.<sup>274</sup>

The ACG, in clarifying its views on net debt, consider that the concept of net debt should be distinguished between setting the level of gearing of a benchmark efficient NSP and measuring equity betas. In regards to setting the level of gearing of a benchmark efficient NSP, the AER considers that the ACG's assumption of a benchmark efficient business only holding physical assets (i.e. cash is used to retire debt) is incorrect. The AER notes that assumptions relating to a benchmark efficient NSP relate to the post-tax revenue model. This model does not explicitly or implicitly make any assumptions about whether or not a business has cash holdings. Further, the AER observes that a benchmark efficient NSP is expected to use its retained earnings (which are likely to include cash) to fund capital expenditure programs where appropriate. To determine therefore that all cash is used to retire debt is not reflective of the assumptions used by businesses and regulators to estimate equity raising costs.

The AER's response to issues relating to the equity beta is discussed in chapter eight.

### **Debt structuring**

The AER maintains its view held in the explanatory paper that it is not clear which approach, adjusting for double leveraging ('see through' gearing analysis) or no adjustment, best informs the AER about the level of gearing of a benchmark efficient NSP.<sup>275</sup> Primarily, the AER's concerns surround the inability to verify the accuracy of the ACG's analysis surrounding this issue.

That said, the AER considers that there are a number of different approaches to estimating the level of gearing of a benchmark efficient NSP. Specifically, the AER has not relied on one single measure, such as Bloomberg's market gearing method, as

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<sup>271</sup> AER, op.cit., 11 December 2008, p.69.

<sup>272</sup> *ibid.*, p.69.

<sup>273</sup> JIA, *Submission in response*, op. cit., January 2009, p.48.

<sup>274</sup> ACG, *Commentary on the AER's analysis of gearing levels*, Report to Energy Networks Association, Grid Australia and APIA, January 2009(b), p.9.

<sup>275</sup> AER, op.cit., 11 December 2008, p.74.

inferred by the JIA.<sup>276</sup> While considerable weight is given to Bloomberg market valuations, book values provided by Standard and Poor's are also assessed.

Furthermore, Spark Infrastructure is the only business selected in the comparator sample with multiple layers of debt. Hence, the impact of adjusting for 'see through' gearing on the overall gearing estimate of a benchmark efficient NSP is limited (as shown in table 5.2).

**Table 5.2: Comparison of Bloomberg market valuations and the ACG's adjusted measure of gearing – Spark Infrastructure**

Year	Provider	Spark	Average of comparator sample
2006	Bloomberg (market) <sup>(a)</sup>	57.9	60.0
	Bloomberg (ACG) <sup>(b)</sup>	70.7	62.1
2007	Bloomberg (market)	45.3	55.3
	Bloomberg (ACG)	60.0	57.8

Source: Bloomberg (2006-2007)

Notes:

- (a) Bloomberg (market) values refer to unadjusted Bloomberg data. The gearing level has then been calculated as the unadjusted Total Debt, divided by the sum of unadjusted Total Debt and Historical Market Capitalisation.
- (b) Bloomberg (ACG) values have been calculated based upon the same set of data as the Bloomberg (market) values. However, Total Debt has been further adjusted to remove the effects of stapled securities, loan notes and double leveraging.

Given the minor impact of the adjustments proposed by the ACG, and by utilising a number of different approaches when estimating gearing levels, the AER considers its approach to evaluating the benchmark gearing level is appropriate.

### Loan notes

The AER considers that the book value of loan notes should be removed from the book value of total debt for the purposes of determining the level of gearing of a benchmark efficient NSP. The JIA support this view, based largely upon analysis undertaken by the ACG.<sup>277</sup>

Specifically, the AER considers that the book value of loan notes as sourced from publicly available annual reports should be used when adjusting book values of debt. The ACG, in its report supporting the JIA's submission in response to the AER's issues paper, sourced the value of loan notes from the Envestra website. The dates listed for the loan notes on the website did not correspond with the annual reporting dates. The AER considers, and the ACG agree, that it would be more appropriate to

<sup>276</sup> JIA, *Submission in response*, op. cit., January 2009, p.48.

<sup>277</sup> ACG, op. cit., January 2009(b), p.12.

use the values recorded in annual reports.<sup>278</sup> However, where information on loan notes is not available from annual reports, the AER considers that the information published on the Envestra website is appropriate.

### **Book value of equity**

The AER defines gearing as the market value of debt as a proportion of the market value of debt and the market value of equity. However, restrictions such as company debt being rarely traded can limit the availability of market data. Additionally, during periods of volatile interest rates, the AER considers that the market values of debt may diverge from their corresponding book values.

In their report commissioned by the JIA, the ACG contests the AER's view that during periods of volatile interest rates, book values of debt and equity can be used as a proxy for market values. The ACG argues that whenever market values of equity can be observed, they should be utilised.<sup>279</sup>

Having regard to the views of the ACG, and supported by the JIA, the AER considers that a number of approaches covering market values and book values of gearing should be adopted to inform the level of gearing of a benchmark efficient NSP. The Bloomberg market value approach is one method used, as is Standard and Poor's book value measure of gearing. The AER has also given regard to the ACG's adjusted measure of Bloomberg's 'market valuation' approach, but only when applied to total debt values.

The AER notes that each of the valuation approaches has some limitations. In particular, Bloomberg market valuations are restricted to listed businesses and therefore do not facilitate analysis of government owned or private businesses. Similarly, Bloomberg market values may diverge from book values during periods of interest rate volatility. On the other hand, while book valuations may address these issues they are an historical measure, and as such may not be representative of forward looking values.

That said the AER does not consider either of these approaches to be fundamentally flawed. Importantly, the AER considers that together, these measures provide a reasonable and valid estimate of the level of gearing of a benchmark efficient NSP.

#### **5.5.1.4 AER's conclusion**

The AER considers that in having regard to persuasive evidence and the NEO to determine whether the level of gearing for electricity distribution and transmission businesses differs from the existing value of 60 per cent, regard should be given to market values of debt and equity provided by Bloomberg. Specifically, the AER considers Bloomberg total debt values that have been adjusted for stapled securities, loan notes and double leveraging. The AER also considers book values provided by Standard and Poor's.

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<sup>278</sup> *ibid.*, p.13.

<sup>279</sup> *ibid.*, p.15.

## **5.5.2 Selection of businesses used to derive an industry benchmark**

In its explanatory statement the AER noted that jurisdictional regulators had selected a group of comparator businesses to inform the level of gearing based on an industry benchmark efficient NSP, rather than adopting a market-wide benchmark. When selecting the businesses to be used for an industry benchmark, the AER identified a number of considerations, such as:

- consistency in approach across other industry benchmarks applied in estimating WACC parameters where appropriate and where information is available;
- the nature of the WACC parameter being estimated; and
- empirical issues such as statistical robustness and issues related to sample selection bias.<sup>280</sup>

### **5.5.2.1 Position in explanatory statement**

The AER recognised that the selection of comparator businesses is an important factor as the sample selected has direct implications on the estimated average level of gearing. The AER considered that ideally, the level of gearing of a benchmark efficient NSP would be taken from a ‘pure play’ regulated electricity network business operating within Australia without parent ownership. However, in Australia, all electricity businesses have either part or full government ownership, own non-electricity networks, are engaged in unregulated activities, are undergoing significant restructuring activities or have private parents.<sup>281</sup> Accordingly, the AER considered it appropriate to broaden the business characteristics used to obtain an average level of gearing which it considers to be sufficiently close comparators to a benchmark efficient NSP.

The AER’s sample of comparator businesses used for the Bloomberg market analysis included:

- the APA Group
- Diversified Utility and Energy Trusts (DUET)
- Envestra
- GasNet
- SP AusNet, and
- Spark Infrastructure.

For Standard and Poor’s book value analysis, the AER’s sample of comparator businesses was expanded to also include:

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<sup>280</sup> AER, op. cit., 11 December 2008, p.77.

<sup>281</sup> *ibid.*, pp.77-78.

- CitiPower
- Country Energy
- the Dampier Bunbury Natural Gas Pipeline Trust (DBNGP)
- ElectraNet
- Energy Australia
- Energy Partnership (Gas) Pty Ltd (EPG)
- Envestra Victoria
- Ergon Energy Corporation
- ETSA Utilities
- Integral Energy
- Powercor, and
- United Energy.

#### **5.5.2.2 Submissions in response to explanatory statement**

The JIA, consistent with their response to the AER's issues paper, hold the view that 'government owned businesses should be excluded from the comparator business sample for the purposes of calculating the benchmark level of gearing'.<sup>282</sup> The JIA consider that as the market value of equity for government owned businesses cannot be observed, the subsequent use of book valuations is not appropriate. The JIA also state that government owned businesses may be subject to constraints which limit their ability to achieve commercial gearing levels.<sup>283</sup>

Additionally, the JIA submit that DUET should be excluded from the comparator business sample for the purposes of calculating the level of gearing for the benchmark efficient NSP. This is based on the grounds that 25 per cent of DUET's asset portfolio relates to international activities, principally its holding in the Pennsylvanian energy business Duquesne Light. The JIA deem such a holding to represent material international activities.<sup>284</sup>

#### **5.5.2.3 Issues and AER's considerations**

In response to the AER's explanatory paper, the JIA contend that the key issue is that government owned businesses should be excluded from the comparable sample as it is not possible to observe the market value of a government owned business's equity.<sup>285</sup>

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<sup>282</sup> JIA, *Submission in response*, op. cit., January 2009, p.50.

<sup>283</sup> *ibid.*, p.50.

<sup>284</sup> *ibid.*, p.51.

<sup>285</sup> *ibid.*, p.50.

The AER have previously addressed this issue (in section 5.5.1) by highlighting that a number of approaches to estimating the level of gearing are appropriate, including the use of book values as a proxy for market values.

The JIA further state that government owned businesses may be subject to constraints which limit their abilities to achieve commercial gearing levels.<sup>286</sup> That said, the JIA do not provide evidence to substantiate these claims.

Indeed, contrary to the JIA's views, the Standard and Poor's book value approach provides that the level of gearing of government owned businesses ranges from 43 per cent to 72 per cent. This range compares to that of privately owned businesses, whose gearing levels range from 21 per cent to 86 per cent. Accordingly, the AER considers the gearing range observed in relation to government owned businesses to be sufficiently comparable to that of a benchmark efficient NSP, and concludes that government ownership does not warrant the exclusion of a business from the comparator sample.

In regards to the inclusion of DUET in the sample, the AER established in its explanatory statement that it would consider removing DUET from the sample if it can be demonstrated that a large proportion of DUET's assets relate to international activities.<sup>287</sup> In response, the JIA supplied details that DUET's 29 per cent interest in the Pennsylvanian energy company Duquesne Light constitutes 25 per cent of DUET's total investment portfolio.<sup>288</sup>

The AER acknowledges the JIA's view that such a holding constitutes a significant and material percentage of DUET's activities. However, the AER notes that the current sample sourced from Bloomberg is already limited in size. Furthermore, DUET is included in the samples for both the AER and the ACG's analysis of beta and credit rating levels. Given the above considerations, the AER has continued to include DUET in the sample of comparator businesses used to estimate the level of gearing.

By including DUET in the sample of comparator businesses, the AER maintains the view held in the explanatory paper, that the approach used to determine the sample of comparator businesses for estimating the benchmark efficient level of gearing should be consistent with the approach used for determining the credit rating and equity beta of a benchmark efficient NSP.<sup>289</sup> The AER also observes that the JIA's own consultant, the ACG, has included DUET and the Hastings Diversified Utilities Fund (HDF) in its analysis of equity betas, and it considers that DUET is a sufficiently close comparator for its 'best comparators' analysis.

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<sup>286</sup> *ibid.*

<sup>287</sup> AER, *op.cit.*, 11 December 2008, p.78.

<sup>288</sup> JIA, *op.cit.*, January 2009, p.50.

<sup>289</sup> AER, *op.cit.*, December 2008, p.79.



It should also be noted that as shown in table 5.4 in the explanatory statement, the effect of maintaining DUET in the sample of comparator businesses has only a marginal impact on the estimated level of gearing.<sup>290</sup>

Given the inclusion of DUET in the comparator sample, the AER considers that it would be inconsistent to subsequently exclude the HDF from the comparator sample.

The HDF has significant overseas interests that contributed 35 per cent of the business's cash inflows in 2007.<sup>291</sup> As noted though, the ACG considered the HDF a sufficiently close comparator for inclusion in its 'best comparators' analysis. Similar to DUET, the inclusion of the HDF has only a marginal impact on the estimated level of gearing.

#### 5.5.2.4 AER's conclusion

The AER maintains its position in its explanatory statement that the sample of comparator businesses used to estimate the level of gearing of a benchmark efficient NSP includes all businesses that operate in the Australian market and have operations which predominantly involve network businesses in the energy sector (including electricity, gas and transmission and distribution businesses). This includes government owned energy businesses.

#### 5.5.3 Summary estimates of gearing

Table 5.3 presents the data used by the AER in determining the level of gearing of a benchmark efficient NSP. Bloomberg market valuations are presented, as are both the ACG's adjusted Bloomberg measures and Standard and Poor's book valuations.

**Table 5.3 Average gearing levels**

Year	Bloomberg (market) <sup>(a)</sup>	Bloomberg (ACG) <sup>(b)</sup>	Standard & Poor's <sup>(c)</sup>	Average
2002	66.3	67.4	61.6	65.1
2003	63.9	63.7	66.7	64.8
2004	62.2	58.2	64.7	61.7
2005	62.8	63.3	67.8	64.6
2006	60.3	62.1	66.4	63.0
2007	58.7	57.8	65.1	60.5
<b>Average</b>	<b>62.4</b>	<b>62.1</b>	<b>65.4</b>	<b>63.3</b>

Source: Bloomberg (2002-2007), Standard and Poor's Industry Report Cards for utility businesses (2002-2007).

Notes:

<sup>290</sup> *ibid.*, p.82.

<sup>291</sup> Hastings Diversified Utilities Fund, *2008 Full Year Results presentation*, February 2008, p.6.

- (a) Bloomberg (market) values refer to unadjusted Bloomberg data. The gearing level has then been calculated as the unadjusted Total Debt, divided by the sum of unadjusted Total Debt and Historical Market Capitalisation.
- (b) Bloomberg (ACG) values have been calculated based upon the same set of data as the Bloomberg (market) values. However, Total Debt has been further adjusted to remove the effects of stapled securities, loan notes and double leveraging.
- (c) Standard and Poor's gearing levels have been calculated as the Total Debt (book value), divided by the sum of Total Debt (book value) and Total Equity (book value).

The data presented in table 5.3 is similar to that portrayed graphically as figure 5.1 in the explanatory statement.<sup>292</sup> However, following changes to the comparator sample, this data has been updated.

In response to the explanatory statement, the MEU submit that given each approach yields an average greater than 60 per cent, the level of gearing of a benchmark efficient NSP should be increased to 65 per cent.<sup>293</sup> While having regard to the comments provided by the MEU, the AER does not consider that the further information submitted constitutes persuasive evidence to depart from the currently adopted level of gearing of 60 per cent.

Therefore, the AER considers increasing the level of gearing of a benchmark efficient NSP from 60 to 65 per cent seems at odds with prevailing market conditions.

## 5.6 AER's conclusion

Having regard to the submissions and data presented in the explanatory statement and subsequently discussed throughout sections 5.5.1 and 5.5.2, the AER maintains the following conclusions:

- The AER agrees with the JIA that consideration of the ratio of the market value of debt to the market value of debt and equity is required in estimating gearing levels. However, both the AER and JIA recognise that calculating the market value of debt is difficult as debt is not frequently traded. Accordingly, the AER also considers the book value of gearing is likely to be a valid proxy for the market valuation of gearing (section 5.5.1).
- The AER considers book values of debt and market values of equity as provided by Bloomberg, as well as the book values of debt and equity provided by Standard and Poor's. When applied to total debt values, regard is also given to adjusted measures of Bloomberg's market valuation approach. In contrast the AER has given limited weight to Bloomberg book valuations, and no weight has been given to net debt measures (section 5.5.1).
- For the purposes of examining gearing levels, the AER maintains its view held in the explanatory statement that businesses which do not own or operate either a gas or electricity network, have significant mergers and acquisition activities, or are involved in substantial unregulated activities, should be excluded from the sample. The AER disagrees with the JIA that government owned businesses should be

<sup>292</sup> AER, *op.cit.*, 11 December 2008, p.84.

<sup>293</sup> MEU, *Submission in response*, *op. cit.*, January 2009, p.22.

excluded. Likewise, the AER does not agree with the JIA that DUET should be excluded from the gearing analysis consistent with its inclusion in the sample of comparator businesses to estimate credit rating levels and the equity beta (section 5.5.2).

In considering a number of different sources and measurements of the gearing ratio, the AER observes that:

- The average level of gearing across the four methods of calculating the gearing ratio ranges from 62.1 to 65.4 per cent over 2002 to 2007.
- The Bloomberg ‘market valuation’ approach presents unadjusted Bloomberg total debt values. The average level of gearing estimated by the Bloomberg ‘market valuation’ approach is 62.4 per cent over the period from 2002 to 2007.
- When applied to total debt values, the ACG’s approach adjusts the Bloomberg ‘market valuation’ measure of gearing for loan notes, ‘double leveraging’ and stapled securities. The ACG approach results in an average level of gearing of 62.1 per cent from 2002 to 2007.
- The Bloomberg measure of book gearing (i.e. book value of debt and equity) provides a high average level of gearing. The AER notes that under this approach no adjustments have been made for market valuations, stapled securities or double leveraging. As a result, the AER considers it is likely to represent an upper bound on the estimated gearing ratio.
- In addition, the Standard and Poor’s measure of gearing (book value of debt and book value of equity) provides an average of 65.4 per cent from 2002 to 2007.

Having regard to the submissions and the data provided, the AER does not consider there is persuasive evidence to depart from the currently adopted level of gearing of 60 per cent.

In accordance with the NER, the AER considers that the current level of gearing:

- is supported by the most recent available and reliable empirical evidence, which the AER considers does not support a change to the existing value, and
- generates a forward looking rate of return that is commensurate with prevailing conditions in the market for funds.

In determining the value of the gearing ratio, the AER has also taken into account the revenue and pricing principles. The AER considers the gearing ratio of 60 per cent for a benchmark efficient NSP:

- together with values, methods and a credit rating for the other parameters, provides a service provider with a reasonable opportunity to recover at least the efficient costs and provides a service provider with effective incentives for efficient investment, and

- is appropriate having regard to the economic costs and risks of the potential framework in under and over investment.

On this basis, the AER considers that its proposed value achieves an outcome that is consistent with and is likely to contribute to the achievement of the NEO.<sup>294</sup>

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<sup>294</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

## 6 Risk-free rate

### 6.1 Introduction

The risk-free rate is the rate of return an investor receives from holding an asset with guaranteed payments (i.e. no risk of default). Where a risk-free rate is calculated in nominal terms (i.e. actual cash flows) the risk-free rate will compensate investors for the opportunity cost of not being able to invest in the next best equivalent 'riskless' investment. This includes compensation for:

- the time value of money
- the expected cost of inflation which is expected to decrease the purchasing power of the certain cash flows to be received, and
- other possible premiums for certain risks, which might include liquidity and inflation risk.<sup>295</sup>

A risk-free rate is used as a direct input into the CAPM to determine the required return on equity. In addition, a risk-free rate is used as an input in the calculation of the required cost of debt.

### 6.2 Regulatory requirements

#### 6.2.1 Matters the AER must have regard to under the NER

In undertaking a review of the WACC parameters, the NER sets out several matters that the AER must have regard to. Relevant to the review of the nominal risk-free rate are:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing regulated transmission or distribution services (as the case may be)
- the need for the return on debt to reflect the current cost of borrowings for comparable debt
- the need for the term of the nominal risk-free rate to be based on a benchmark efficient transmission or distribution network service provider (as the case may be)
- the need to achieve an outcome that is consistent with the NEO, and

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<sup>295</sup> The liquidity premium positively compensates investors for bearing higher interest rate risk on longer-term bonds. The inflation risk premium compensates investors for bearing the risk of higher inflation risk on longer-term nominal bonds.

- the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it<sup>296</sup>.

The AER's reasoning as to why each of these matters appear relevant to the review of the nominal risk-free rate is discussed in chapter three on the regulatory framework.

In addition, as discussed in chapter three, the AER has decided to take into account the revenue and pricing principles. The revenue and pricing principles which are directly relevant to this review are:

- providing a service provider with a reasonable opportunity to recover at least the efficient costs
- providing a service provider with effective incentives in order to promote efficient investment, and
- having regard to the economic costs and risks of the potential for under and over investment.

### 6.2.2 Previously adopted method

In addition to other relevant considerations, where a parameter cannot be determined with certainty, the NER provides that the AER must have regard to the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it. The AER must also have regard to the need to achieve an outcome that is consistent with the National Electricity Objective.<sup>297</sup>

The NER set out the initial method for estimating the nominal risk-free rate for both electricity transmission and distribution, consistent with current regulatory practice.<sup>298</sup> The basis for the current NER method – in particular the use of the yield on ten year Commonwealth Government Securities (CGS) as the risk-free proxy – was largely established by the Australian Competition Tribunal (the 'Tribunal') in its 2003 GasNet decision.<sup>299</sup> The prescribed NER method for transmission and distribution is almost identical [cls. 6.5.2(c)-(d) and 6A.6.2(c)-(d)], as set out below:

- (c) The nominal risk-free rate for a regulatory control period is the rate determined for that regulatory control period by the AER on a moving average basis from the annualised yield on Commonwealth Government bonds with a maturity of 10 years using:
  - (1) the indicative mid rates published by the Reserve Bank of Australia; and
  - (2) a period of time which is either:

<sup>296</sup> NER, cls. 6.5.4(e) and 6A.6.2(j).

<sup>297</sup> NER, cls. 6.5.4(e)(4) and 6A.6.2(j)(4).

<sup>298</sup> NER, cls. 6.5.2(c)-(d) and 6A.6.2(c)-(d).

<sup>299</sup> Australian Competition Tribunal, *Application by GasNet Australia (Operations) Pty Ltd [2003] ACompT 6*, 23 December 2003. It should be noted that some jurisdictional regulators adopted a 10 year risk-free proxy prior to the GasNet decision.

- (i) a period ('the agreed period') proposed by the relevant [Network Service Provider], and agreed by the AER (such agreement is not to be unreasonably withheld); or

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**Transmission**

a period specified by the AER, and notified to the provider prior to the commencement of that period, if the period proposed by the provider is not agreed by the AER under subparagraph (i),

**Distribution**

a period specified by the AER, and notified to the provider within a reasonable time prior to the commencement of that period, if the period proposed by the provider is not agreed by the AER under subparagraph (i),

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and, for the purposes of subparagraph (i):

- (iii) the start date and end date for the agreed period may be kept confidential, but only until the expiration of the agreed period; and
  - (iv) the AER must notify the [Network Service Provider] whether or not it agrees with the proposed period within 30 business days of the date of submission of the [initial regulatory proposal].
- (d) If there are no Commonwealth Government bonds with a maturity of 10 years on any day in the period referred to in paragraph (c)(2), the AER must (unless some different provision is made by a relevant statement of regulatory intent) determine the nominal risk-free rate for the regulatory control period by interpolating on a straight line basis from the two Commonwealth Government bonds closest to the 10-year term and which also straddle the 10 year expiry date.

It is also important to note the NER requirement that the term of the nominal risk free be equivalent to the term of the corporate bond used to calculate the debt risk premium. Specifically cls. 6A.6.2(e) and 6.5.2(e) define the debt risk premium as follows:

- (e) The debt risk premium for a regulatory control period is the premium determined for the regulatory control period by the AER as the margin between the nominal risk-free rate and the observed annualised Australian benchmark corporate bond rate for corporate bonds which have...

**Transmission**

...a BBB+ credit rating from Standard and Poors and a maturity equal to that used to derive the nominal risk-free rate.

**Distribution**

...a maturity equal to that used to derive the nominal risk-free rate and a credit rating from a recognised credit rating agency.

The length of the averaging period is not a prescribed component of the formal NER risk-free rate method, though the AER must not unreasonably withhold its agreement of an averaging period proposed by the service provider. In implementing this provision, the AER has adopted the ACCC's position as set out in the *Statement of principles for the regulation of electricity transmission revenues* (the 'SRP'), as follows:

The ACCC will accept the period used to calculate the moving average of the risk-free rate (between 5 and 40 days) submitted by a TNSP in its application.<sup>300</sup>

The averaging period adopted in distribution decisions has generally varied between 10 and 20 days in length.

### 6.3 Summary of AER's explanatory statement

In its December 2008 explanatory statement, the AER examined the reasoning contained in the Australian Competition Tribunal's (Tribunal) 2003 GasNet decision – in particular that related to the use of the yield on 10 year CGS as the risk-free rate proxy. Based upon the most current available evidence the AER made the following observations in relation to some of the Tribunal's key reasons for adopting a 10-year term assumption:

- The key issue of consistency between the risk-free rate terms in the CAPM equation is recognised as important as part of this review.
- The Tribunal in its GasNet decision did not specifically discuss or address the possibility of over-compensation resulting from the use of a term for the risk-free rate that exceeds the length of the regulatory period.
- Given that energy network businesses are estimated to have a weighted average debt maturity profile of around five years or less, there is no evidence to suggest that network businesses will seek to issue long term debt as a matter of preference.

After examining all the submissions to the Issues Paper as well as the available evidence from a number of sources, the AER's conclusions in its explanatory statement on the methodology for estimating the nominal risk-free rate were as follows:

- There is insufficient persuasive evidence to justify the use of an alternative to CGS as the appropriate risk-free rate proxy.
- While it is clear that the current conditions in debt markets are far from favourable, market-based evidence from a number of sources strongly suggests that, rather than create risks, the regulatory regime insulates energy network businesses from market volatility.

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<sup>300</sup> ACCC, *Final decision*, op. cit., 8 December 2004, p.98.



- A term of the risk-free proxy which matches the length of the regulatory period (i.e. five years) better reflects the financing strategies of regulated energy network businesses.
- The current 10-year term-to-maturity assumption will on average violate the ‘present value principle’ as it compensates regulated businesses for risks they do not face over the regulatory period. The empirical evidence indicates that the extent of over-compensation on the cost of debt has been around 40 bps on average.
- A forward-looking MRP of 6 per cent is consistent with a 5-year term assumption for the risk-free rate.
- The current NER methodology for calculating the risk-free rate will be retained, with one exception – the AER will only accept an averaging period commencing as close as practically possible to the start of the regulatory control period. An averaging period of between 10 and 40 business days in length will be accepted as reasonable.

On this basis the AER considered there to be sufficient persuasive evidence to depart from the previously adopted methodology for estimating the nominal risk-free rate, in relation to the term of the risk-free rate, and considered it is appropriate to do so.

In summary, the AER proposed that the methodology for estimating the risk-free rate be based upon the yield on CGS with a maturity matching the length of the regulatory period, calculated over a 10 to 40 business day period commencing as close as possible to the start of the regulatory control period.

## **6.4 Summary of submissions in response to explanatory statement**

In response to the explanatory statement the AER received a substantive submission from the Joint Industry Associations (JIA). The JIA’s submission on the nominal risk-free rate parameter is supported by two consultants’ reports from the Competition Economics Group (CEG)<sup>301</sup> as well as a number of statements outlining the Treasury practices of regulated network businesses.

The JIA’s submission on the nominal risk-free rate is summarised as follows:

- A report from the JIA’s consultant CEG argues that the use of the CGS yield as a proxy for the risk-free rate will lead to a cost of equity figure that underestimates the true cost of raising equity capital in the current financial environment.<sup>302</sup>

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<sup>301</sup> CEG, *Term of the risk-free rate under the NER*, A report for the Joint Industry Association, January 2009 (a); and CEG, *CGS as a proxy for the risk-free rate*, A report for the Joint Industry Association, January 2009 (b).

<sup>302</sup> *ibid.*, p. 8.

- The AER has given inadequate consideration to the cost of equity in examining the appropriate term for the risk-free rate, and in particular the issue of consistency between the risk-free rate terms in the CAPM equation.
- The AER has erred in relying on data from Deloitte on the remaining weighted average term-to-maturity of debt to conclude that a five-year term assumption is appropriate. Based on analysis from its consultants CEG, the JIA submit that the average remaining term of debt will be substantially less than the term-to-maturity at the time of issuance.
- The JIA present data on the weighted average term-to-maturity of debt at issuance for private energy network businesses as at the end of financial year 2007, which indicates a weighted average term of debt at the time of issuance of 10.14 years.
- The Treasury statements outline in some detail the strategies employed by regulated energy network businesses to manage refinancing and interest rate risk. The Treasurers express the view that the financing strategy of the private energy networks is best proxied by a 10-year rather than a 5-year term assumption for the risk-free rate.
- Contrary to the AER's conclusions in the explanatory statement regarding the term of the risk-free rate, there is no basis upon which a different view from the Tribunal in the GasNet decision could be taken.
- The MRP must be increased by around 20 bp if the AER maintains its position from the explanatory statement with respect to the term of the risk-free rate.<sup>303</sup>

Overall the JIA submit that the AER's proposal regarding the term of the nominal risk-free rate is not supported by the available evidence, particularly in relation to businesses's actual debt-raising practices.

The JIA conclude as follows:

On the basis of existing and new evidence, the JIA is of the view that there is not persuasive evidence before the AER to justify a shift from the existing 10-year term of the risk-free rate. Furthermore, once, correctly interpreted, the evidence strongly supports the status quo.<sup>304</sup>

In a separate submission the QTC also challenges some of the conclusions made by the AER in its explanatory statement with respect to the term of the risk-free rate. In particular the QTC argues that a regulated business should not be penalised for minimising refinancing risk by borrowing long term.<sup>305</sup>

In its submission the MEU and Energy Roundtable states that it agrees with the AER's proposal to move to a term for the risk-free rate that matches the length of the

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<sup>303</sup> JIA, *Submission in response*, op. cit., February 2009, pp.53-78.

<sup>304</sup> *ibid.*, p.53.

<sup>305</sup> Queensland Government, *Submission in response*, op. cit., 29 January 2009, Attachment – Queensland Treasury Corporation.

regulatory period, however there may need to be an adjustment to the MRP to reflect this change.<sup>306</sup>

## 6.5 Issues and AER's considerations

This section is structured as follows:

- proxy for the risk free asset (section 6.5.1)
- term of the risk-free proxy (section 6.5.2)
- consistency with the Market Risk Premium (section 6.5.3), and
- measuring the risk-free rate of return (section 6.5.4).

### 6.5.1 Proxy for the risk free asset

In its explanatory statement the AER considered that the JIA had not presented sufficient persuasive evidence justifying a move away from CGS as the appropriate proxy for the risk free asset.

On this basis the AER proposed to continue with the use of CGS as the proxy for the risk free asset as part of this review.

#### Submissions in response to explanatory statement

In response to the AER's explanatory statement, the JIA again commissioned CEG to investigate the CGS yield as an appropriate proxy for the risk-free rate.

CEG maintains that the use of the CGS yield as a proxy for the risk-free rate will lead to a cost of equity figure that underestimates the true cost of raising equity capital in the current financial environment. Moreover, CEG states that the current premium investors are paying for CGS indicates that CGS yields have become a worse predictor of the return a firm with zero beta must offer investors to attract equity.<sup>307</sup>

Furthermore, CEG states that:

Whether one believes that this is because the CGS yield is a poor proxy for the CAPM risk-free rate or simply because the MRP is at historic highs is irrelevant. Whatever the correct explanation, reducing other CAPM parameters without regard to the impact on the overall allowed cost of equity will widen an already large gap between the NER cost of equity and the actual cost of equity required by investors.<sup>308</sup>

CEG's main contention is that the divergence between the yields on CGS and other (zero beta) risk-free assets – for example State government bonds and Commonwealth Government guaranteed bank debt – is evidence that the CGS is no longer a true reflection of the risk-free rate. As in its previous report, CEG argues that this

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<sup>306</sup> MEU, *Submission in response*, op. cit., 30 January 2009, p.22.

<sup>307</sup> CEG, op. cit., January 2009 (b), p.5.

<sup>308</sup> *ibid.*, p.8.

divergence represents a ‘convenience yield’ that reflects investors’ willingness to pay a premium for the ‘non-beta’ attributes of CGS. CEG continues to define the criteria for a risk-free rate as reflecting:

...zero CAPM risk (a zero beta) but otherwise similar qualities to the non-government equity being priced. In particular, this includes similar levels of liquidity.<sup>309</sup>

The report also addresses Handley’s ‘differential liquidity’ explanation for the divergence in yields on very low-risk assets, as referenced by the AER in its explanatory statement. CEG argues that Handley’s explanation recognises the existence of a fundamental difference in liquidity characteristics between CGS and non-CGS, and therefore in fact supports the view that CGS is a poor proxy for the CAPM risk-free rate. Specifically CEG states that:

...it does not matter whether the pricing of liquidity is semantically thought of a raising non-CGS required returns or lowering CGS required returns – either way CGS returns underestimate the required return for an asset of a similar beta but different liquidity (such as equity).<sup>310</sup>

The CEG report examines current CGS yields relative to the yields on other very low risk assets – citing the following:

- Commonwealth guaranteed bank debt is being issued at yields between 178–248 bp above CGS
- State debt yields exceed the CGS yields by more than 100 bp, and
- a reduction in the breakeven inflation rate (to below RBA expectations) as measured by the difference between nominal CGS and inflation-indexed CGS.<sup>311</sup>

Separate submissions from the NSW Treasury and Envestra also cite similar examples of what they consider a heightened convenience yield on CGS. Both submissions argue for either an alternative proxy for the risk-free rate, or an adjustment to take account of the convenience yield on CGS.<sup>312</sup>

CEG’s interpretation of this data is that it provides strong evidence of the heightened demand for the liquidity of CGS in the current financial crisis and goes further to support the argument that the CGS yield is an inappropriate proxy for the risk-free rate. In addition, CEG argues that:

...there is no basis to believe that the yield on CGS is a better proxy for the risk-free rate than the yield on State Government debt.<sup>313</sup>

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<sup>309</sup> *ibid.*, p.5.

<sup>310</sup> *ibid.*

<sup>311</sup> *ibid.*, pp.5-6, and 11-12.

<sup>312</sup> NSW Treasury, *Submission in response*, op. cit., 28 January 2009, pp.10-11; Envestra, *Submission in response*, op. cit., 28 January 2009, pp.5-6.

<sup>313</sup> CEG, op. cit., January 2009 (b), p.7.

CEG suggests a range of possible solutions to overcome the problems it associates with CGS in providing for an appropriate yield to price non-Government equity. CEG suggests that the AER could define an alternative proxy for the risk-free rate, however it acknowledges that:

...the value of this as a proxy for the underlying risk-free rate may vary over time and may be overtaken by events.<sup>314</sup>

CEG favours an approach of adding an incremental adjustment to the CGS yield at each reset, as in its view it ensures a more accurate estimate of the forward looking cost of equity.

### **Issues and AER considerations**

The key issue concerning the AER as part of this review is whether there is currently any viable and adequate alternative to the CGS yield as a proxy for the nominal risk-free rate.

While the AER acknowledges that a gap currently exists between the yields on CGS and other very low risk assets (e.g. Commonwealth-guaranteed bank debt, State Government debt), it does not necessarily support the view that CGS is a poor proxy for the risk-free rate.

The AER reiterates the earlier views from Handley that there is no ‘unambiguous’ evidence in the finance literature that suggests the spread between CGS and other default-free non-CGS assets is driven purely by the relatively higher liquidity characteristics of CGS. Handley stated that:

Importantly, this literature highlights the relative nature of the liquidity advantage of government bonds over corporate bonds (or swaps) – for example, if liquidity is a priced factor then part of the credit spread may be interpreted as either (i) a price premium (lower expected return) that investors pay for holding (relatively) liquid government bonds – consistent with CEG/NERA’s views or alternatively, (ii) a price discount (higher expected return) that investors receive for holding (relatively) illiquid corporate bonds (or swaps).

The AER notes that CEG (and others) have suggested the following relative indicators of a high ‘convenience yield’ on CGS:

- yields on Commonwealth government guaranteed bank debt,
- yields on State government debt, and
- current implied breakeven inflation rate as implied by the fisher equation.

The AER will discuss each of these in turn.

In the AER’s view CEG has not demonstrated that Commonwealth government guaranteed bank debt is entirely free from the risk of default such that it could represent a reliable alternative proxy for the risk-free rate.

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<sup>314</sup> *ibid.* pp.10-11.

The AER considers that bank debt is still likely to carry an element of default risk, not least due to the limited terms of the deposit and wholesale funding guarantees which expose future holders of bank debt to the possibility of default. In addition, both the wholesale funding and deposit guarantees will be reviewed on an ongoing basis and revised if necessary.<sup>315</sup> This creates uncertainty around the length and coverage of the guarantees and would suggest that a positive level of default risk would indeed be incorporated in quoted yields. As noted by David Green in the recent S3 report prepared for the AEMC on the impact of the ‘global financial crisis’:

Anything that adds uncertainty or additional risks in the eyes of investors needs to be mitigated, managed and/or priced by them.<sup>316</sup>

It is also worth noting that the yield spread on government guaranteed debt over CGS ranges between 178 and 248 bp, indicating significant variability among individual financial institutions. This highlights the current instability in the yields on government guaranteed bank debt across different financial institutions, and provides further evidence that the yield on such debt is likely to contain a positive default risk premium.

On this basis the AER does not consider that Commonwealth guaranteed bank debt yield can be considered a true zero-beta risk-free rate appropriate for use in the Sharpe CAPM, nor can it be used as a benchmark to illustrate any claimed downward bias in the CGS yields.

Regarding the relevance of State government debt, as stated above the AER maintains its argument that the measurement of a liquidity premium is not clear. That is, it is an open question whether a premium should be paid for CGS due to their relatively higher liquidity characteristics, or whether a discount should be applied to non-CGS assets due to their relative illiquidity characteristics.<sup>317</sup> It therefore cannot be persuasively determined whether the CGS yield is downwardly biased, or whether instead the State Government debt yields demonstrate an upward bias.

Given the ambiguity of such a measurement, the AER considers that there is no persuasive evidence to use the yield on State Government debt instead of the CGS yield as a proxy for the risk-free rate.

It is noted that the credit ratings of the Australian State of Queensland and the Queensland Treasury Corporation have recently been downgraded (from 'AAA/A-1+' to 'AA+ / A-1+'),<sup>318</sup> which suggests that State issued debt may not be unequivocally

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<sup>315</sup> Australian Government, *Guarantee Scheme for Large Deposits and Wholesale Funding*, 2008, Australian Government guarantee scheme, <<http://www.guaranteescheme.gov.au/qa/wholesale-funding.html>>, accessed on: 23 April 2009.

<sup>316</sup> D. Green, *Financing of future energy sector investments in Australia: The potential effects of the Carbon Pollution Reduction Scheme and Renewable Energy Target*, S3 Advisory, December 2008, p.21.

<sup>317</sup> J. C. Handley, *Comments on the CEG report “Establishing a proxy for the risk-free rate”*, November 2008, p.4.

<sup>318</sup> Standard and Poor’s, *Ratings On State Of Queensland Lowered To 'AA+' With Stable Outlook On Expectation Of Weaker Budgetary Performance*, February 2009, <<http://www2.standardandpoors.com/portal/site/sp/en/au/page.article/4,5,5,1,1204844412721.html>>, accessed on: 20 February 2009.

considered free of default. Further, the AER notes that on 26 March 2009 the Commonwealth Government extended the federal guarantee to State Government debt.<sup>319</sup> The fee payable by State Governments will range between 30 and 35 bp depending on credit rating, which is significantly less than that payable by the banks for access to the federal guarantee. This difference in the fees payable by the various parties seeking a guarantee casts further doubt on CEG's claim that credit risk is equivalent across these various low risk issuers. It also highlights further the risk for the AER in over-reacting to the currently volatile conditions in debt markets as part of this review.

On this basis the AER does not consider there is persuasive evidence to adopt the yield on State government debt as an appropriate proxy for the risk-free rate, nor can it be used as a benchmark to measure any claimed downward bias in the CGS yield.

The AER notes the views from CEG and the NSW Treasury regarding the decrease between nominal and indexed CGS yields, in the context of the RBA's inflation forecasts. On this point the AER notes that it has previously determined that the yields on indexed CGS are not a reliable estimate given supply concerns in that market. The indexed CGS market is characterised by illiquidity, which has been acknowledged by the RBA in previous advice to the ACCC. The RBA stated that:

The issue of insufficient supply is relevant for the indexed bond market. Turnover in the bonds is low and the market is fairly illiquid.<sup>320</sup>

There has been no evidence presented to suggest that the supply situation in indexed CGS markets has changed such that these yields can now be considered reliable. On this basis the AER maintains its previous view that any conclusions drawn from the indexed CGS market are questionable.

An important consideration in the current debate on the proxy for the risk-free rate has been the rejection of CEG's proposed alternative proxies within a relatively short space of time as a result of developments in financial markets. This is particularly the case for the yield on credit default swaps (CDS) insured debt and the fixed component of the bank bill swap rate (BBSW) – two alternative proxies that have featured prominently in previous NERA/CEG reports on this issue, but have since been withdrawn as being unreliable. The latest CEG report acknowledges this critical issue and notes the following:

The AER could define an alternative risk-free rate but the value of this as a proxy for the underlying risk-free rate may vary over time and may be overtaken by events. Indeed, the impact of the Government guarantee of bank debt appears to have reduced the usefulness of bank bill swap rates as a proxy for the CGS.<sup>321</sup>

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<sup>319</sup> D. Crowe, *Swan throws debt lifeline to states*, Australian Financial Review, 26 March 2009. The AER also notes that the spread on semi-government debt to CGS narrowed sharply immediately following the Commonwealth Government's announcement.

<sup>320</sup> RBA, *Letter from Reserve Bank of Australia Financial Market Group to Mr Joe Dimasi ACCC re: distortions in CGS yields*, 9 August 2007, p.3.

<sup>321</sup> CEG, op. cit., January 2009 (b), p.9.

This statement from CEG highlights the lack of persuasive evidence for moving away from the CGS yield as the proxy for the risk-free rate, and indeed the inherent risk of doing so, particularly given the currently unstable economic environment. In the AER's view the CGS yield continues to provide the most reliable and viable proxy for the nominal risk-free rate in the Australian market.

Finally, the AER notes CEG's argument that adoption of the current CGS yield as the proxy for the risk-free rate will understate the prevailing cost of equity. CEG makes a number of suggestions, including:

- Adopt a similar approach to UK regulators and estimate a revised value for the cost of equity that does not alter with prevailing government bond rates.
- Retain CGS as the proxy for the risk-free rate, but at each reset include an increment on the CGS yield based on the current evidence of divergence between CGS and other zero beta assets.

As CEG acknowledges, the option to take a longer averaging period for the risk-free rate has not been consulted on by the AER to date, hence it is not a viable option as part of this review. In any case, this method of estimating the risk-free rate is inconsistent with one of the key assumptions underpinning the Sharpe CAPM prescribed by clause 6.5.2(b) of the NER. Specifically a longer term historical estimate of the risk-free rate would not represent a best estimate of forward-looking expectations over the relevant CAPM period.

The AER has considered CEG's suggestion to add, on a reset-by-reset basis, an increment to the current CGS yield based on the differences in yields between CGS and other zero or very low risk instruments. The AER rejects this approach as it does not believe an ad-hoc adjustment to the CGS yield is consistent with a sustainable, long term method to estimate the cost of equity capital which creates regulatory uncertainty.<sup>322</sup> Given that regulatory certainty is considered important in promoting efficient investment, the AER considers that such an approach would not be consistent with the National Electricity Objective (NEO).

On this basis the AER considers that the prevailing yield on CGS at the time of a reset provides the best forward-looking estimate that is commensurate with prevailing conditions in the market for funds for the purposes of determining the cost of equity. The AER notes that broader issues associated with the MRP and the overall cost of equity are addressed at chapters seven and two respectively.

### **AER conclusions**

There was not any new information contained in submissions to the explanatory statement that has given the AER cause to depart from its position in the explanatory statement on the risk-free rate proxy.

In the AER's view, there is no persuasive evidence to suggest that a more appropriate proxy for the risk-free rate exists, or indeed that the CGS yield exhibits any

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<sup>322</sup> It is noted however, that electricity DNSPs may propose a departure from the AER's final decision on the WACC parameters at the time of a reset.



downward bias. On this basis the AER concludes that the most appropriate proxy for the risk-free rate remains the nominal CGS yield.

### **6.5.2 Term of the risk-free proxy**

The currently adopted methodology under the NER for estimating the risk-free rate is based on a 10-year term assumption. In turn, the NER methodology has been consistently adopted by all regulators in the Australian energy sector since the Tribunal's 2003 GasNet decision (including the ACCC and the AER).<sup>323</sup>

In the explanatory statement the AER examined in particular the concept of the 'present value principle', which simply states that correct compensation should be provided for the risks faced over the regulatory (i.e. price-setting) period. On the equity side the AER considered that application of the present value principle supports a term for the risk-free rate which matches the length of the regulatory period, given that the cost of equity is reset each regulatory period.

In response to the issues paper the JIA submitted that a 10-year term assumption remains appropriate, particularly on the debt side given that refinancing risk is best mitigated by seeking long term finance. In order to empirically explore the concept of the present value principle on the debt side, the AER examined the actual term of debt portfolios of the regulated energy network businesses, including a number of issues such as refinancing risk, liquidity and transaction costs.

The AER's reasoning for a term matching the length of the regulatory period on the debt side was as follows:

- Data from Deloitte provided evidence that, at least in a relative sense, there is not an issue with liquidity in shorter term (e.g. five-year) CGS and corporate bond markets. On this basis a potential move to a term matching the length of the regulatory period was not expected to impose additional costs in terms of illiquidity.
- Data provided in report from Deloitte indicated a weighted average debt term of five years or less for energy network businesses, implying that refinancing takes place every five years or less (on average). Therefore a potential move to a term matching the length of the regulatory period (i.e. five years) was not expected to impose additional refinancing risk.
- There was no evidence provided to suggest an incremental increase in debt transactions costs as a result of a potential move to a risk-free rate term which matches the length of the regulatory period, given that the current methodology supports a five year refinancing assumption.
- Data from Deloitte indicated that there is a positive term premium between 10 and five year corporate bonds, indicating a material incremental benefit to consumers as a result of a potential move to a risk-free rate term which matches the length of

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<sup>323</sup> The AER notes that a number of jurisdictional regulators adopted a 10-year term assumption prior to the Tribunal's GasNet decision.

the regulatory period. The quantum of the term premium was estimated to average around 40 bps on the cost of debt.<sup>324</sup>

Therefore, based on the available evidence, the AER considered there to be persuasive evidence to move away from a 10-year term assumption to a term that matches the length of the regulatory period. Specifically the AER considered that a term matching the length of the regulatory period would provide correct compensation for the risks faced over the regulatory period (for both equity and debt).

Additionally, based upon the evidence available the AER considered there to be significant counter-arguments to a number of the Tribunal's reasons for adopting a 10-year term assumption in its GasNet decision (leaving aside the issue of consistency with the MRP), including:

- It did not appear that the issue of potential incorrect compensation resulting from the use of a term for the risk-free rate that exceeds the length of the regulatory period was specifically raised, discussed or addressed as part of the Tribunal's GasNet decision.
- Given that energy network businesses are estimated to have a weighted average debt maturity profile of around five years or less, there was no evidence to suggest that network businesses will seek to issue long term debt as a matter of preference. It appeared that the evidence upon which this current assessment has been made was not before the Tribunal at the time of making its conclusions in the GasNet decision.

On this basis, the AER considered there to be persuasive evidence to depart from the 10-year term assumption as established by the Tribunal in its GasNet decision, and considered it appropriate to do so. Based on the available evidence the AER proposed that the term of the risk-free rate match with the length of the regulatory period (normally five years).

### **Submissions in response to the explanatory statement**

In their submission to the explanatory statement the JIA contend that there is no persuasive evidence to depart from the well-established commercial and regulatory practice of using a 10-year term assumption for the risk-free rate.

The JIA challenge some of the AER's key conclusions on the appropriate term of the risk-free rate, stating that:

1. the evidence presented by the JIA conclusively shows energy network businesses will seek to issue long-term debt as a matter of preference;
2. this is supported by the AER's own Deloitte evidence when it is interpreted properly;

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<sup>324</sup> Given the NER requirement to have equivalent bond terms [cls. 6A.6.2 (e) and 6.5.2(e)], in estimating the over-compensation the AER has had regard not only to the effect on the risk-free rate but also to the effect on the corporate bond rate.

3. A term of the risk-free proxy that matches the length of the regulatory period (i.e. the yield on the 5 year CGS) is contrary to the financing strategies of benchmark regulated energy network businesses which do not include the Government owned businesses;
4. There is no over-compensation resulting from the use of a risk-free rate that exceeds the duration of the regulatory period.<sup>325</sup>

The JIA submit that the AER has given inadequate consideration to the cost of equity in examining the appropriate term for the risk-free rate, and in particular the issue of consistency between the risk-free rate terms in the CAPM equation. This argument is also made by the Queensland Treasury Corporation (QTC) in its submission on behalf of the Queensland Government. The QTC argues that the term of the regulatory period is not relevant to the term of the risk-free rate proxy in a conceptual sense, and also states that:

We strongly disagree with the AER's use of actual debt maturity information to justify shortening the proxy term to 5 years. This information is of no relevance whatsoever in calculating expected equity returns within the CAPM framework.<sup>326</sup>

The need to focus the analysis on the cost of equity is also supported in separate submissions from Ergon, Grid Australia, the Financial Investors Group (FIG) and NSW Treasury.

One of the JIA's key arguments in response to the explanatory statement is that the AER has erred in relying on data from Deloitte on the remaining weighted average term-to-maturity of debt to conclude that a five-year term assumption is appropriate:

It is the term-to-maturity of the debt at the time of issuance that is the relevant metric for the CAPM framework, as this illustrates the time period for which the debt was actually issued (i.e. preferred term-to-maturity).<sup>327</sup>

The distinction between the remaining term-to-maturity and the term-at-issuance of debt portfolios is also raised in separate submissions from the QTC, Energex, Envestra, and the FIG.

Based on analysis from its consultant CEG, the JIA submit that the average remaining term of debt will be substantially less than the term-to-maturity at the time of issuance. Applying some assumptions CEG calculates that the data relied upon by the AER in its explanatory statement actually supports a weighted average term-to-maturity at issuance of around 12 years.<sup>328</sup> The JIA note that this result is broadly in line with evidence presented in its original submission indicating a weighted average term of debt at issuance of 11.4 years.

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<sup>325</sup> JIA, *Submission in response*, op. cit., February 2009, p.77.

<sup>326</sup> Queensland Government, *Submission in response*, op. cit., 30 January 2009, p.1.

<sup>327</sup> JIA, *Submission in response*, op. cit., February 2009, p.55.

<sup>328</sup> CEG, op. cit., January 2009 (a), pp.9-10.

The JIA have also identified several issues with the data relied upon by Deloitte in its report, which it argues detracts from the reliability of the weighted average term-to-maturity of debt portfolios as presented.<sup>329</sup>

In its submission the JIA present data on the weighted average term-to-maturity of debt at issuance as at the end of financial year 2007, for the following private energy network businesses:

- Citipower and Powercor
- ETSA Utilities
- SP AusNet, and
- Envestra.

The data provided by the JIA in its submission indicates a weighted average term of debt at the time of issuance of 10.14 years.<sup>330</sup> The JIA submit that:

The above table demonstrates that the conclusions drawn from Deloitte's analysis – namely that network companies do not have a preference for longer term debt – is incorrect.<sup>331</sup>

On a confidential basis, Citipower and Powercor, SP AusNet and Envestra also provided a breakdown of the full debt portfolio amounts provided in the JIA submission into broad debt categories.

The JIA argue that the debt-raising practices of government-owned energy network businesses should not be used in setting a benchmark term for the risk-free rate proxy, as government owned businesses do not face the same refinancing risks as private businesses.<sup>332</sup> This is supported by the JIA's consultant CEG.<sup>333</sup>

The JIA's submission on the nominal risk-free rate parameter is supported by a number of statements outlining the Treasury practices of energy network businesses, including from:

- Sim Buck Khim (Jemena)<sup>334</sup>
- Gregory Meredith (Envestra)<sup>335</sup>
- Andrew Noble (Citipower and Powercor)<sup>336</sup>

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<sup>329</sup> JIA, *Submission in response*, op. cit., February 2009, pp.56-57.

<sup>330</sup> *ibid.*, p.58.

<sup>331</sup> *ibid.*

<sup>332</sup> *ibid.*, pp.59-60.

<sup>333</sup> CEG, op. cit., January 2009 (a), p.6.

<sup>334</sup> S. B. Khim, *Statement of Sim Buck Khim, Head of Treasury – Jemena*, 2 February 2009.

<sup>335</sup> G. D. Meredith, *Statement of Gregory Damien Meredith, Treasurer for Envestra*, 2 February 2009.

- Alastair Watson (SP AusNet),<sup>337</sup> and
- Queensland Treasury Corporation.<sup>338</sup>

The Treasurers state that refinancing risk is a key concern for both shareholders and credit rating agencies, and that it can even threaten the viability of a business with strong underlying fundamentals. According to the Treasurers, refinancing risk is best managed by:

- having longer term debt to provide certainty of funding,
- having a range of debt instruments with a range of maturities to ensure that there is not too much debt maturing in any one year (no more than 15-25 per cent),
- arranging debt refinancing well in advance of maturity, and
- obtaining finance from a variety of sources and markets, with appropriate consideration of the benchmark 'efficient' size and term of the market in question, and the timing of the issuance into that market.

The Treasurers state that in choosing a term of maturity for new debt issuances, the objective is to seek the longest possible tenor at a price considered reasonable. As Gregory Meredith of Envestra explains:

Usually, therefore, there is a trade-off that must be made between a long term which reduces refinancing risk and the price of debt which, if the yield curve steeply slopes upward, imposes a high cost on the company outstripping the regulatory allowances and appetite for shareholders to suffer reduced returns even when risk is reduced.<sup>339</sup>

The Treasurers explain that interest rate risk is managed separately by hedging against movements in base rates away from the risk-free rate assumed by the regulator at the reset (i.e. via BBSW swaps). The credit spread is determined at the time of the physical debt issuance and cannot be effectively hedged. Typically businesses hedge the base interest rate risk for between 80 per cent and 100 per cent of their debt portfolios at the time of the regulatory reset.

Overall the Treasurers express the view that the financing strategy of the private energy networks is best proxied by a 10 year rather than a 5-year term assumption for the risk-free rate.

The JIA state that these Treasury statements are direct evidentiary accounts of how debt raising is actually undertaken by the private regulated network businesses in

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<sup>336</sup> A. Noble, *Statement of Andrew Nole, Senior Treasury Analyst – Citipower and Powercor*, 29 January 2009.

<sup>337</sup> A. Watson, *Statement of Alastair Watson, Treasurer for SP AusNet*, 30 January 2009.

<sup>338</sup> Queensland Treasury Corporation, *Expert Statement*, 2 February 2009.

<sup>339</sup> G. D. Meredith, *Statement*, op. cit., February 2009, p.4.

practice, and therefore provide an ‘unequivocal, full factual basis’ upon which the AER may base its final decision.<sup>340</sup>

In a separate submission the QTC also challenge some of the conclusions in the explanatory statement with respect to the term of the risk-free rate. The QTC submits that:

- a regulated business should not be penalised for minimising refinancing risk by borrowing long term
- the use of interest rate swaps to manage interest rate risk over the regulatory period does not influence the frequency of refinancing or the size of the credit margins
- hedging is not costless, and should therefore be compensated by the regulatory regime
- given that refinancing does not take place each five years, a term assumption matching the length of regulatory period (i.e. five years) will significantly increase refinancing risk and transactions costs, particularly in the current market
- most of the term premium calculated by the AER does not measure actual over-compensation as it represents the credit margin which is still payable by the typical network business with long term debt on issue, and
- the extent of any true term premium is immaterial and declining over time.<sup>341</sup>

Based on the evidence now presented, the JIA argue that the AER has no basis to challenge the outcomes of the Tribunal’s 2003 GasNet decision. Regarding the AER’s statement that there does not appear to be evidence that regulated energy network businesses issue long term debt as a matter of preference, the JIA state:

...these findings are based on a fundamental misinterpretation of evidence by the AER. The JIA has also provided further evidence that network businesses will seek to issue long term debt as a matter of preference.<sup>342</sup>

Also in relation to the AER’s statement that the issue of potential overcompensation from a term that exceeds the length of regulatory period was not specifically raised or addressed in the Tribunal’s GasNet decision, the JIA state:

The AER’s argument relies on the fact that they believe the businesses issue short term debt but are compensated for long term debt in the regime... the evidence shows the businesses issue debt at a similar maturity to that assumed in the current regulatory regime (10 years). Therefore, there is no evidence of overcompensation.<sup>343</sup>

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<sup>340</sup> JIA, *Submission in response*, op. cit., February 2009, p.54.

<sup>341</sup> Queensland Government, *Submission in response*, op. cit., 30 January 2009, pp.2-3.

<sup>342</sup> JIA, *Submission in response*, op. cit., February 2009, pp.61-62.

<sup>343</sup> *ibid.*, p.62.

Based on these findings the JIA argue that, contrary to the AER's conclusions in the explanatory statement, there is no basis upon which a different view from the Tribunal in the GasNet decision could be taken.

Further, the JIA state that it is 'a matter of concern' that the AER is essentially reopening a Tribunal decision that established a strong regulatory precedent. This is also raised by Envestra and United Energy in their submissions, which argue that the AER's proposal to move to a term for the risk-free rate which matches the length of the regulatory period has increased regulatory risk for the sector.

### **Issues and AER's considerations**

This section will focus on the issues raised in submissions on the appropriate term of the risk-free rate. The issue of maintaining consistency with historical estimates of the MRP – one of the key reasons for the Tribunal in its GasNet decision – is discussed separately at section 6.5.3.

This section assesses the various issues on the appropriate term for the risk-free rate by looking at the following inter-related aspects in turn:

- Framework for analysis
- Financing strategies
- Benchmark assumption
- Empirical evidence.

#### ***Framework for analysis***

One of the key themes from submissions relates to the AER's approach to setting an appropriate term for the risk-free rate, and in particular the extent of focus on the cost of debt relative to the cost of equity.

The QTC criticises the AER's approach, arguing that the length of the regulatory period and debt financing strategies are irrelevant considerations in setting an appropriate term for the risk-free rate. For example the QTC states that:

The process of calculating a regulated WACC simply takes a 'snapshot' of the cost of capital at a particular point in time and fixes the return on capital for a 5 year period. It is inappropriate to confuse the frequency of measurement of the cost of capital with the length of risk free and risky assets which the investor compares to determine the required return for investing in a regulated business...

... The length of the regulatory period is arbitrary, has no economic basis and, therefore, is not relevant to the calculation of expected returns.<sup>344</sup>

Similarly the FIG argues that the clearest and most transparent evidence on the appropriate term of the risk-free rate is provided by market practice, and therefore the

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<sup>344</sup> Queensland Government, *Submission in response*, op. cit., 30 January 2009, p.4.

length of the regulatory period should not be a central consideration.<sup>345</sup> The FIG provides a statement from independent expert valuer Grant Samuel indicating that a 10 year risk-free rate term is commonly used as a benchmark for valuation purposes.

In essence it appears that the QTC and the FIG are arguing that the relevant term for the risk free asset should reflect the investment horizon of equity investors rather than the price-setting period. On this theoretical point, the AER notes that the CAPM is a single-period model, however there is no guidance in theory on the length of the CAPM period. This ambiguity is acknowledged by Officer and Bishop in their report for the JIA in response to the AER's WACC issues paper:

The CAPM is a one period model but the time period is not specified...  
...Conceptually it is the price setter's horizon that would define the period but typically there is an assumption of some match between the asset life and investors' planning horizon.<sup>346</sup>

In the current context it is clear that the price setter's horizon is defined as being equal to the length of the regulatory period – given that the outcome of the AER's WACC review will apply for the term of the regulatory period for each business subject to the review, at which time the parameters (including the prevailing risk-free rate) will be reset. While explicit definition of the price-setting period does not necessarily preclude the relevance of asset lives to the analysis, it is the basis upon which the AER has discussed the 'present value principle' in selecting an appropriate term for the risk-free rate in a regulatory context. For example in the issues paper the AER stated that:

...in a regulatory setting, use of a term for the risk-free rate that exceeds the length of the regulatory period may lead to overcompensation – for risks that are essentially removed at each reset...

...This outcome does not appear consistent with the principle that in setting fair rates of return on regulated investments, the present value of expected future cash flows should equate to the initial investment such that the net present value of the investment is zero (the 'present value principle').<sup>347</sup>

The present value principle has been discussed previously by a number of finance experts as part of the regulatory debate in this area.<sup>348</sup> It is merely a framework within which to consider efficient compensation for regulated investments, having regard to the risks faced over the regulatory period as defined.

Conceptually it could be argued that the only risk-free rate which satisfies the present value principle is that with a term matching the length of the regulatory period (assuming an upward-sloping yield curve and leaving aside transactions costs). Put

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<sup>345</sup> Financial Investor Group, *Submission in response*, op. cit., January 2009, p.48.

<sup>346</sup> Officer & Bishop, *Term or risk-free rate*, Report to ENA, APIA and Grid Australia, September 2008, p.7.

<sup>347</sup> AER, *Issues paper: Review of the weighted average cost of capital (WACC) parameters for electricity transmission and distribution*, Issues Paper, August 2008, p.33.

<sup>348</sup> For example, see: Lally, *Determining the risk-free rate for regulated companies*, prepared for the ACCC, August 2002, pp.4-8; and Davis, *Report on risk free interest rate and equity and debt beta determination in the WACC*, prepared for the ACCC, August 2003, p.15.



another way, even if the investor's horizon extends beyond the regulatory period, arguably the only risk-free rate which correctly compensates for a regulated investment over its life is that with a term which matches the length of the regulatory period. This point has been made previously by Professor Lally in relation to a 10-year term assumption:

In the presence of a liquidity premium in the term structure of interest rates, the allowed price is greater than it otherwise would be. This increased allowance is inappropriate because the regulated firm is being compensated for bearing interest rate risk for a period beyond the review term, when it does not face that risk due to the resetting of the output price to reflect interest rate changes.<sup>349</sup>

These same arguments apply in relation to the relevance of market practice. The AER has had regard to market practice in its analysis of the appropriate term for the risk-free rate, in particular the observed practice of independent expert valuer Grant Samuel. The key issue of significance is that the regulatory regime provides for a full reset of the cost of capital at defined intervals, whereas such explicit resets are not evident in the unregulated sector. In the absence of regular and defined price resets a longer term risk-free rate may be more appropriate.

The AER also notes the QTC's argument that any reduced interest rate risk brought about by regulatory price-setting should be reflected in a lower equity beta, and on this basis deeming a risk-free rate term equal to the length of the regulatory period double-counts the risk reduction and may under-compensate equity investors.<sup>350</sup> The AER agrees with the QTC that the underlying risks faced by regulated energy network businesses should be reflected in the empirical equity beta estimates. However it does not necessarily follow that equity investors will be under-compensated by a risk-free rate term equal to the length of the regulatory period. As stated above, arguably the only risk-free rate which correctly compensates for a regulated investment over its life is that with a term which matches the length of the regulatory period.

For clarity, the AER is not suggesting that regulated energy network businesses only bear risks for a finite period equal to the length of the regulatory period. Rather the AER's objective is to provide correct compensation to for the risks faced over each defined regulatory reset period.

One of the other key arguments raised in submissions is that the AER has inappropriately focused on the cost of debt in its analysis on the term of the risk-free rate. For example the QTC argues that:

The interaction of clauses 6A.6.2(e) and 6.5.2(e) in drawing a direct connection between the term of the risk free (asset) and the credit premium on the corporate bond do not allow the AER to decide the term of the risk-free

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<sup>349</sup> M. Lally, *Determining the risk-free rate for regulated companies*, prepared for the ACCC, August 2002, pp.4-8.

<sup>350</sup> Queensland Government, *Submission in response*, op. cit., 30 January 2009, p.4.

rate by reference to the term of corporate bonds issued by regulated entities.<sup>351</sup>

The NER provisions referred to above by the QTC [cls. 6A.6.2(e) and 6.5.2(e)] require that the maturity of the corporate bond used to calculate the debt risk premium is equal to that used to derive the nominal risk-free rate. While the AER has clearly had regard to these provisions, it has not exclusively relied upon cost of debt considerations in coming to its decision on the appropriate term for the risk-free rate. Rather, as with the cost of equity, the AER has been guided by the present value principle in examining the debt financing practices of regulated energy network businesses.

The JIA's consultant CEG argues that a focus on the cost of debt in setting the term of the risk-free rate is inappropriate as it violates a fundamental principle of asset pricing theory – that the value of an asset is determined independently of the way in which it is funded. CEG states that:

...one gains the impression that the AER believes that it is efficient to issue short term debt (which has lower interest rates) provided that the transaction costs of issuing short term debt are not higher by an offsetting amount.

We do not agree with this. The principle of conservation of risk suggests that any lower interest rates available from issuing short term debt will be fully offset by a higher cost of equity – this is known as the Modigliani-Miller theorem.<sup>352</sup>

In the AER's view, CEG correctly observes that the impact of current debt financing practices on interest rate risk should already be reflected in empirical equity beta estimates. However, as the AER's objective is to provide fair compensation for the *current* financing practices of a benchmark efficient firm, this final decision is not expected or intended to change debt raising practices such that the risk to equity-holders would increase as a result. On this basis the AER does not consider that its focus on the cost of debt to inform the appropriate term of the risk-free rate will in any way violate the Modigliani-Miller theorem.

In summary, the AER's approach to examining the appropriate term of the risk-free rate can be summarised as follows:

- Assuming an upward sloping term structure of interest rates, conceptually it could be argued that the only means of providing correct compensation for the risks faced by equity investors over the regulatory period is for the term of the risk-free rate to match the term of each regulatory price-setting period over the life of that asset.<sup>353</sup>

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<sup>351</sup> *ibid.*, p.5.

<sup>352</sup> CEG, *op. cit.*, January 2009 (a), p.7.

<sup>353</sup> This raises the issue of consistency with the term of the risk-free rate assumed in the calculation of the MRP, as discussed at section 6.5.3.

- Given the NER requirement to have consistent terms for the risk-free rate across equity and debt, as part of this review the AER has had regard to the debt financing strategies of the benchmark efficient regulated energy network business.
- In examining the debt financing practices of the benchmark efficient business the AER's objective has been not only to seek an outcome which satisfies the present value principle (i.e. to provide correct compensation for the cost of debt), but also to ensure that the outcome does not unreasonably increase refinancing risk for the sector.

This approach remains consistent with the cost-benefit framework outlined by the JIA's consultants, Officer and Bishop, in response to the issues paper, and that which was subsequently adopted by the AER in its explanatory statement.<sup>354</sup>

### *Financing strategies*

The AER notes that the JIA accept the AER's approach of examining the debt financing strategies of network businesses to inform its assessment on the term of the risk-free rate:

The JIA's submission is that the AER must give appropriate weight to the debt practices of network companies. In doing so, it can be reasonably assumed that network companies currently face strong incentives to minimise refinancing costs, and therefore that current practice is best practice.<sup>355</sup>

The AER has examined the debt financing strategies of regulated energy network businesses, as described in the Treasurers' statements. It is clear from these statements that the central task of the Treasury function at these businesses is to manage risks (i.e. refinancing, interest rate and currency risks) at the lowest possible cost.

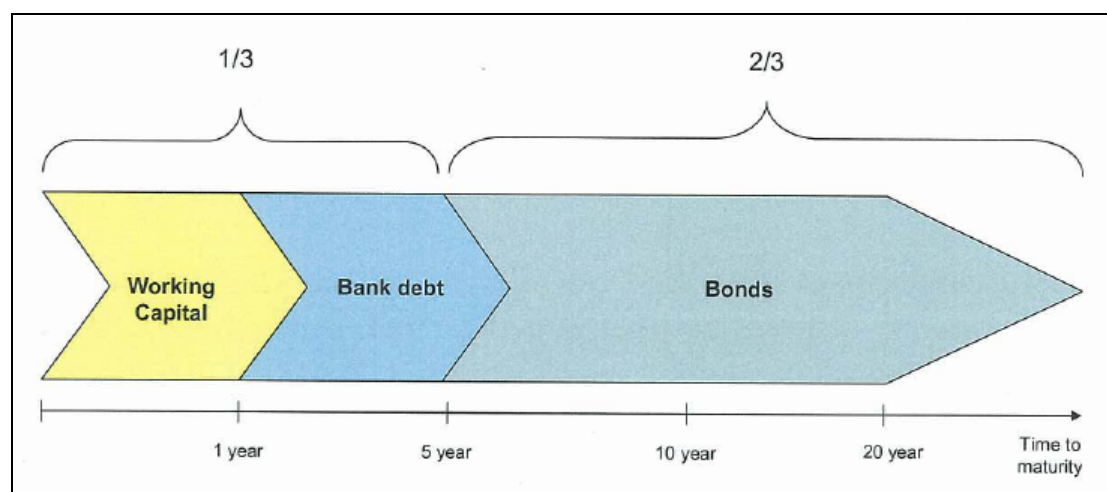
Consistent with the views from Deloitte in its earlier report for the AER, it is clear that regulated energy network businesses seek a diversified debt portfolio. For example, figure 6.1 provided by Sim Buck Khim of Jemena illustrates what is considered an 'ideal' debt portfolio, with varying terms to maturity.

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<sup>354</sup> R. R. Officer & S. Bishop, op. cit., September 2008, p.20.

<sup>355</sup> JIA, *Submission in response*, op. cit., February 2009, p.59

**Figure 6.1: Statement of Sim Buck Khim – Ideal debt portfolio**



Source: Sim Buck Khim<sup>356</sup>

According to the Treasurers, having a debt portfolio with staggered maturity dates is critical to mitigating refinancing risk. Reflecting this objective, most businesses have a Treasury policy which seeks to restrict the amount of debt maturing in any given year – to between 15 and 25 per cent of the total value of the debt portfolio. As Greg Meredith of Envestra explains, this policy has implications for the weighted average term of debt portfolios:

In relation to refinancing risk the Policy states that no more than 15% of the debt portfolio should mature in any one financial year. So when you work that back, it's essentially saying that as a *minimum*, on average debt must have a term of 7 years from when it is raised...<sup>357</sup>

At the other end of the range, SP AusNet's policy is to ensure that no greater than 25 per cent of the total debt portfolio matures in any given year, implying a minimum average term of debt at issuance of 4 years.<sup>358</sup>

The Treasurers state that in choosing a term of maturity for new debt issuances, the objective is to seek the longest possible term at a price considered reasonable. For example, as Greg Meredith of Envestra explains:

The purpose and skill of the treasury function at Envestra, like at most companies, is to simultaneously seek a low cost of debt and extend the tenor of the portfolio.<sup>359</sup>

Likewise, Sim Buck Khim of Jemena explains the cost-benefit considerations in deciding whether to issue long term debt:

...the longer the term the better for a company like Jemena because it reduces refinancing or roll-over risk. However, because long dated bonds are more

<sup>356</sup> Sim Buck Khim, *Statement*, op. cit., February 2009, p.6.

<sup>357</sup> G. D. Meredith, *Statement*, op. cit., February 2009, p.3.

<sup>358</sup> A. Watson, *Statement*, op. cit., January 2009, p.4.

<sup>359</sup> G. D. Meredith, *Statement*, op. cit., February 2009, p.2.

expensive than short dated bonds, I will always compare the pricing for different durations against my sense of the value over time...<sup>360</sup>

These statements highlight the complex trade-off between refinancing risk and the cost of debt. That is, assuming an upward sloping yield curve (on average) it is acknowledged that longer term debt will in general be more expensive. However it is clear that despite its higher cost, long term debt may still be a preferred source of financing as it mitigates refinancing risk. These particular statements from the Treasurers are pertinent in the context of the AER's position in its explanatory statement, which was that:

...there is no evidence to suggest that network businesses will seek to issue long term debt as a matter of preference.<sup>361</sup>

Based on the available information, particularly that from the Treasurers, the AER accepts that network businesses will seek to include long term debt in their portfolios so as to mitigate refinancing risk. However, it is clear that the preference for long term debt is balanced with the competing objectives of:

- the need to diversify across different maturities, and
- minimising the overall cost of debt.

As stated in its explanatory statement, assuming that current debt financing practices represent efficient practice, the AER considers that the appropriate benchmark term of the debt risk premium is ultimately an empirical question. The empirical evidence on the weighted average term of debt portfolios is examined in detail below.

The second major issue discussed in the Treasurers' statements is the management of interest rate risk. As Alastair Watson of SP AusNet explains, interest rate risk is managed independently of refinancing risk:

In considering funding I am interested in managing refinancing risk by securing a diversified portfolio of bonds with different terms to maturity, sourced in different markets and that don't all mature at once... Note that I do not consider as a significant factor in raising debt the issue of interest rate risk and that is because I manage that type of risk separately.<sup>362</sup>

The Treasurers explain that interest rate risk is managed by hedging against movements in base rates away from the risk-free rate assumed by the regulator at the reset (i.e. via interest rate swaps). These hedging activities were noted by Deloitte in its earlier report for the AER:

Typically private companies borrow on the longest tenor available, and then convert the fixed rate debt into synthetic floating rate debt. This would then be hedged during the reset period via an interest rate swap for the duration of the regulatory period.

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<sup>360</sup> Sim Buck Khim, *Statement*, op. cit., February 2009, p.5.

<sup>361</sup> AER, *Explanatory statement*, op. cit., 11 December 2008, p.128.

<sup>362</sup> Alastair Watson, *Statement*, op. cit., January 2009, p.8.

In the absence of the long term bond market, corporates will typically borrow bank debt on the longest tenor available on a floating basis and then again hedge their interest rate risk to match the regulatory period.<sup>363</sup>

According to the Treasurers' statements, typically businesses hedge the base interest rate risk for up to 100 per cent of their debt portfolios at the time of the regulatory reset. Greg Meredith explains the hedging strategy employed by Envestra in some detail:

...The interest rate on the principal is usually floating rate consisting of a base rate, such as BBSW, plus a credit margin plus establishment fees... The Treasury Policy requires that we hedge between 80% and 100% of the interest rate risk on the floating rate debt.

So to explain that in more detail, for each regulatory period we enter into hedges over the Regulators designated risk-free rate averaging period, in order to match as closely as we can the base rate of our actual debt (i.e. BBSW) with the risk-free rate used in the regulatory cost of debt and WACC. The hedges are for the term of the regulatory period.<sup>364</sup>

According to data provided by Alastair Watson, SP AusNet hedges between 98 and 100 per cent of the total debt portfolios of the three energy network businesses at the time of their respective resets.<sup>365</sup>

These hedging strategies were noted in some detail by the AER in its explanatory statement.<sup>366</sup>

The Treasurers are careful to note that, unlike the base interest rate component on the cost of debt (i.e. the BBSW), the credit spread is determined at the time of the physical debt issuance and cannot be effectively hedged. As the JIA states in its submission:

While regulated energy network businesses can and do broadly align their interest rate risk to the regulatory benchmark, credit spread risk is something a privately held regulated distribution business simply cannot align to benchmark, either in the physical market or synthetically.<sup>367</sup>

This is further clarified by Alastair Watson of SP AusNet:

We can easily hedge against changes in the BBSW and we commonly do so but we can not hedge the credit margin. So while the hedging helps with managing the risks of the whole market interest rates moving, our hedging commonly leaves us exposed to changes in the margin between the BBSW and the rate at which we borrow.<sup>368</sup>

The AER's underlying objective in examining the debt financing strategies of these regulated energy network businesses is to gain an understanding of the extent of term

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<sup>363</sup> Deloitte, *Refinancing, debt markets and liquidity*, 12 November 2008, p.13.

<sup>364</sup> G. D. Meredith, *Statement*, op. cit., February 2009, pp.5-7.

<sup>365</sup> Alastair Watson, *Statement*, op. cit., January 2009, pp.8-9.

<sup>366</sup> AER, *Explanatory statement*, op. cit., 11 December 2008, pp.103-104.

<sup>367</sup> JIA, *Submission in response*, op. cit., February 2009, p.76.

<sup>368</sup> Alastair Watson, *Statement*, op. cit., January 2009, p.10.

premium incurred on the cost of debt. That is, following the present value principle, the relevant question is whether a 10-year term assumption provides over-compensation on the cost of debt for interest rate risk (i.e. a term premium) that is not faced over the regulatory period. Based on the qualitative Treasurers' statements the AER makes the following observations in this respect:

- There is evidence that the issuance of long term debt is considered important for the purposes of managing refinancing risk, however the extent of term premium faced by regulated energy network businesses can only be determined with reference to the weighted average term of debt portfolios.
- The Treasury policies regarding the management of refinancing risk suggest a minimum weighted average term of debt portfolios of 4 to 7 years.
- The hedging strategies employed by the regulated energy network businesses imply that the term premium incurred on the base interest rate component of the cost of debt is commensurate with a term matching the length of the regulatory period.
- The credit spread component of the cost of debt (and the associated term premium) is determined at the time of physical debt issuance, and it appears that it cannot be altered with hedging instruments.

On this basis it can reasonably be concluded that regulated energy network businesses are being over-compensated with a 10-year term assumption. The extent of over-compensation is represented by the term premium (i.e. 10 year relative to 5 year) on the base interest rate component of the cost of debt, which via hedging instruments is not faced by the benchmark efficient business over the regulatory period. Assuming that the term premium implicit in swap rates follows closely the term premium on CGS yields, the extent of over-compensation is estimated at around 18 bp per annum on average.<sup>369</sup> The AER recognises that there may be additional transaction costs not explicitly compensated via the regulatory regime (e.g. hedging costs), however the extent of over-compensation on the cost of debt is expected to more than offset these costs.

The AER accepts that there may not currently be any derivative instruments available to hedge the credit spread component of the cost of debt. Therefore the true extent of the term premium faced by regulated energy network businesses can only be determined with reference to the underlying weighted average term of debt portfolios. This is discussed below.

#### ***Benchmark assumption***

In the explanatory statement the AER stated that:

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<sup>369</sup> Officer and Bishop, op. cit., September 2008, p.18.

The AER considers there are strong reasons to support the inclusion of data on all debt on issue (i.e. both long term and short term) as well as data from all regulated energy network businesses (i.e. both private and government).<sup>370</sup>

In response the JIA argue that the debt-raising practices of government-owned energy network businesses should not be used in setting a benchmark term for the risk-free rate proxy, as government owned businesses do not face the same refinancing risks as private businesses. This is supported by the JIA's consultants CEG.

The AER notes that its conceptual definition of the benchmark efficient business under the NER is a pure play regulated electricity network operating in Australia without parent support. This definition does not necessarily preclude the inclusion of government-owned businesses in the analysis of debt financing practices however the issue of parent support remains to be dealt with.

Given the views raised in submissions to the issues paper, in the explanatory statement the AER considered there to be minimal difference between private and government-owned businesses in terms of the refinancing risk faced. However having reconsidered this issue in light of submissions to the explanatory statement, the AER now accepts the view that government-owned businesses face lower refinancing risk given their greater ability to access debt markets (relative to private businesses). As CEG argues, Government owned businesses are backed by the State. Therefore, they are not subject to the same market pressures as a private business. On this basis the AER considers it is reasonable to exclude government owned businesses from this analysis.

The question then becomes whether those private regulated electricity network businesses with parent support should be retained within the sample of firms used to determine the benchmark efficient electricity NSP. On this point the AER considers it is reasonable to assume that a privately-owned electricity network business will inherently face a degree of refinancing risk that is unlikely to be materially altered by its parent support. This contrasts with the level of refinancing risk faced by a government-owned business, which the AER expects will be materially affected by its parent support. The AER also considers that it is not unreasonable to include privately-owned gas network businesses in the sample, as these businesses are expected to face the same or similar refinancing risk as privately-owned electricity businesses.

On this basis the AER considers that, in the context of observing debt-raising practices, a reasonable proxy for the benchmark efficient business can be considered a privately-owned pure play regulated energy network business operating in Australia.

It should be noted that the application of such a proxy may over-compensate government owned electricity network businesses on the cost of debt, given that these businesses are generally expected to have shorter debt maturity profiles.

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<sup>370</sup> AER, *Explanatory statement*, op. cit., 11 December 2008, p.122.



### *Empirical evidence*

In the explanatory statement the AER relied upon data provided by Deloitte on full debt portfolios which indicated that regulated energy network businesses have a weighted average debt term of five years or less. On this basis the AER considered that a move to a term for the risk-free rate which matches the length of the regulatory period (i.e. five years) was not expected to impose additional refinancing risk.

The QTC contends that a move to a term for the risk-free rate which matches the length of the regulatory period will in fact increase refinancing risk:

A 5 year proxy will force regulated businesses to raise shorter term funding even if longer term funding is available. Although the AER does not prescribe the type of funding strategy to be used, the proposed change will effectively 'price out' debt with tenors longer than 5 years as the debt risk premium will be lower than the actual credit margins.<sup>371</sup>

In the AER's view it does not follow that a term for the risk-free rate which matches the length of the regulatory period will necessarily 'price out' longer term debt as the QTC claims. As is discussed below, the relevant evidence to consider is that on the weighted average term of debt portfolios for the benchmark efficient energy network business, which provides an indication of the extent of true term premium expected to be faced over the regulatory period. Moreover, in accordance with the NER requirements, the AER's objective in observing the actual debt financing strategies of regulated energy network businesses is to:

- provide a forward-looking rate of return commensurate with the prevailing conditions in the market for funds and the risk involved in providing regulated services
- provide a return on debt which reflects the current cost of borrowings for comparable debt, and
- adopt a term assumption which is based upon the practices of the benchmark efficient electricity NSP.<sup>372</sup>

Further, to the extent that the AER has regard to current practice in forming its views on the appropriate term of the risk-free rate, the outcome of this review is not intended or expected to change the degree of refinancing risk faced.

The JIA submit that they have 'serious concerns' with the AER's proposal to depart from the previously adopted 10-year term assumption, given their view that:

- The AER has fundamentally misinterpreted the evidence before it, in particular the evidence from Deloitte on businesses's actual debt raising practices; and, therefore
- has come to key conclusions that are not supported by the evidence; and

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<sup>371</sup> Queensland Government, *Submission in response*, op. cit., 30 January 2009, p.7.

<sup>372</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

- proposed changes which depart from well established regulatory and commercial practice.<sup>373</sup>

Specifically, the JIA and others argue that the AER has erred in relying on data from Deloitte on the remaining weighted average term-to-maturity of debt to conclude that a 5-year term assumption is appropriate. Based on the Treasurer's statements, the JIA submit that the term-to-maturity at the time of the physical debt issuance is most relevant in the current context, as this will illustrate the preferred term-to-maturity of the businesses.<sup>374</sup>

The JIA state that the average remaining term of debt at a particular point in time will by definition be substantially less than the term-to-maturity at the time of issuance. This view is also supported by the JIA's consultant CEG, which states that:

If regulated businesses *issue* ten year debt then we would expect that the weighted average term-to-maturity of outstanding debt would be five years. That is, if a firm issues ten year debt which it refinances at the end of each ten years then the average term-to-maturity of that debt (over its life) will be five years.

...on average it will be true that the term-to-maturity at issue will be double the term-to-maturity of an existing debt portfolio.<sup>375</sup>

With the exclusion of the government-owned electricity network businesses from the sample, CEG argues that the appropriate interpretation of the Deloitte evidence is a term-to-maturity at issuance of between 8 and 12 years, which supports retention of the 10-year term assumption.

Based on this information, as submitted by the JIA, the AER acknowledges that the weighted average term of debt at issuance may be more relevant to determining the debt risk premium for a benchmark efficient NSP. However, the AER maintains that data on the weighted average term-to-maturity at a particular point in time can still provide useful information on the cost of debt. This is particularly the case given the significant amount of floating rate debt on issue by regulated energy network businesses, which may alter the effective duration (and therefore cost) of debt on issue. This issue is discussed below.

The AER has considered the analysis from CEG suggesting a weighted average term of debt at issuance of 8 to 12 years. In the AER's view, this analysis is suitable for illustrative purposes only, and offers no substitute for actual data.

In response to the explanatory statement the JIA provided data on the weighted average term of debt at issuance for a selection of private energy network businesses. The data provided by the JIA on the full debt portfolios of selected businesses is presented in table 6.1.

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<sup>373</sup> JIA, *Submission in response*, op. cit., February 2009, p.53.

<sup>374</sup> JIA, *ibid.*, p.55.

<sup>375</sup> CEG, op. cit., January 2009 (a), pp.7-8.

**Table 6.1: JIA submission – weighted average term of debt portfolios**

Business	Ownership	Amount (\$m)	Average term (years)	
			To maturity	At issuance
Citipower & Powercor	Private	2,532.0	5.65	10.40
ETSA Utilities	Private	2,353.5	7.11	10.81
SP AusNet	Private	3,662.8	4.47	7.27
Envestra	Private	1,960.9	10.91	14.39
<b>Totals</b>		<b>10,509.1</b>	<b>6.55</b>	<b>10.14</b>

Source: JIA<sup>376</sup>

The JIA submit that the data in table 6.1 indicates that private regulated energy network businesses refinance around every 10 years on average, thus supporting the retention of a 10-year term assumption on the cost of debt.

In attempting to verify the information provided in table 6.1, the AER has examined publicly available data on Bloomberg, and can make the following observations:

- while the AER is able to independently verify some of the debt issued by these businesses on Bloomberg, not all of the debt on issue is publicly listed,
- there is a significant amount of long term floating rate debt on issue by these businesses, however the full extent of floating rate debt on issue cannot be verified from either the information provided in submissions to the explanatory statement or other publicly available information (e.g. annual reports), and
- the data provided in table 6.1 appears to be based on an assumption that floating rate debt has the same cost (i.e. effective term) as fixed rate debt.

The AER is particularly interested in the cost impact of the floating rate debt on issue by these businesses. This is based on an assumption that, with an upward sloping yield curve (i.e. a positive term premium), floating rate or variable rate bonds are likely to have a lower yield than fixed rate bonds at the time of issuance, when those bonds have:

- the same term-to-maturity at the time of issuance, and
- the same credit rating.

That is, given that (at least a portion of) the yield on floating rate debt resets on a quarterly (i.e. 3 monthly) basis, this yield is likely to be lower than the equivalent

<sup>376</sup> JIA, *Submission in response*, op. cit., February 2009, p.58. On a confidential basis, the Treasurers of Citipower and Powercor, SP AusNet and Envestra also provided a breakdown of the full debt portfolio amounts listed in table 6.1 into broad debt categories.

fixed rate yield assuming an upward sloping yield curve. On this basis the prevalence of floating rate debt in the debt portfolios of these businesses is expected to alter the extent of the term premium faced at the time of physical debt issuance. In turn, this has an impact on the AER's consideration of the benchmark term assumption for the cost of debt (and the risk-free rate).

Given these conceptual considerations, the AER considered that even if the weighted average *maturity* of debt at issuance is around 10 years as reported by the businesses (see table 6.1), the weighted average *duration* (and therefore cost) of debt at issuance may be somewhat less than 10 years once the impact of floating rate debt is taken into account.

To explore this issue further, on 16 February 2009 the AER requested more detailed information from the JIA regarding the debt on issue by network businesses. Specifically the AER sought a breakdown / disaggregation of the full debt portfolio amounts listed in table 6.1, including details for each individual debt instrument on:

- issue date and maturity date,
- amount issued and amount drawn,
- how the coupon is determined (i.e. floating / fixed),
- coupon rate and yield-to-maturity at the issue date,
- details of interest rate hedging instruments in place, and
- the relevant debt contracts and other legal documents to allow independent verification of the information provided.

The information requested by the AER was received on a confidential basis from SP AusNet (11 March 2009), and ETSA, Citipower & Powercor (12 March 2009).<sup>377</sup> On 24 March 2009 Envestra provided a confidential Treasury report, however, the information provided was insufficient to draw conclusions regarding the term premium faced, and verifying documents have not been provided as requested.<sup>378</sup>

Taking into account this new information, the AER has verified that the weighted average maturity of debt portfolios at the time of issuance for these businesses is 10.14 years as presented above in table 6.1. That is, the further information confirms that these businesses refinance on average every 10 years.

Further, the AER has examined the information provided on the long term floating rate debt on issue by these businesses in some detail, and confirms the following:

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<sup>377</sup> The AER notes that the JIA initially claimed that the information requested had already been provided to the AER (Email, 23 February 2009). On 5 March 2009 AER staff met with representatives from the JIA to clarify the information request, and subsequently the information was provided to the AER.

<sup>378</sup> The AER notes that the information provided indicates that Envestra has a significant amount of floating rate debt on issue.

- the yield on floating rate debt is comprised of two distinct components – a variable component and a fixed component,
- the variable component of the yield on floating rate debt is the ‘base interest rate’, which is generally the bank bill swap rate (BBSW). The BBSW resets on a 3-monthly basis in line with general interest rate movements (e.g. reflecting RBA monetary policy), and
- the fixed component of the yield on floating rate debt is the ‘credit spread’ component, which is determined at the time of debt issuance based on the bond’s credit rating, and is fixed until maturity.

The AER has undertaken a detailed analysis of the actual coupon / yield rates for the floating rate bonds on issue by these businesses, and compared these yields to Bloomberg fair yields on that same day. The AER observes that, at the time of issuance:

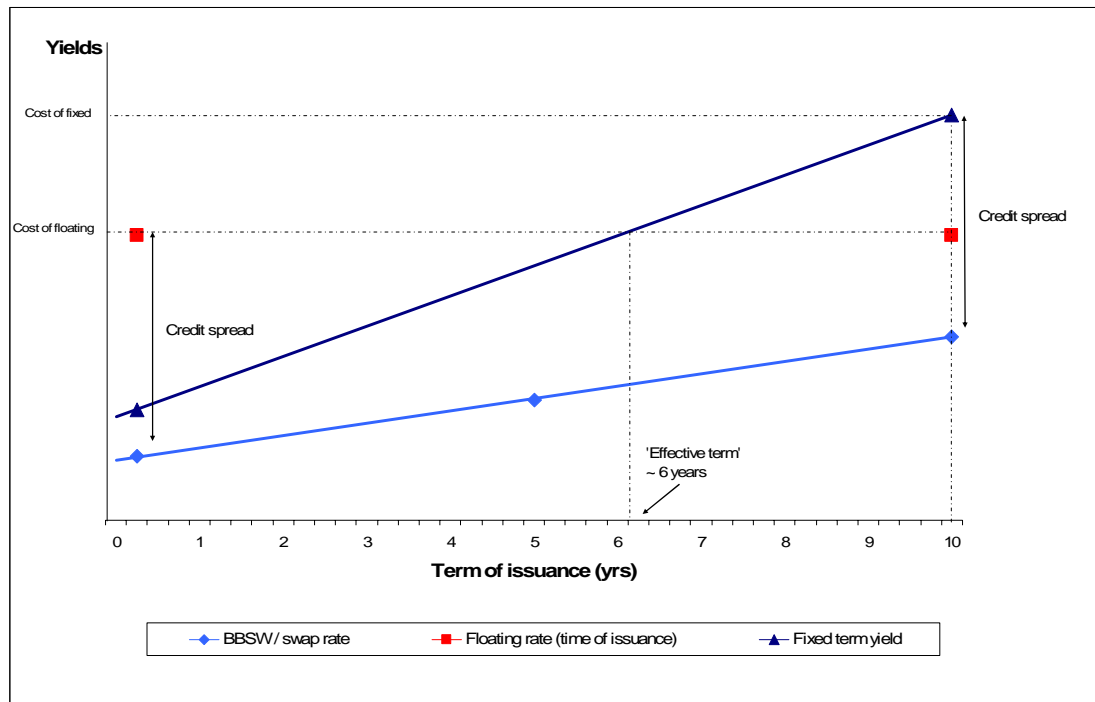
- the average term-to-maturity at the time of issuance for these floating rate bonds is around 10 years,
- the base interest rate component of the yield on floating rate debt is the BBSW, which has a duration of 3 months,
- the credit spread component of the yield on floating rate debt varies according to the credit rating of the bond issued, and has a duration equal to the average full term-to-maturity, of around 10 years,
- the yield on floating rate debt exceeds the 3-month fixed term yield for debt with the same or a similar credit rating, confirming that the total yield on floating rate bonds is not entirely variable, and
- the yield on floating rate debt is less than the yield on fixed rate debt with the same maturity and the same or a similar credit rating, confirming that floating rate debt is indeed cheaper than fixed rate debt at the time of issuance.<sup>379</sup>

These observations are illustrated diagrammatically in figure 6.2, based on the average yields from the actual bonds issued by these businesses. Note in particular, that for two bonds with the same maturity, the yield on the floating rate bond (‘Cost of floating’) is lower than the yield on the fixed rate bond (‘Cost of fixed’).

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<sup>379</sup> It is noted that Bloomberg only publishes fair yields for broad investment-grade credit ratings (i.e. AAA, AA, A, BBB), therefore yields for bonds with credit ratings in between (e.g. BBB+, A-, A+) have been estimated as the mid-point between the Bloomberg fair yields.

**Figure 6.2: Floating rate vs fixed rate debt – at time of issuance**



Source: AER analysis

Using the actual data presented in figure 6.2, the AER can infer an ‘effective term’ for floating rate debt on average.<sup>380</sup> Assuming linear interpolation, the AER infers from figure 6.2 that the floating rate bonds on issue with a maturity of 10 years have an effective term of 6 years at the time of issuance, on average.

Applying these observations, the AER has calculated a weighted average effective term at issuance for the full debt portfolios of the sample businesses (i.e. including commercial paper and bank debt on issue). The results are presented in table 6.2.

<sup>380</sup> The effective term represents the equivalent fixed term-to-maturity that best reflects the cost of a floating rate bond.

**Table 6.2: Weighted average effective term of debt portfolios – at time of issuance**

Business	Amount (\$m)	Weighted average effective term – at issuance (years)		
		Base interest rate <sup>(a)</sup>	Credit spread <sup>(b)</sup>	Total yield <sup>(c)</sup>
Citipower & Powercor	2,532.0	3.15	10.40	7.07
ETSA Utilities	2,353.5	3.30	10.81	7.45
SP AusNet	3,662.8	5.34	7.21	6.93
Envestra <sup>(d)</sup>	1,960.9	N/A	14.39	N/A
Total	10,509.1	4.13	10.14	7.11

Source: JIA; Bloomberg; AER analysis.<sup>381</sup>

Notes:

- (a) Effective term of long term floating rate debt (base interest rate component): three months; Effective term of long term fixed rate debt: full term-to-maturity at time of issuance
- (b) Effective term of all long term debt debt (credit spread component): full term-to-maturity at time of issuance
- (c) Effective term of long term floating rate debt: six years; Effective term of long term fixed rate debt: full term-to-maturity at time of issuance.
- (d) N/A: the effective term cannot be inferred from the information provided.

As table 6.2 indicates, the weighted average effective term of the debt portfolios of these businesses (as at the end of financial year 2007) at the time of issuance was 7.11 years. This is significantly lower than the weighted average term of 10.14 years at issuance reported by the JIA and presented in table 6.1 above, with the difference reflecting a proper and full consideration of the true costs of floating rate debt on issue.

The AER has also observed the information provided by the businesses on the hedging instruments in place to manage risk on the base interest rate component of the cost of debt over the regulatory period. This information verifies the qualitative statements made by the Treasurers – that the great majority of debt on issue (both fixed and floating rate debt) is hedged so that the base interest rate closely matches the risk-free rate assumed for the regulatory period. That is, once the hedging activities of regulated energy network businesses are allowed for, the base interest rate component of the yield on floating rate bonds will approximate the yield on a swap with a term matching the length of the regulatory period (i.e. nominally five years) on average.

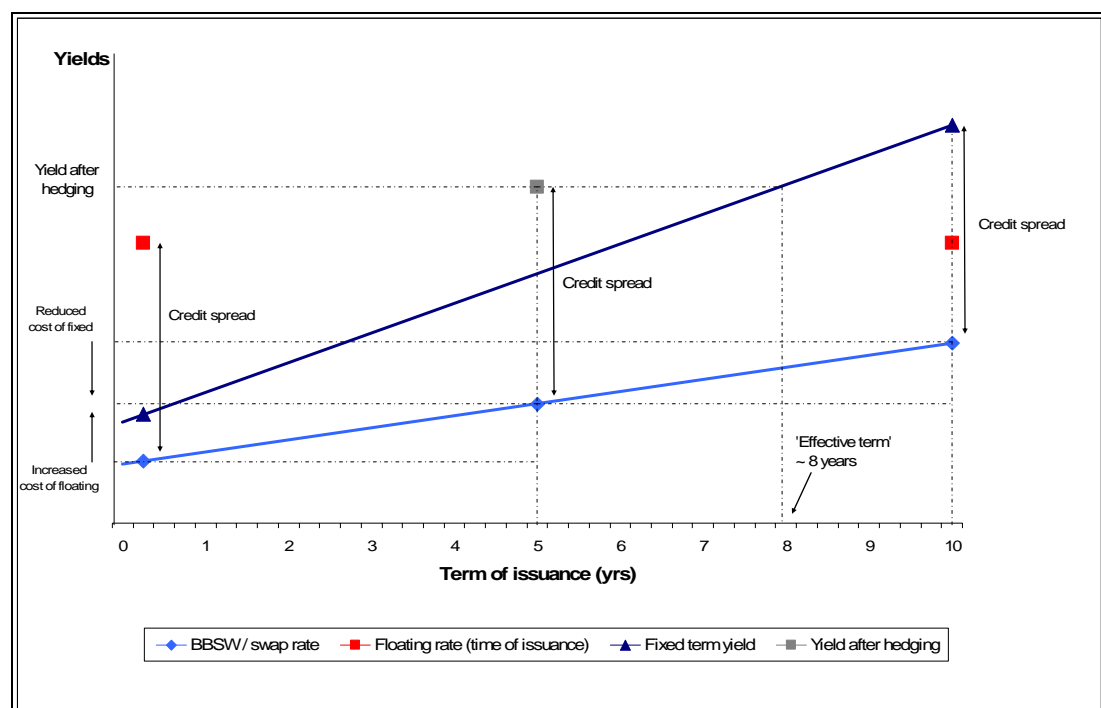
On this basis, at the time hedging is undertaken (for bonds with an average maturity of 10 years at the time of issuance), on average:

<sup>381</sup> Envestra did not provide the detailed information requested by the AER which would allow the effective weighted average term to be calculated. The weighted average term of the credit spread faced by Envestra has been included for completeness, and in any case the inclusion of the full Envestra data-set is not expected to materially alter the results presented in table 6.2.

- the base interest rate component of the yield on fixed rate debt is swapped from a duration equal to the term-to-maturity (say, 10 years) to a duration equal to the length of the regulatory period (i.e. normally five years),
- the base interest rate component of the yield on floating rate debt is swapped from a 3 month duration to a duration equal to the length of the regulatory period (i.e. normally five years),
- the credit spread component of the yield on floating rate and fixed rate debt is unchanged with hedging – it has a duration equal to the 10 year average full term-to-maturity, and
- due to convergence of the base interest rate, after hedging the total yield on floating rate and fixed rate debt with an maturity of 10 years at the time of issuance is close to equivalent.

These observations are illustrated diagrammatically in figure 6.3, based on the average yields on the actual bonds issued by these businesses.

**Figure 6.3: Floating rate vs fixed rate debt – after hedging**



Source: AER analysis

As figure 6.3 illustrates, on average after hedging the cost of 10 year floating rate debt increases with hedging whereas the cost of 10 year fixed rate debt decreases. On average, the two yields converge to the 'Yield after hedging', which can be inferred as an effective term of 8 years assuming linear interpolation.

Applying these observations, the AER has calculated a weighted average effective term for the full debt portfolios of the sample businesses (i.e. including commercial paper and bank debt on issue) after hedging. In doing so, consistent with figure 6.3, the AER has assumed that all long term debt (i.e. all debt other than working capital



and bank debt) has an effective term equivalent to 80 per cent of the full term-to-maturity.<sup>382</sup>

The results are presented in table 6.3.

**Table 6.3: Weighted average effective term of debt portfolios – after hedging**

Business	Amount (\$m)	Weighted average effective term – after hedging		
		Base interest rate <sup>(a)</sup>	Credit spread <sup>(b)</sup>	Total yield <sup>(c)</sup>
Citipower & Powercor	2,532.0	5.00	10.40	8.32
ETSA Utilities	2,353.5	4.82	10.81	8.65
SP AusNet	3,662.8	4.39	7.21	5.88
Envestra	1,960.9	n/a	14.39	n/a
<b>Total</b>	<b>10,509.1</b>	<b>4.69</b>	<b>10.14</b>	<b>7.37</b>

Source: JIA; Bloomberg; AER analysis.<sup>383</sup>

Notes:

- (a) Effective term of all long term debt (base interest rate component): five years;
- (b) Effective term of all long term debt (credit spread component): full term-to-maturity at time of issuance
- (c) Effective term of all long term debt: 80 per cent of the full term-to-maturity at time of issuance

As table 6.3 indicates, the weighted average effective term of the debt portfolios of these businesses (as at the end of financial year 2007) after hedging was 7.37 years. This is significantly lower than the weighted average term of 10.14 years at issuance reported by the JIA and presented in table 6.3 above, with the difference reflecting a proper consideration of the cost savings generated by locking in the base interest rate at the time of the reset.

The AER considers that the weighted average effective term after hedging, of 7.37 years, is directly relevant to the benchmark term assumption for the cost of debt. As illustrated in figure 6.4 below, relative to a 10-year term assumption, this finding implies that:

- on average a 10-year term assumption (i.e. point 'A') is expected to over-compensate the benchmark efficient energy network business on the cost of debt,
- the major source of over-compensation on the cost of debt from a 10-year term assumption (i.e. from point 'A' to point 'E') can be approximated by the term premium on the base interest rate component, which via hedging instruments is

<sup>382</sup> That is, as the effective term of 10 year debt is estimated at 8 years (i.e. 80 per cent).

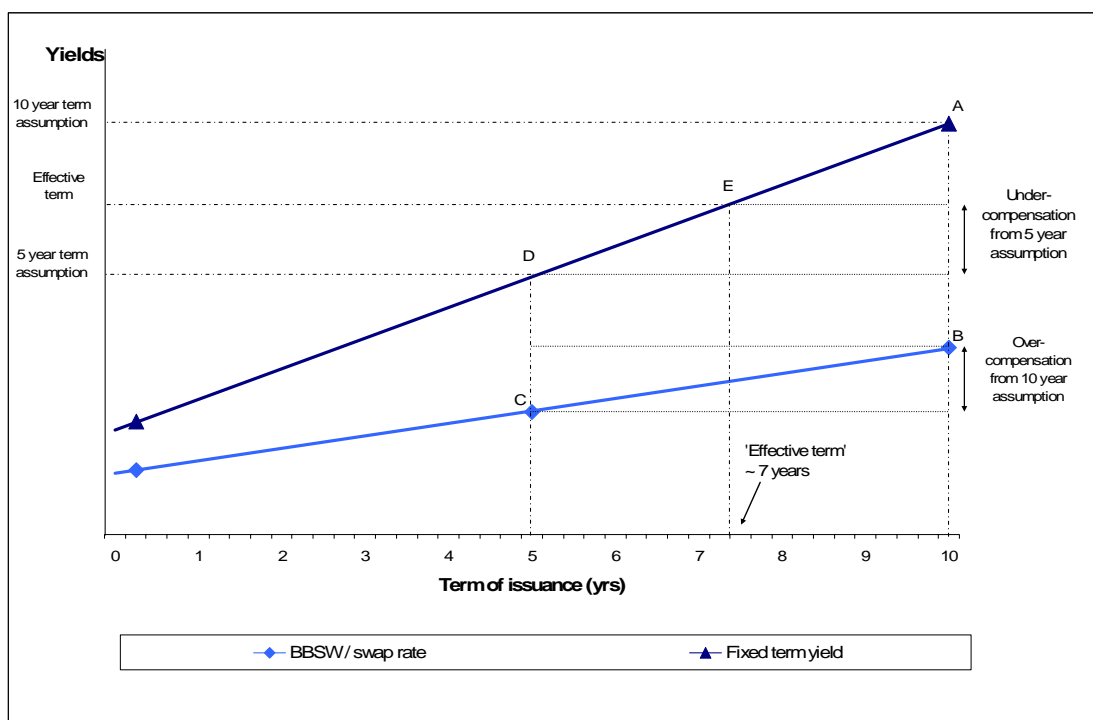
<sup>383</sup> Envestra did not provide the detailed information requested by the AER which would allow the effective weighted average term to be calculated. The weighted average term of the credit spread faced by Envestra has been included for completeness, and in any case the inclusion of the full Envestra data-set is not expected to materially alter the results presented in table 6.3.

converted to a term matching the length of the regulatory period (i.e. from point 'B' to 'C'),

- despite the over-compensation provided by a 10-year term assumption, a term matching the length of the regulatory period (i.e. five years) is expected to under-compensate the benchmark efficient energy network business on average, and
- the major source of under-compensation on the cost of debt from a 5-year term assumption is the on the credit spread component, which cannot be altered via hedging instruments (i.e. point 'D' to 'E').

These summary findings are illustrated in figure 6.4 below.

**Figure 6.4: Benchmark term assumption for the cost of debt**



Source: AER analysis

On this basis the AER considers there is not persuasive evidence to depart from the 10-year term assumption in calculating the debt risk premium.

Moreover, the AER considers that for the average effective term at issuance to match the length of the regulatory period (i.e. five years) the term-to-maturity of the long term bonds on issue by the benchmark business would need to shorten significantly. Given the statements made by the Treasurers, the AER accepts that such a shortening of debt maturities may increase refinancing risk for the benchmark efficient energy network business. Although shorter maturities are more likely in the current market than previously, due to the lack of liquidity in (particularly long term) corporate bond markets, the AER considers that it is reasonable and appropriate to take a cautious approach and adopt a longer term perspective on the benchmark term assumption.

Notwithstanding the lack of persuasive empirical evidence to move to a term for the debt risk premium which matches the length of the regulatory period, it must be

reiterated that retention of a 10-year term assumption is a conservative position which is expected to result in some over-compensation on average. Based on the analysis from Officer and Bishop on the historical term premium implicit in 10 year relative to five year CGS, the AER estimates that the extent of over-compensation on the cost of debt (leaving aside transaction costs) is 18 bp per annum on average.<sup>384</sup> This is represented in figure 6.4 as the difference in yield between point ‘B’ and point ‘C’.

The AER expects that the average over-compensation provided by a 10-year term assumption will comfortably exceed any additional transaction costs (e.g. hedging) incurred to implement the debt financing strategies of the benchmark efficient business (defined above). Indeed, given that these strategies represent current practice, on average the total cost of debt (i.e. including transaction costs) cannot exceed the current benchmark cost of debt for a rational business. On this basis, and in responding to the QTC in particular, the AER does not consider it necessary to allow any compensation for these additional transaction costs at the time of a reset.<sup>385</sup>

Further, the data provided by the JIA indicating a weighted average maturity of debt at issuance of around 10 years suggests that, for consistency, the allowed debt-raising costs (currently based on a five year assumption under the existing methodology) should be reduced at future regulatory resets following this WACC review.

### **AER’s conclusion**

The currently adopted methodology under the NER for estimating the risk-free rate is based on a 10-year term assumption. In turn, the NER methodology has been consistently adopted by all regulators in the Australian energy sector since the Tribunal’s 2003 GasNet decision (including the ACCC and the AER).<sup>386</sup>

In the explanatory statement the AER considered there to be persuasive evidence to move away from a 10-year term assumption to a term that matches the length of the regulatory period. Specifically, based on the available information the AER estimated that, relative to a term assumption consistent with the length of the regulatory period (i.e. five years), the current 10-year term assumption will result in over-compensation for the risks faced over the regulatory period.

Based on the evidence presented in their submission, the JIA argue that, contrary to the AER’s conclusions in the explanatory statement, there is no basis upon which a different view from the Tribunal in the 2003 GasNet decision could be taken. That is, the JIA argue that:

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<sup>384</sup> Officer and Bishop, op. cit., September 2008, p.18. The over-compensation is represented by the term premium (i.e. 10 year relative to 5 year) on the base interest rate component of the cost of debt, which via hedging instruments is not faced by the benchmark efficient business over the regulatory period.

<sup>385</sup> This is based on Deloitte’s estimate of 2-5 bps for hedging costs per debt portfolio *per regulatory period* in normal market conditions. By comparison, the expected over-compensation from a 10-year term assumption is 90 bps per regulatory period (i.e. 18 bps per annum).

<sup>386</sup> The AER notes that a 10-year term assumption was also commonly adopted by jurisdictional regulators prior to the GasNet decision.

- regulated energy network businesses do seek to issue long term debt as a matter of preference, and
- there is no evidence to suggest that regulated energy network businesses will be over-compensated with a term for the risk-free rate which exceeds the length of the regulatory period.

Based on its detailed analysis of all the available evidence presented in submissions to the explanatory statement and subsequently, the AER can conclude as follows:

- Assuming an upward sloping term structure of interest rates, conceptually it could be argued that the only means of providing correct compensation for the risks faced by equity investors over the regulatory period (and indeed over the life of the underlying assets) is for the term of the risk-free rate to match the term of the regulatory price-setting period.<sup>387</sup>
- In examining the debt financing practices of the benchmark efficient business, the AER's objective has been not only to seek an outcome which satisfies the present value principle (i.e. to provide correct compensation for the cost of debt), but also to ensure that the outcome does not unreasonably increase refinancing risk for the sector.<sup>388</sup>
- There is evidence that the issuance of long term debt is considered important for the purposes of managing refinancing risk, however the extent of term premium faced by regulated energy network businesses can only be determined with reference to data on the weighted average term of debt portfolios for the benchmark efficient business.
- The hedging strategies employed by the regulated energy network businesses imply that the term premium incurred on the base interest rate component of the cost of debt is commensurate with a term matching the length of the regulatory period. The credit spread component of the cost of debt (and the associated term premium) is determined at the time of physical debt issuance, and it appears that it cannot be altered with hedging instruments.
- On average the benchmark efficient energy network business refinances its debt portfolio every 10 years, implying that the current allowed debt-raising costs (which assume a five year refinancing period) are excessive.
- The weighted average effective term of the debt portfolios of these businesses (as at the end of financial year 2007) at the time of issuance is estimated at 7.11 years. This is significantly lower than the weighted average term of 10.14 years at issuance reported by the JIA, with the difference reflecting a proper consideration of the true costs of floating rate debt on issue.

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<sup>387</sup> This raises the issue of consistency with the term of the risk-free rate assumed in the calculation of the MRP, as discussed at section 6.5.3.

<sup>388</sup> Clauses 6A.6.2(e) and 6.5.2(e) of the NER require consistent terms for the risk-free rate across equity and debt.

- The weighted average effective term of the debt portfolios of these businesses (as at the end of financial year 2007) after hedging is estimated at 7.37 years. This is significantly lower than the weighted average term of 10.14 years at issuance reported by the JIA, with the difference reflecting a proper consideration of the cost savings generated by locking in the base interest rate at the time of the reset.
- The weighted average effective term after hedging, of 7.37 years, is considered directly relevant to the benchmark term assumption for the cost of debt.
- On average a 10-year term assumption is expected to over-compensate the benchmark efficient energy network business on the cost of debt. The major source of over-compensation is the term premium on the base interest rate component of the cost of debt, which via hedging instruments is converted to a term matching the length of the regulatory period.
- On average a term matching the length of the regulatory period (i.e. five years) would be expected to under-compensate the benchmark efficient energy network business on average. The major source of under-compensation from a 5-year term assumption is the term premium on the credit spread component of the cost of debt, which the JIA have shown is commensurate with a 10-year term and cannot be altered via hedging instruments.

Based on the available evidence the AER acknowledges that a term for the risk-free rate which matches the length of the regulatory period may result in a significant shortening of debt on issue by the benchmark efficient regulated energy network business. Despite the strong conceptual arguments for a term matching the length of the regulatory period on the equity side (leaving aside the issue of consistency with estimates of the MRP – discussed at section 6.5.3), the AER considers it is reasonable and appropriate to take a cautious approach on this matter so as to ensure that refinancing risk is not increased for the sector.

On this basis the AER considers there is not persuasive evidence to depart from a 10-year term assumption for the risk-free rate.

Retention of a 10-year term assumption is a conservative position which is expected to result in over-compensation on average. Based on the empirical evidence the AER estimates that the extent of over-compensation on the cost of debt (leaving aside transaction costs) is 18 bp per annum on average. On this basis the AER considers it inappropriate to allow any explicit compensation for any additional transaction costs (e.g. hedging costs) at the time of a reset.<sup>389</sup>

Further, the data provided by the JIA indicating a weighted average maturity of debt at issuance of around 10 years suggests that for consistency the allowed debt-raising costs (currently based on a five year assumption under the existing methodology) should be reduced at the future regulatory resets following this WACC review.

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<sup>389</sup> This is based on Deloitte's estimate of 2-5 bps for hedging costs per debt portfolio *per regulatory period* in normal market conditions. By comparison, the expected over-compensation from a 10-year term assumption is 90 bps per regulatory period (i.e. 18 bps per annum).

The AER's final decision is that the 10-year term assumption for the risk-free rate will be retained. This position reflects detailed consideration of additional and new information submitted in response to the AER's explanatory statement.

### **6.5.3 Consistency with the market risk premium**

In the explanatory statement the AER acknowledged that maintaining consistency in the term of the risk-free rate throughout the CAPM is an important consideration as part of this review.

The AER proposed that a forward-looking MRP of 6 per cent is consistent with a term of the risk-free rate which matches the length of the regulatory period.

#### **Submissions in response to issues paper**

In response to the AER's proposal to adopt a term for the risk-free rate which matches the length of the regulatory period, the JIA argues that:

While the AER is not proposing to alter the value of the MRP (retaining it at 6%) it is proposing to alter the definition (defining it relative to 5 year CGS rather than 10 year CGS). The Explanatory Statement makes clear that applying a 6% MRP with the proposed new definition (relative to a 5 year CGS) is equivalent to reducing the MRP by 20bp based on the current definition of the MRP (relative to 10 year CGS)...

...this is demonstrably a de facto reduction in the MRP and cannot be reasonably justified.<sup>390</sup>

These views are based on the report from CEG, which argues that as a result of the AER's proposal on the term of the risk-free rate:

...for a constant MRP measured relative to 10 year CGS (the old definition) the MRP measured relative to 5 year CGS must increase. However, the AER argues that it does not need to make this adjustment to maintain the *status quo* (given the new definition) because there is no 'persuasive evidence' for altering the MRP...

...It is not clear to us that this is a natural way to interpret the need for persuasive evidence.<sup>391</sup>

In summary, the JIA submit that the MRP must be increased by around 20 bp if the AER maintains its position from the explanatory statement with respect to the term of the risk-free rate.

#### **Issues and AER's considerations**

This issue is discussed in detail in the context of the MRP in chapter seven.

The AER notes the views from CEG that a change to the term of the risk-free rate effectively changes the definition of the MRP in the CAPM. This argument is similar to that raised in the Tribunal's GasNet decision (essentially that the term of the risk-free rate must be consistent in different parts of the CAPM equation).

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<sup>390</sup> JIA, *Submission in response*, op. cit., February 2009, pp.69-70.

<sup>391</sup> CEG, op. cit., January 2009 (a), p.15.

The AER maintains its view from the explanatory statement that consistency in the term of the risk-free rates throughout the CAPM is an important consideration as part of this review. However the AER's approach to the review has been not to be overly mechanistic in estimating the WACC parameters. As discussed in chapter seven, in the explanatory statement the AER observed a range of indicators to estimate a forward-looking MRP. Long term historical estimates of excess equity market returns measured relative to five year CGS was just one such indicator taken into account in forming a conclusion on the MRP. In this respect the AER considers that it had due regard in its explanatory statement to the issue of consistency in the term of the risk-free rate throughout the CAPM.

The AER maintains this approach to consistency from the explanatory statement on this issue.

For the purposes of this final decision, and as discussed in detail in chapter seven the AER considers that its forward-looking estimate of the MRP is consistent with a 10-year term assumption for the risk-free rate.

### **AER's conclusion**

Consistent with the explanatory statement, the AER considers that the issue of consistency between the term of the risk-free rate and the estimate of the MRP is an important consideration as part of this review.

The AER concludes that a 10-year term assumption for the risk-free rate has been consistency adopted across the CAPM.

### **6.5.4 Measuring the risk-free rate of return**

According to the averaging method that was outlined in the explanatory statement, the AER would set a single rate of return for each regulatory control period, consistent with the NER.<sup>392</sup>

In addition, the AER proposed that the beginning of the averaging period must be as close as practically possible to the start of the regulatory control period. This represents a formalisation of the AER's current approach to determining an averaging period and ensures an un-biased and forward-looking estimate of the risk-free rate.

Subject to satisfying the formal NER methodology, the AER affords the regulated businesses discretion to choose the length of the averaging period within the span of 10 to 40 days. In the opinion of the AER, the range of 10 to 40 days represented an optimal length of time to balance the trade-off between 'volatility driven error' and 'old information driven error.'<sup>393</sup>

### **Submissions in response to explanatory statement**

The AER has not received any submissions in response to the explanatory draft regarding the issue of an appropriate averaging methodology for the risk-free rate.

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<sup>392</sup> NER, cls. 6A.6.2(b) and 6.5.2 (b).

<sup>393</sup> AER, *Explanatory statement*, op. cit., December 2008, pp.132-133.

The AER acknowledges the suggestions of an appropriate averaging period for the risk-free rate made by the NSW, ACT and Tasmanian businesses as part of their current reset process.<sup>394</sup> Specifically, due to the global financial crisis these businesses have proposed an averaging period which does not commence as close as practically possible to the start of their respective regulatory periods.

### **Issues and AER considerations**

There have been no submissions in response to the explanatory statement and therefore the AER has been given no cause to depart from its position in the explanatory statement on this issue.

The AER acknowledges the proposal from the NSW, ACT and Tasmanian businesses for an averaging period 12 months before the end of the current regulatory control period. However, it is noted that the proposed approach is inconsistent with:

- the assumptions underpinning the CAPM, which require the risk-free rate to reflect the best forward-looking estimate over the CAPM period,
- the AER's previous approach to accepting an averaging period as close as possible to the start of the regulatory period, and
- the AER's proposed formalisation of the current approach in its explanatory statement.

The AER's considerations of the specific proposals of the NSW, ACT and Tasmanian businesses are dealt with in the final decisions for these businesses.

### **AER conclusions**

The AER has not been provided with any evidence which would cause it to depart from the averaging approach of the risk-free rate proposed in the explanatory statement.

On this basis, the AER's final decision is to retain the current NER methodology for calculating the risk-free rate, with one addition – the AER will only accept an averaging period commencing as close as practically possible to the start of the regulatory control period. This represents a formalisation of the AER's current approach in this regard.

Subject to satisfying the formal NER methodology, the AER will accept as reasonable an averaging period between 10 and 40 business days in length.

## **6.6 AER's conclusion**

The AER's objective is to set a term for the risk-free rate (and the corporate bond rate) that result in fair ex-ante compensation for any given investment over both the regulatory period and the life of the assets.

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<sup>394</sup> CEG, *Rate of return and the averaging period under the National Electricity Rules and Law*, January 2009, p.3



The NER established the initial method for estimating the nominal risk-free rate for both electricity transmission and distribution, consistent with current regulatory practice. The basis for the current NER methodology – in particular the use of the yield on ten year CGS as the risk-free proxy – was largely established by the Tribunal in its 2003 GasNet decision.<sup>395</sup>

The AER's objective as part of this WACC review has been to re-examine the issues associated with the risk-free rate afresh, in particular to establish whether there is persuasive evidence to justify a departure from current practice.

In the explanatory statement the AER considered there to be persuasive evidence to move away from a 10-year term assumption to a term that matches the length of the regulatory period. Specifically the AER considered that a term matching the length of the regulatory period would provide correct compensation for the risks faced over the regulatory period (for both equity and debt).

The AER has received a significant amount of information in response to the explanatory statement and subsequently in response to further requests from the AER. The AER's final decision is to maintain its position on the proxy for the risk-free rate, for the following reasons:

- There is not persuasive evidence to suggest that a more appropriate proxy for the risk-free rate exists, or indeed that the CGS yield exhibits any downward bias. On this basis the AER maintains its view that the most appropriate proxy for the risk-free rate remains the CGS yield.
- Consistency between the term of the risk-free rate and the estimate of the MRP remains an important consideration as part of this review.
- The current NER methodology for calculating the risk-free rate will be retained with one addition – the AER will only accept an averaging period commencing as close as practically possible to the start of the regulatory control period. Subject to satisfying the formal NER methodology, the AER will accept as reasonable an averaging period between 10 and 40 business days in length.

Based upon new information received following the explanatory statement, the AER's final decision is that there is not persuasive evidence to justify a departure from a 10-year term assumption for the risk-free rate. The AER's reasoning is as follows:

- There is evidence that the issuance of long term debt is considered important for the purposes of managing refinancing risk, however the extent of term premium faced by regulated energy network businesses can only be determined with reference to data on the weighted average term of debt portfolios for the benchmark efficient business.

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<sup>395</sup> The AER notes that a number of jurisdictional regulators adopted a 10-year term assumption prior to the Tribunal's GasNet decision.

- On average the benchmark efficient energy network business refinances its debt portfolio every 10 years, implying that the current allowed debt-raising costs (which currently assume a five year refinancing period) are excessive.
- The weighted average effective term of the debt portfolios of these businesses (as at the end of financial year 2007) after hedging is estimated at 7.37 years. This is considered directly relevant to the benchmark term assumption for the cost of debt.
- On average a 10-year term assumption is expected to over-compensate the benchmark efficient energy network business on the cost of debt. The major source of over-compensation is the term premium on the base interest rate component of the cost of debt, which via hedging instruments is converted to a term matching the length of the regulatory period.
- On average a term matching the length of the regulatory period (i.e. five years) is expected to under-compensate the benchmark efficient energy network business on average. The major source of under-compensation from a 5-year term assumption is the term premium on the credit spread component of the cost of debt, which the JIA have shown is commensurate with a 10-year term and cannot be altered via hedging instruments.

On this basis, despite the strong conceptual arguments for a term matching the length of the regulatory period on the equity side, the AER considers it is reasonable and appropriate to take a cautious approach on this matter and retain a 10-year term assumption. This reflects the AER's concern that refinancing risk not be increased for the sector, which is particularly important given the current market conditions. In reviewing the risk-free rate, as for the other parameters, the AER has given consideration to other factors, such as the importance of regulatory stability, in order to promote efficient investment, so as to contribute to the National Electricity Objective. Consequently, the AER has taken a broader view in the context of the National Electricity Objective, and having regard to the current financial environment, particularly the current situation in debt markets.

In summary, having regard to all the relevant factors in the NER,<sup>396</sup> the AER considers there is no persuasive evidence to depart from a 10-year term assumption for the risk-free rate.

The AER's final decision is that the methodology for estimating the risk-free rate is based upon the yield on CGS with a maturity of 10 years, calculated over a 10 to 40 business day period commencing as close as practically possible to the start of the regulatory control period. In accordance with the NER, the AER considers that this method:

- is supported by the most recent available and reliable empirical evidence

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<sup>396</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

- generates a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing prescribed transmission services or standard control services (as the case may be), and
- generates a return on debt that reflects the current cost of borrowings for comparable debt.

In determining the method for the nominal risk-free rate, the AER has also taken into account the revenue and pricing principles. The AER considers the method for the nominal risk-free rate:

- together with values, methods and a credit rating for the other parameters, provides a service provider with a reasonable opportunity to recover at least the efficient costs and provides a service provider with effective incentives for efficient investment, and
- is appropriate having regard to the economic costs and risks of the potential framework in under and over investment.

On this basis, the AER considers that its proposed method achieves an outcome that is consistent with and is likely to contribute to the achievement of the NEO.<sup>397</sup>

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<sup>397</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

## 7 Market risk premium

### 7.1 Introduction

The MRP is the expected return over the risk-free rate that investors would require in order to invest in a well-diversified portfolio of risky assets. The MRP represents the risk premium investors who invest in such a portfolio can expect to earn for bearing only non-diversifiable (i.e. systematic) risk. The MRP is common to all assets in the economy and is not specific to an individual asset or business.

The MRP is scaled up or down by the equity beta (of a particular asset or business) to reflect the risk premium—over and above the risk-free rate—equity holders would require to hold that particular risky asset or business as part of the investor’s well-diversified portfolio.

### 7.2 Regulatory requirements

#### 7.2.1 Matters the AER must have regard to under the NER

In undertaking a review of the WACC parameters, the NER sets out several matters that the AER must have regard to. Of particular relevance to the review of the MRP are:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing regulated transmission or distribution services (as the case may be)
- the need to achieve an outcome that is consistent with the NEO, and
- the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it<sup>398</sup>.

The AER’s reasoning as to why these matters appear particularly relevant, while the other matters listed in the NER appear to be of lesser value to the review of the MRP, is discussed in chapter three on the regulatory framework.

In addition, as discussed in chapter three, the AER has decided to take into account the revenue and pricing principles. The revenue and pricing principles which are directly relevant to this review are:

- providing a service provider with a reasonable opportunity to recover at least the efficient costs
- providing a service provider with effective incentives in order to promote efficient investment, and

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<sup>398</sup> NER, cls. 6.5.4(e) and 6A.6.2(j).

- having regard to the economic costs and risks of the potential for under and over investment.

## 7.2.2 Previously adopted value

The NER deemed the initial value of the MRP for TNSPs in all jurisdictions and the DNSPs in NSW and the ACT to be 6 per cent.<sup>399</sup> Accordingly, this is the previously adopted MRP for these service providers for the purposes of the NER.

For the remaining DNSPs—those in Queensland, Victoria, Tasmania and South Australia—the NER did not deem an initial value of the MRP and the previously adopted value in these jurisdictions is that adopted in the most recent distribution determination. In other cases, this was 6 per cent.

As illustrated in table 7.1, for the purposes of the NER, the previously adopted value of the MRP for TNSPs and DNSPs in all jurisdictions is 6 per cent.

**Table 7.1 Previously adopted value – market risk premium**

Service provider	Source	MRP
Transmission (all jurisdictions)	NER	6.00%
Distribution (NSW)	NER	6.00%
Distribution (ACT)	NER	6.00%
Distribution (Tasmania)	OTTER (2007)	6.00%
Distribution (Victoria)	ESC (2006)	6.00%
Distribution (Queensland)	QCA (2005)	6.00%
Distribution (South Australia)	ESCOSA (2005)	6.00%
		<b>6.00%</b>

Source: NER<sup>400</sup>, OTTER<sup>401</sup>, ESC<sup>402</sup>, QCA<sup>403</sup>, ESCOSA<sup>404</sup>.

## 7.3 Summary of position in explanatory statement

The premise of the JIA's submission on the MRP in response to the issues paper seemed to be an assertion that the previously adopted MRP of 6 per cent was initially determined by Australian regulators having no regard to the value of imputation credits. Therefore it was 'incorrect' and needed to be 'corrected'. The JIA considered,

<sup>399</sup> NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

<sup>400</sup> NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

<sup>401</sup> OTTER, op. cit., September 2007, p.152.

<sup>402</sup> ESC, op. cit., October 2006, p.332.

<sup>403</sup> QCA, op. cit., April 2005, p.97.

<sup>404</sup> ESCOSA, op. cit., April 2005, p.161.

having had regard to the value of imputation credits, that the MRP should be corrected from the previously adopted 6 per cent to 7 per cent.

While the AER accepted the legitimacy of the value of imputation credits forming part of the MRP, after examining regulatory determinations from the time 6 per cent was adopted in regulatory practice, the AER considered it was clear that the previously adopted MRP of 6 per cent did not need to be ‘corrected’ to incorporate the value of imputation credits. Regard was had by Australian regulators to the value of imputation credits in establishing the previously and consistently adopted MRP of 6 per cent. Accordingly, the AER considered that the issue was not whether a 6 per cent MRP needed to be ‘corrected’ for imputation credits, but rather, after ‘grossing-up’ historical excess returns for the value of imputation credits, among other measures and matters considered, whether or not 6 per cent remained a reasonable estimate of the MRP having had regard to the relevant factors.

In assessing the MRP, the AER had regard to historical estimates, cash flow measures using variants of the dividend growth model (DGM), and surveys of market practitioners. Consistent with past regulatory practice, rather than placing sole weight on any particular measure of the MRP, the AER had regard to each measure, tempered by an understanding of the strengths and weaknesses of each measure. This led to the AER placing primary weight on historical estimates, but also having regard to cash flow measures and surveys.

The most recently updated long term average historical excess market returns, without a ‘gross-up’ for imputation credits, fell within a range of 5.6 to 6.1 per cent. When ‘grossed-up’ for a 0.65 utilisation rate of distributed imputation credits—consistent with the AER’s proposed gamma—this range increased to 5.9 to 6.5 per cent.

These historical excess returns were, for the most part, measured relative to the yield on a 10 year Commonwealth Government Security (CGS). In the explanatory statement, the AER proposed departing from a 10 year risk-free rate term to one matching the length of the regulatory control period (which in general is five years). Based on Professor Officer and Dr Bishop’s estimate of the historical difference between 5 and 10 year CGS yields, being approximately 20 bps, the AER considered that for consistency with its proposed risk-free rate term, these historical excess returns should be interpreted with the understanding that they may underestimate historical estimates relative to a five year CGS by approximately 20 bps. The AER did not rely on historical excess returns relative to five year CGS yields directly, as this approach was not, at the time, producing statistically significant results.

The AER noted that the most recently updated long term average historical excess returns:

- ‘grossed-up’ for a utilisation rate of 0.65 (consistent with the AER’s proposed gamma)
- interpreted in view of the 20 bps as the likely difference if they had been estimated relative to a five year CGS (consistent with the AER’s proposed risk-free rate)

- over a range of long term estimation periods considered appropriate (1883-2008, 1937-2008, 1958-2008), and
- fell within a range of 6 to 7 per cent (specifically, 6.1 to 6.7 per cent).

Also noted were reasons why historical estimates were more likely to overstate, than understate, forward looking expectations of the MRP. These included:

- Brailsford, Handley and Maheswaran identified a number of data quality issues with pre-1958 data that the authors considered probable to bias upwards estimates using data from this period
- the historical excess returns covered periods which included several significant and positive one-off or unexpected events that were unlikely to be repeated, and
- the use of historical equity returns will bias upwards the estimated return on the CAPM market portfolio, which in theory includes all assets in the economy and is not limited to equities.

In addition the AER noted that:

- surveys measures indicate that a MRP of 6 per cent is the most commonly adopted value of market practitioners, and
- cash flow measures generally support a MRP of around or below 6 per cent.

Based on these considerations, the AER considered:

- there was not persuasive evidence to justify a departure from the previously adopted MRP of 6 per cent
- that 6 per cent was likely to be a reasonable estimate of a forward looking MRP commensurate with prevailing conditions in the market for funds, and
- that 6 per cent was an outcome that was consistent with the National Electricity Objective (NEO).

## **7.4 Summary of submissions in response to explanatory statement**

In response to its explanatory statement, the AER received submissions that commented specifically on the MRP from:

- the APA Group
- the ENA
- EnergyAustralia
- Envestra

- the ESAA
- the FIG
- the JIA
- the MEU, and
- a range of equity market participants

The MEU assesses that the MRP currently lies between 5.5 and 6 per cent, though increased global integration of financial markets will see the medium term MRP fall well below 6 per cent. It considers this provides some justification for a MRP lower than 6 per cent, but on balance there is probably insufficient market based evidence to justify a departure from 6 per cent.

The JIA agreed with the AER that historical excess returns:

- ‘grossed-up’ for a utilisation rate of 0.65
- interpreted in view of the 20 bps as the likely difference if they had been estimated relative to a five year CGS, and
- over a range of estimation periods that the AER considers appropriate (1883-2008, 1937-2008, 1958-2008)

fall within a range of 6 to 7 per cent, and specifically within the 6.1 to 6.7 per cent. However the JIA notes that without the inclusion the 2008 data, the range becomes 6.8 to 7.4 per cent. The JIA disagrees with the AER’s view that historical estimates are more likely to overstate, than overstate a forward looking MRP.

The JIA argue that cash flow measures show that a forward looking MRP is well above 7 per cent ‘for the period relevant to the AER’s WACC review’.

On survey evidence, the JIA state:

Survey data should be used with caution, especially when the surveys have been conducted prior to the current financial crisis. Nonetheless, the surveys quoted by the AER indicate that an MRP of 6 per cent or above is by far the most commonly adopted value of market practitioners in combination with a gamma of zero. The JIA notes that the survey data strongly supports JIA’s original submission that an MRP of 6% can only be sustained by the evidence before the AER in combination with a low or zero gamma.<sup>405</sup>

The JIA argue that gamma should be set close to zero, and that with a gamma greater than 0.2 the MRP should be 7 per cent.<sup>406</sup>

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<sup>405</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p.96.

<sup>406</sup> *ibid.*, p.93.



Overall, based on the consideration of historical estimates, the effects of the current financial crisis on the medium term MRP, cash flow analysis and survey data, the JIA conclude:

...there is sufficient persuasive evidence to justify a departure from the previously adopted MRP of 6%, the parameter must be lifted. As to how much higher the parameter should be lifted, the evidence demonstrates the best long-term value is an MRP of 7%.<sup>407</sup>

The APA Group states that in December 2008 it completed an equity raising in which it was required to provide investors a return on equity higher than that which would have been provided in December 2008 with the AER's proposed cost of equity parameters. The APA Group argues that this demonstrates that the AER's proposed parameters are too low by a substantial degree. Accordingly, they argue that either the equity beta or MRP should be revised upwards, or both.<sup>408</sup>

The ESAA states that the AER's explanatory statement does not appear to adequately consider the evidence that global capital market developments may have resulted in equity risk premiums moving significantly above long term historical averages.<sup>409</sup>

Similarly, The FIG argue that:

Unlike the AER, the FIG does not consider that there can be any certainty over the duration of the current downturn, the path that a recovery may take nor whether markets will return to more "normal" levels. In particular any return to more stable or "normal" conditions is unlikely to be at the level which preceded the global financial crisis.<sup>410</sup>

The FIG argue that an alternative explanation to current market conditions may be that there has not been a structural break, but that the medium term MRP will be above the long term MRP into the foreseeable future. On this, the FIG argue:

FIG is well aware that business cycles exist. However, whether prevailing conditions are part of a normal business cycle or not cannot be determined at this point in time. In any event, even if they were part of a business cycle, the evidence suggests that those cycles can be very long and can incorporate significant deviations from the norm.<sup>411</sup>

The FIG contend that a mechanical application of the CAPM will not necessarily capture the prevailing cost of equity in the market. The FIG contend:

Resolving this dilemma would, at a minimum, require not changing the relevant parameters. This, however, would not capture the increase in the cost of equity. To address this, the FIG believes that the AER could give consideration to using a market risk premium that is at the top end of its reasonable range, but explicitly tie its use to prevailing market conditions. It

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<sup>407</sup> *ibid.*, February 2009, p.96.

<sup>408</sup> APA Group, *Submission in response*, op. cit., 3 February 2009, pp.2-5.

<sup>409</sup> ESAA, *Submission in response*, op. cit., 4 February 2009, p.3.

<sup>410</sup> FIG, *Submission in response*, op. cit., 29 January 2009, p.12.

<sup>411</sup> *ibid.*, p.24.

may also be possible to adopt a risk-free rate that is more consistent with long term averages, than those currently observed in the market.<sup>412</sup>

In its explanatory statement, the AER noted that the JIA's combined recommendation on the MRP and gamma was not supported by EnergyAustralia who considered that if a 0.2 gamma is adopted, then there is no persuasive evidence to move away from a MRP of 6 per cent. In its submission in response to the explanatory statement, EnergyAustralia claims that the AER misinterpreted its submission due to "two unintentional drafting errors" by EnergyAustralia. EnergyAustralia states that it wishes to withdraw its comments on the MRP, and states that it fully supports the JIA's position on this issue.<sup>413</sup>

## 7.5 Issues and AER's considerations

The AER begins by considering the basis of the 6 per cent MRP from the time this estimate became adopted in Australian regulatory practice. The AER also discussed this issue in its explanatory statement in response to an assertion made by the JIA that the previously adopted MRP of 6 per cent was based on a gamma of zero and therefore needed to be 'corrected'.

The AER also discusses the conceptual issue of the term of the MRP, and the issue of whether a value or method should be adopted for the MRP.

Estimating a forward looking MRP, commensurate with prevailing conditions in the market for funds, generally involves having regard to historical estimates, known as 'ex post' measures of the MRP, on the basis that investors' forward looking expectations will be based on past experience. The AER discusses the use of historical estimates of the MRP in the following order:

- historical estimates – methodological issues, and
- historical estimates – results and interpretation.

Following that the AER considers the use of 'ex-ante' measures of the MRP, specifically:

- estimating the implied MRP from current stock prices and forecasts of future cash flows, and
- adopting the MRP from surveys of market practitioners, and
- others indicative measures such as stock market return volatility, the implied MRP from forwards markets contracts, and the implied MRP from the spread on corporate debt

The AER also considers an issue of consistency between the MRP, gamma and tax rate that has been raised in a paper by Gray and Hall.

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<sup>412</sup> *ibid.*, p.4.

<sup>413</sup> EnergyAustralia, *Submission in response*, op. cit., 17 December 2008, pp.1-2.

Rather than placing sole weight on any particular measure, it is common practice to have regard to most or all of these measures, tempered by an understanding of the strengths and weaknesses of each measure, in determining a ‘final’ MRP. The AER considers this is an appropriate approach in the context of having regard to the need for persuasive evidence, and is consistent with past regulatory practice. The AER’s overall considerations and weighting of each of these measures is discussed in section 7.6.

### **7.5.1 Previously adopted value—basis of determination**

As noted above, for parameters which cannot be determined with certainty—of which the MRP is one—the AER must have regard to the need for persuasive evidence before adopting a value that differs from the previously adopted value.

This persuasive evidence test was interpreted by the JIA (based on advice by Gilbert and Tobin submitted in response to the issues paper) as installing a very high and specific threshold that must be met before departing from a MRP of 6 per cent. Gilbert and Tobin advised that threshold was:

In this context the evidence would need to establish, more likely than not, that a previously adopted value was incorrect.<sup>414</sup>

The JIA contended (on the advice of Officer and Bishop) that a MRP of 6 per cent was ‘incorrect’—and always had been incorrect—as it had been formed without regard to the value of imputation credits (which are a component of the MRP), despite regulators giving a positive value in imputation credits in the gamma. The JIA stated:

...the 6 per cent MRP was originally based on evidence that excluded any explicit consideration of the value of imputation credits. This is clearly inconsistent with previous regulatory decisions which adopted a positive value for gamma. To correct this inconsistency when calculating [the] MRP, it is necessary to recognise the value of the imputation credits.<sup>415</sup>

It was this alleged need to ‘correct’ the MRP, which was the primary motivation for Officer and Bishop recommending the departure from 6 per cent to 7 per cent. They advised:

The market risk premium of 6% was originally based on evidence that excluded any explicit consideration of a component to reflect any value of imputation tax benefits in the historical MRPs. Consequently the 6% can be viewed as an estimate of the MRP when this value is zero...

The inclusion of an estimate of the imputation tax benefits in the historical estimate of the market equity returns forms the basis of our recommendation that the MRP be increased from 6% to 7% as qualified below.<sup>416</sup>

### **Summary of position in explanatory statement**

While the AER did not agree with the JIA’s interpretation of the persuasive evidence test (as discussed in chapter three), the AER responded to the JIA’s assertion that a 6

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<sup>414</sup> Gilbert and Tobin, *Legal opinion 1*, 22 September 2008(a), p.18.

<sup>415</sup> JIA, *Submission in response*, op. cit., September 2008, p.84.

<sup>416</sup> B. Officer, and S. Bishop, August 2008, p.i.

per cent MRP had been based on the assumption that imputation credits have no value. To do this, the AER reviewed the decisions from the time a MRP of 6 per cent was initially adopted in Australian regulatory practice.

To the AER's knowledge the first decisions by Australian regulators to adopt a 6 per cent point estimate for the MRP were:

- the 1998 decision by the ACCC on the access arrangement submitted by Transmission Pipeline Australia (TPA) for the Victorian Principal Transmission System and Western Transmission System,<sup>417</sup> and
- the 1998 decision by the (Victorian) Office of the Regulator-General (ORG) on the access arrangements submitted by Multinet Energy, Westar (Gas) and Stratus (gas).<sup>418</sup>

The AER noted that in the context of these reviews, the ACCC and ORG collectively commissioned Professor Davis to advise on WACC issues for the gas industry. Davis advised that historical excess market returns and forward-looking cash flow (i.e. dividend growth model) estimates were two measures used to estimate the MRP.

In the explanatory statement, the AER included extracts from both Davis' report and the ACCC's decision. These extracts demonstrated that:

- Davis had regard to the value of imputation credits in interpreting historical estimates of the MRP—which suggested '...an estimate of 6-7 per cent might not be unreasonable',<sup>419</sup>
- Davis explicitly 'grossed-up' dividend growth model estimates of the MRP for a gamma of 0.5 (which was consistent with Davis' recommended gamma and consequently that adopted by the ACCC and ORG)—which suggested '...an ex ante market risk premium of between 4.5 and 7 per cent with figures at the lower end of that range probably more applicable'

After taking into account the advice of Professor Davis, the ACCC rejected TPA's proposed MRP and gamma values of 6.5 per cent and 0.25, respectively, and substituted these for values of 6 per cent and 0.5. The ACCC derived a range of 4.5-

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<sup>417</sup> ACCC, *Access arrangement by Transmission Pipelines Australia Pty Ltd and Transmission Pipelines Australia (Assets) Pty Ltd for the Principal Transmission System – Access arrangement by Transmission Pipelines Australia Pty Ltd and Transmission Pipelines Australia (Assets) Pty Ltd for the Western Transmission System – Access arrangement by Victorian Energy Networks Corporation for the Principal Transmission System*, Final decision, 6 October 1998.

<sup>418</sup> ORG, *Access arrangements – Multinet Energy Pty Ltd and Multinet (Assets) Pty Ltd – Westar (Gas) Pty Ltd and Westar (Assets) Pty Ltd – Stratus (Gas) Pty Ltd and Stratus Networks (Assets) Pty Ltd*, Final decision, October 1998.

<sup>419</sup> These historical estimates were not explicitly 'grossed-up' to reflect the value of imputation credits, as such 'gross-ups' would have been erroneous. This is because the historical estimates considered were based on historical excess returns under a classical tax system. As is evident from Officer (in his seminal 1994 paper), if the introduction of dividend imputation only changes the sources but not the total required return to equity holders, which Officer argues is what would happen, then 'un-grossed-up' historical estimates under a classical tax system will be an unbiased proxy for 'grossed-up' historical estimates under an imputation tax system.

7.5 per cent for the MRP, and adopted the mid-point of that range being 6 per cent. The upper bound of this range was based on historical estimates, while the lower bound was based on cash flow measures.

Accordingly, in its explanatory statement, the AER considered it was clear that the JIA's assertion (and that of Officer and Bishop) that the MRP of 6 per cent was originally based on evidence that assumed a value of imputation credits of zero appears incorrect.

The AER stated that to its knowledge, all subsequent energy decisions determined by the ACCC, AER and other Australian regulators have followed on from these decisions and adopted either point estimates for the MRP and gamma of 6 per cent and 0.5, respectively, or ranges for these parameters with these point estimates falling within those ranges. The AER acknowledged that some decisions by Australian regulators since this time have been less explicit on the recognition of imputation credits in a 6 per cent MRP. However in many respects these decisions followed on from the precedent established in the 1998 decisions of the ACCC and ORG, with some referencing the Davis report in justifying 6 per cent (which did have explicit regard to the value of imputation credits).

### **Summary of submissions in response to explanatory statement**

The JIA state that they again emphasis the interrelated nature of the MRP and gamma (among other parameters), and that with a gamma of greater than 0.2 the MRP should be 7 per cent.<sup>420</sup> However, the JIA do not state that a 6 per cent MRP is 'incorrect' and must be 'corrected' to 7 per cent, along the reasoning in their initial submission.

### **Issues and AER's considerations**

Despite the assertion that a 6 per cent MRP is 'incorrect' being fundamental to the JIA's initial submission in its justification for a departure from 6 per cent value and the adoption of 7 per cent, the JIA do not state whether or not they agree or disagree with the AER's rejection of the JIA's argument. Additionally, despite this assertion being based on advice from Officer and Bishop, and Officer and Bishop stating this correction of the alleged inconsistency in past regulatory practice formed the basis of their recommendation that the MRP should be increased from 6 per cent to 7 per cent, the JIA did not request Officer and Bishop to respond to the AER's rejection of their assertion.

As no new information was contained in submissions on the explanatory statement that has given the AER cause to depart from its position in the explanatory statement, the AER maintains its position on this issue.

### **AER's conclusion**

As discussed in section 7.5.4.5, the AER accepts the legitimacy of the value of imputation credits forming part of the MRP from a conceptual definition. However, as outlined above, the AER maintains its position that the previously adopted MRP of 6 per cent does not need to be 'corrected' to incorporate the value of imputation credits.

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<sup>420</sup> JIA, *Submission in response*, op. cit., 2 February 2009, pp.79 and 93.

Regard was had by Australian regulators to the value of imputation credits in establishing the previously and consistently adopted MRP of 6 per cent.

Accordingly, the issue is not whether a 6 per cent MRP needs to be ‘corrected’ for imputation credits. Rather, the issue is whether, after ‘grossing-up’ historical excess returns for the value of imputation credits, among other measures and matters considered, whether or not 6 per cent remains a reasonable estimate of the MRP, having had regard to:

- the need for the rate of return to be a forward looking rate commensurate with prevailing conditions in the market for funds
- the need for persuasive evidence before departing from 6 per cent, and
- the need to achieve an outcome that is consistent with the National Electricity Objective.

### 7.5.2 Term of the MRP

In this section, the AER addresses the issue of consistency in the term of the risk-free rate and MRP, from a conceptual perspective. In section 7.5.4.2, the AER addresses the issue of what this implies for the term of the risk-free rate proxy used in historical estimates of the MRP.

The risk-free rate appears twice in the CAPM equation. It appears once by itself and once as part of the MRP:

$$k_e = r_f + \beta_e \times (r_m - r_f)$$

where:

$k_e$  = the expected rate of return on equity or cost of equity

$r_f$  = the nominal risk-free rate of return

$\beta_e$  = the equity beta

$r_m$  = the expected return on the market portfolio

$(r_m - r_f)$  = the expected market risk premium

The CAPM is a single period model, though with an unspecified time period (that is, it may be applied to any time period). Internal consistency in the model would imply that when a time horizon is determined for one parameter, such as the risk-free rate, then the same time horizon should be adopted for all parameters.

Consistency between WACC parameters is an issue that has long been held as of the utmost importance. For example, in the matter of *Application by GasNet*, the Australian Competition Tribunal stated that:

While it is no doubt true that the CAPM permits some flexibility in the choice of the inputs required by the model, it nevertheless requires that one remain true to the mathematical logic underlying the CAPM formula. In the present

case, that requires a consistent use of the value of  $r_f$  in both parts of the CAPM equation where it occurs so that the choice was either a five year bond rate or a ten year bond rate in both situations.<sup>421</sup>

### **Summary of position in explanatory statement**

In the issues paper, the AER raised the question of whether a distinct MRP could be estimated for different terms. The JIA did not directly address this issue (however did state that a forward looking MRP for any term should be estimated on the basis of long term historical data).<sup>422</sup> Officer and Bishop considered that a ten year view for both the risk-free rate and MRP is a ‘near convention’.<sup>423</sup>

In responding to the issues paper, the JIA referred to:

...the alleged short term nature of the CAPM as presented in the [AER’s] Issues Paper.<sup>424</sup>

In response, the AER noted that the JIA appeared to have misunderstood the comments of the AER in the issues paper. The AER stated that it does not believe that the CAPM is a short term model. Rather:

- The CAPM is a single period model, though with an unspecified time period (that is, it may be applied to any time period).
- Internal consistency in the model would imply that when a time horizon is determined for one parameter, such as the risk-free rate, then the same time horizon should be adopted for all parameters, regardless of whether this time horizon is short term or long term.
- The AER did not contest, and in fact completely emphasised, the importance of this internal consistency.

In the explanatory statement, the AER considered there was persuasive evidence to depart from a 10-year term for the risk-free rate and adopt a term matching the length of the regulatory control period (which in general is five years). Consequently—in recognition of the importance of consistency in the terms of different parameters—the AER stated that this implied that the term of the MRP should also match the length of the regulatory control period.

### **Summary of submissions in response to explanatory statement**

The JIA again state their strong belief in the importance of consistency between parameters, arguing:

The MRP is measured as the difference between the return on equity and “the” risk-free rate (and presented as a premium added to “the” risk-free rate). The MRP can therefore only be defined in terms of what the practitioner defines as the risk free [rate]. As outlined previously, standard practice is to

<sup>421</sup> *Application by GasNet Australia (Operations) Pty Ltd [2003] AcompT 6*, p.24.

<sup>422</sup> *JIA Submission in response*, op. cit., September 2008, p.89.

<sup>423</sup> B. Officer, and S. Bishop, op. cit., August 2008, p.3.

<sup>424</sup> *JIA Submission in response*, op. cit., September 2008, p.74.

use a 10-year term-to-maturity for the risk-free rate in the CAPM. The MRP must be consistent with this assumption.<sup>425</sup>

The JIA also consider that the MRP should reflect a long term rather than short term perspective, al beit arguing that it is 7 per cent rather than 6 per cent that the evidence demonstrates reflects the ‘best long term value’.<sup>426</sup> As the JIA reiterate:

In the current economic environment the MRP is well above even this amount, however, the JIA are of the view that the long term forward looking MRP is 7%.<sup>427</sup>

### **Issues and AER’s considerations**

As discussed in chapter six, the AER has changed its position on the term of the risk-free rate. In light of further consideration, the AER now considers that there is not persuasive evidence to depart from the previously adopted term of the risk-free rate, being 10 years. Consequently, for internal consistency within the CAPM (and consistent with the approach in the explanatory statement), the term of the MRP should also be 10 years.

### **AER’s conclusion**

The AER maintains its view, which is supported by the JIA, on the importance of consistency in the conceptual definition of the term of the risk-free rate and the term of the MRP (and its constituent components).

In its explanatory statement, the AER adopted a risk-free rate term matching the length of the regulatory period (which in general is five years). Accordingly, the AER stated that, for internal consistency, this implied the term of the MRP should also match the length of the regulatory control period.

Upon further investigation and consideration, the AER no longer considers that there is persuasive evidence to depart from the previously adopted term of the risk-free rate, being 10 years. Therefore, following the same logic and reasoning as set out in the explanatory statement, for internal consistency, the term of the MRP should also be 10 years.

### **7.5.3 Adoption of a value or method for the MRP**

The previously adopted parameter for the MRP under the NER is a ‘value’, specifically 6 per cent. However, there does not appear to be any restriction in the NER for the AER to alternatively adopt a ‘method’ for the MRP, as is adopted for the risk-free rate, if this was justified.

### **Summary of position in explanatory statement**

The AER did not raise this issue directly in its explanatory statement. However, the AER did conclude that there was not persuasive evidence to depart from the previously adopted value of 6 per cent for the MRP. The adoption of a value was also

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<sup>425</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p.69.

<sup>426</sup> *ibid.*, p.69.

<sup>427</sup> *ibid.*, p79.



supported by the JIA and its advisers on the MRP (Officer and Bishop), albeit advocating a value of 7 per cent, rather than 6 per cent.

### **Summary of submissions in response to explanatory statement and AER's considerations**

Of relevance to this issue is the NER requirement that in reviewing the MRP (along with all other parameters) the AER must have regard to the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds.

As explained in chapter three, the requirement that the AER must have regard to the rate of return to be both forward looking and reflect prevailing conditions in the market for funds are not competing requirements. Rather, it is a requirement that the AER must have regard to the need for the rate of return to reflect forward looking expectations, as at the relevant point in time. That relevant point in time is at the time of the individual reset determinations, rather than at the time of the AER's WACC review.

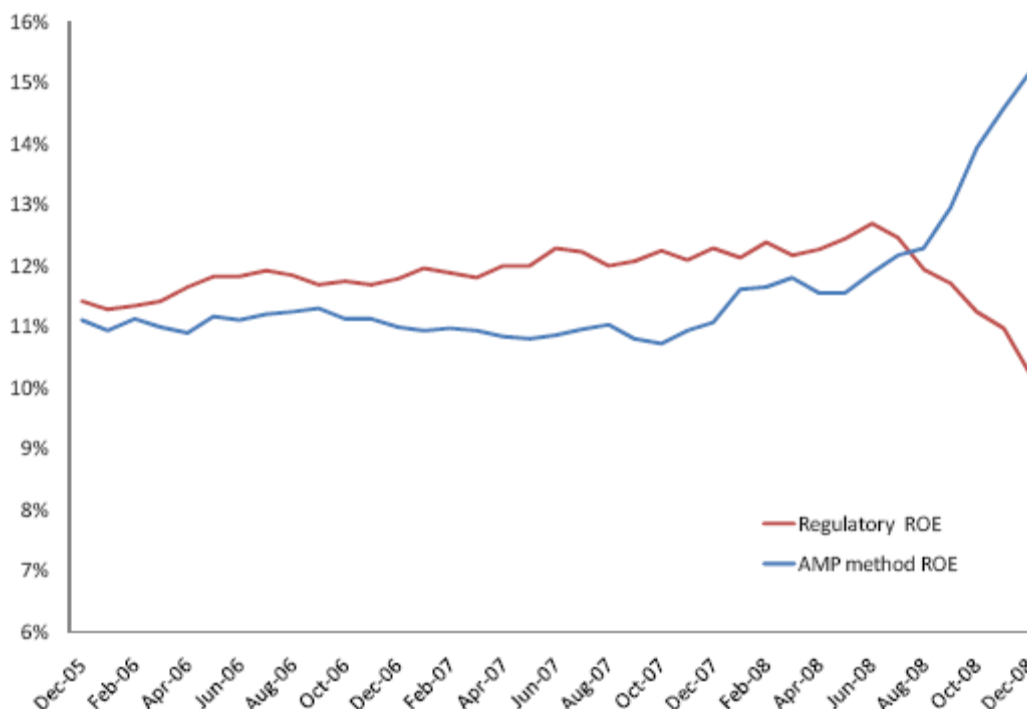
Accordingly, the AER should determine each parameter, including the MRP, in such a way as it is relevant for a 10 year perspective (consistent with the term of the risk-free rate) from the commencement of the next regulatory control period for each service provider affected by this review. Notwithstanding this statement, current economic and financial conditions (i.e at the time of this WACC review) are relevant to the extent that these conditions are expected to prevail over the period to which the outcomes of this WACC review apply.

The AER notes that, in contrast, it is apparent from the FIG's and Envestra's submissions that they consider the prevailing conditions factor refers to prevailing conditions at the time of the WACC review. Though neither submission substantiates why this should be the preferred interpretation.

For parameters such as the nominal risk-free rate, the adoption of a method—rather than a value—enables this parameter to be updated at the time of each reset determination and therefore produce a rate which reflects the forward looking risk-free rate prevailing at the time of that reset determination. That is, the risk-free rate varies over time and the adoption of a method—rather than a value—for this parameter enables individual reset determinations to adopt either a higher or lower risk-free rate depending on the forward looking expectations prevailing in the market for funds at the time of the reset.

Theoretically the MRP could also vary over time in line with different economic conditions. For example, CEG (in advice to the JIA on the overall cost of equity) considers the regulatory return on equity using the previously adopted WACC parameters (prevailing 10 year CGS yields as proxy for the risk-free rate, 6 per cent MRP, and 1.0 equity beta) which it names the 'regulatory ROE' and compares this over time with the cost of equity implied from cash flow measures following the 'AMP method' (CEG's analysis is critiqued in section 7.5.6). The variation in these returns is illustrated in figure 7.1.

**Figure 7.1 CEG—Comparison of the implied cost of equity and regulatory cost of equity (before AER explanatory statement)**



Source: CEG<sup>428</sup>

CEG consider that this downward trend in the regulatory ROE since mid-2008:

...is largely due to the fall in CGS yields in the latter half of 2008—a fall in yields that is demonstrably coincident with a rise in the actual cost of equity observed in the market. This inverse relationship between government bond yields and the return on equity is not surprising and is well documented in the finance literature. However, this is not reflected in the Australian regulatory approach.<sup>429</sup>

CEG argue that this is consistent with two possible explanations:

- the yield on CGS is currently a poor proxy for the risk-free rate used to estimate the cost of equity in the CAPM, or
- the yield on CGS is a good proxy for the risk-free rate used in the CAPM but the MRP has recently moved in the opposite direction to the yield on CGS.

In chapter six, the AER considers that there is not persuasive evidence to depart from adopting CGS yields as the proxy for the risk-free rate. Accordingly, the AER considers that the first explanation is unlikely.

<sup>428</sup> CEG, *Forward looking estimates of the equity premium—For regulated businesses and the market as a whole*, A report for the JIA, January 2009, p.22.

<sup>429</sup> *ibid.*, p.23.

However, to the extent that the second explanation is possible—that the risk-free rate (proxy) and MRP move in opposite directions—CEG provides no solution to address this issue through the MRP. Rather CEG argue this is a reason why the AER should not lower the equity beta, at this time, from the previously adopted value.

However, the AER considers that the integrity in the estimation of each individual WACC parameter is important. This integrity includes that the MRP is a measure of market-wide non-diversifiable risk, whereas the equity beta is a measure of the benchmark efficient NSP's exposure to non-diversifiable risk relative to that of the market. To the extent that the prevailing MRP (and the MRP into the foreseeable future) is above the long term MRP, the AER does not agree that it is appropriate to address this issue via the equity beta.

Accordingly, while theoretically the MRP could vary over time in line with different economic conditions, the view of the AER and the JIA's advisers (Professor Officer and Dr Bishop) is that, unlike for the nominal risk-free rate, there is no adequate method to automatically update the MRP at the time of each reset determination.

Yet the NER requires the AER to lock in either a value or method for each parameter. Given the lack of an appropriate method that could be used to update the MRP for each reset determination effected by this WACC review, the only alternative is that a value for the MRP be adopted.

In relatively stable market conditions, the adoption of a value for the MRP (which then applies for multiple reset determinations) is unlikely to be a significant issue, as the long term estimate is likely to be the best estimate of forward looking expectations prevailing at any particular point in time.

However, due to the global economic and financial crisis, relatively stable market conditions do not currently exist. While it is conditions at the time of the reset, rather than at the time of the WACC review which are relevant, the AER has taken into account current conditions to the extent these conditions are expected to prevail over the time of reset determinations affected by this review. In other words, as the AER is reviewing the WACC parameters now—including 'locking-in' a value for the MRP—to the extent that current conditions (at the time of this review) are expected to be maintained until the time of the determinations effected by this review, then current conditions remain a relevant consideration in determining what value should be 'locked-in' for the MRP.

However, if the MRP varies over time, then by definition, the locking in of a value may not always completely reflect forward looking expectations prevailing at the time of each reset determination.

The requirement to lock-in a value or method for the MRP now (which for practical purposes can only be a value) and the requirement to have regard to the need for the rate of return to reflect forward looking expectations commensurate with prevailing conditions at the time of each reset determination compete, particularly where some reset determinations occur during relatively unstable market conditions. However, the manner in which these requirements can best be reconciled is to lock in a value for the MRP which is equally relevant for each reset determination to which the WACC review applies. Acknowledging that for some reset determinations the actual

(unobservable) MRP may be somewhat above this value, though for other reset determinations the actual (unobservable) MRP maybe be somewhat below. In formulating this approach, the AER has been guided by the NEO.

### **AER's conclusion**

The AER considers that there is not persuasive evidence to depart from the adoption of a value for the MRP.

However, if the MRP varies over time, then by definition, the locking in of a value may not always completely reflect forward looking expectations prevailing at the time of each reset determination. Accordingly, for some reset determinations the actual (unobservable) MRP may be somewhat above this value, though for other reset determinations the actual (unobservable) MRP maybe be somewhat below. However, this approach is the way the NER requirements can best be reconciled.

### **7.5.4 Historical estimates—methodological issues**

Estimates based on historical averages are the most common proxy of the MRP. Historical estimates, though strictly not forward looking, have predominantly been used to estimate the MRP on the assumption that investors base forward looking expectations on past experience.

Widely cited studies of Australian historical excess returns include Officer's 1989 study and Dimson, Marsh and Staunton's 2003 study (which is an update of a previous study).<sup>430</sup> Officer estimated the arithmetic average historical excess return, relative to bonds, over the 1882-1987 period to be 7.9 per cent.<sup>431</sup> Dimson et al estimated the arithmetic average historical excess return, relative to bonds, over the 1900-2002 period to be 7.6 per cent.<sup>432</sup>

To this collection a recent 2008 study by Brailsford, Handley and Maheswaran has made a significant contribution in assessing the quality of the underlying data used in previous Australian studies, including the studies noted above.<sup>433</sup> Brailsford et al estimate the arithmetic average historical excess return, relative to bonds, over the 1883-2005 period to be 6.2 per cent. This is significantly less than previous estimates due principally to an issue identified by Brailsford et al regarding the method in which the return from dividends had been incorporated into the overall return in the pre-1958 data relied upon in previous studies.

In the context of this review, the JIA commissioned Professor Officer and Dr Bishop to, among other matters, update the estimates from the previous Officer study. Similarly, the AER commissioned Associate Professor Handley to, among other

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<sup>430</sup> R. R. Officer, 'Rates of return to shares, bond yields and inflation rates: an historical perspective', in R. Ball, P. Brown, F. Finn and R.R. Officer (eds.), *Share markets and portfolio theory: readings and Australian evidence*, 2<sup>nd</sup> ed., University of Queensland Press, Brisbane, 1989; E. Dimson, P. Marsh and M. Staunton, *Global evidence on the equity risk premium*, LBS Institute of Finance and Accounting, working paper, August 2003.

<sup>431</sup> R. R. Officer, op. cit., 1989, p.207.

<sup>432</sup> E. Dimson P. Marsh and M. Staunton, op. cit., August 2003, p. 6.

<sup>433</sup> T. Brailsford, J.C.Handley, and K.Maheswaran , 'Re-examination of this historical equity risk premium in Australia', *Accounting and Finance*, Vol.48, 2008.

matters, update the estimates from the Brailsford et al study to incorporate data from 2005 to 2008.

This section addresses the following methodological issues associated with the estimation of historical excess market returns:

- selection of the appropriate proxy for the market portfolio
- selection of the appropriate proxy for the risk-free rate
- method of averaging returns over multiple periods (arithmetic, geometric, average)
- length of the estimation period including start and end dates
- adjustments for imputation credits, and
- adjustments to account for unexpected or one-off events in the historical estimates.

The resultant historical estimates are then presented and discussed in section 7.5.5.

#### **7.5.4.1 Selection of the appropriate proxy for the market portfolio**

Theoretically the CAPM market portfolio consists of all risky assets in the economy and is not limited to equities. However for practical reasons this is commonly restricted to a subset of listed stock. To capture the return provided by both capital gains and dividends, an accumulation index is commonly used.

The issue of whether and how the value of imputation credits should be incorporated into the market portfolio proxy is discussed in section 7.5.4.5.

#### **Summary of position in explanatory statement**

The AER considered it was appropriate that the stock return index used to estimate historical excess returns be:

- a domestic market index for consistency with the domestic version of the CAPM applied by the AER
- a broad-based index so as to cover most of the market, and
- an accumulation index to incorporate the return provided from both capital gains and dividends.

However the AER noted that no regularly published and high quality domestic, broad-based, accumulation index has been in existence for the longest periods of time. Accordingly, in studies of historical excess returns finance experts have had to construct their own stock return (capital gain and dividend) series splicing together different data sources, or relying on indices constructed previously by other experts.

The AER noted that finding a particular data source from which to obtain returns data, particularly for returns data prior to the 1950s can be an issue of contention. In particular:

- For post-1980 data, there appeared to be consensus that the All Ordinaries Accumulation index is an appropriate and reliable data source.<sup>434</sup>
- For the post-1958 period generally, the AER considered that the data sources for both the price series and dividend yield series adopted in Officer's 1989 study, Brailsford et al's 2008 study, and subsequent updates by these authors, were all of an acceptable quality standard and produce either the same or similar results.
- However, where estimates from the 1883-1958 period are used, the AER considered reliance should be placed on the data sources utilised by Brailsford et al (particularly for the dividend yield series), and not by Officer, due to the significant data quality issues subsequently identified by the former.

Both Officer's 1989 Officer study, Brailsford et al's 2008 study, and updates thereof, utilise a data series for the 1883-1958 period on stock prices and dividend yields calculated retrospectively from Lamberton, and published in 1958.

The AER noted that Brailsford et al cautioned that concerns over the small sample of businesses, exclusion of certain sectors, and government stock price controls result in a probable bias that overstates equity returns up to the mid-1950s.

However of greater concern was Brailsford et al's findings in relation to the dividend yields calculated by Lamberton for the pre-1958 period. Brailsford et al noted that the dividend yield series represents the simple equal-weighted average yield on dividend-paying stocks only, with non-dividend paying stocks excluded, and will consequently contain two sources of bias.

- The first bias is that this equal-weighted, rather than value-weighted, average is biased towards high yielding small stocks.
- The second bias is that as the yield is based on dividend-paying stocks only, the yield inevitably overstates the market average as not all stocks pay dividends. Effectively, the Lamberton dividend yield series assumes that stocks that pay no dividends are paying the same amount of dividends as the (unweighted) market average.

Brailsford et al concluded that:

... although there might be uncertainty about the appropriate magnitude of the adjustment to be made to the Lamberton/SSE dividend yield series, it is clear that an adjustment is required. In the absence of doing so, estimates of the

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<sup>434</sup> The All Ordinaries Accumulation Index provides the return on the 500 largest companies based on market capitalisation listed on the Australian Stock Exchange. Dividends are included into the index on the ex-dividend date.

historical stock return and, hence, the historical equity risk premium will be overstated.<sup>435</sup>

The AER noted that of the two significant biases identified by Brailsford et al in the pre-1958 data series commonly adopted in Australian studies, the authors only attempted to correct for one of the biases. Additionally, of the bias that is corrected for, the correction factor applied is on the boundary of what the authors considered a defensible range, meaning a conservatively small downwards correction is made. Therefore, in using the approach from Brailsford et al, the AER considered that returns from pre-1958 are still highly likely to overstate the market return from this period.

Of a more general nature, and as acknowledged by the JIA, theoretically the CAPM market portfolio consists of all assets in the economy and is not restricted to equities. The AER considered that:

- Equities, as an asset class, is widely accepted as the riskiest asset class and consequently providing the highest return, with the other asset classes being cash, bonds and property.
- To construct an index that encapsulated all of these asset classes would be cumbersome and controversial and the AER does not propose a departure from the current approach of using equities as the proxy for the CAPM market portfolio.
- However, the AER considers that it is important to recognise, in forming a view on the value of the MRP, the limitations in this approach, and the likelihood that any estimate of the MRP derived purely from historical equity returns may consequently overstate the return of the CAPM market portfolio.

### **Summary of submissions in response to explanatory statement**

The JIA agrees that historical estimates pre-1958 may overstate the actual historical excess return from this period for the reasons stated by Brailsford et al (such as small sample of firms, exclusion of certain sectors, and government stock price controls).

However, they disagree with the conclusion of the further potential sources of upwards bias being:

- use of an equal weighted rather than value weighted dividend yield index, and
- an upward bias in the dividends included

Further, the JIA disagree with the AER's general point that historical excess returns from equity markets alone will overstate the return on the CAPM market portfolio, which is comprised of all assets and not just equity.

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<sup>435</sup> T. Brailsford, J.C.Handley, and K. Maheswaran , op. cit., 2008, p.91.

### **Issue and AER's considerations**

The AER continues to consider, for the reasons outlined above, that a domestic, broad-based, accumulation index is appropriate.

As noted in the explanatory statement, the dividend yield in the pre-1958 data series constructed by Lamberton is based on an equal weighted rather than value weighted dividend yield. The AER noted the finding of Brailsford et al that this would therefore be expected to be biased towards high dividend paying small stocks. That is, an equally weighted yield (which is the one being used) would be expected to be greater than a value weighted yield (which is the one desired). In response, however, the JIA state this was a statement only, with no data or statistical analysis provided, and so was 'speculative and unproven'.<sup>436</sup>

The second bias relates to how dividend yields were incorporated into stock return series constructed by Lamberton. The dividend yield series effectively assumes that non-dividend paying businesses had the same dividend yield as the average of dividend paying businesses.

Handley clarifies that the adjustment made to the historical data for the two biases identified above were made by the Sydney Stock Exchange (SSE), and not by Brailsford, Handley and Maheswaran. Specifically, the SSE applied an adjustment factor of 0.75. However, Officer's 1989 study was not based on the adjusted SSE data series.

Handley confirms his view that an adjustment is required to correct for the biases, for the reasons outlined in the Brailsford, Handley and Maheswaran paper. Brailsford et al considered a range for the adjustment of 0.65 to 0.75 was defensible, and accordingly there was no strong evidence to suggest a different adjustment factor should be applied.

### **AER's conclusion**

The AER concludes that a domestic, broad-based, accumulation index is appropriate.

For the post-1958 period, the data series utilised in different studies are either the same or similar, and each provide a relatively reliable source of historical excess returns over that period.

For the pre-1958 period, the use of the Lamberton data series without adjustment (that has been used in previous historical studies of Australian excess returns) would lead to an upwards biased estimate of the historical average excess return. Rather the data series adjusted by the SSE, and utilised by Brailsford et al and Handley should be adopted to avoid biased estimates.

Notwithstanding the above adjustment being made relating to the dividend yield series, as noted in Brailsford et al (as accepted by the JIA) a probable upwards bias remains in the stock price series up to the mid-1950's due to the small sample of businesses, exclusion of certain sectors, and government stock price controls.

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<sup>436</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p79.



Accordingly, Brailsford et al advise, and the AER agrees, that the pre-1958 data should be used with caution.

#### **7.5.4.2 Selection of the appropriate proxy for the risk-free rate**

In section 7.5.2, the AER discusses the issues of consistency in the conceptual definition of the term of the MRP and the term of the risk-free rate. In this section, the AER addresses the issue of consistency in the term of the risk-free rate and the term of the risk-free rate proxy used in historical estimates of the MRP.

#### **Summary of position in explanatory statement**

As discussed in section 7.5.2, in the explanatory statement, the AER considered there was persuasive evidence to adopt a five-year term of the risk-free rate. The AER recognised the importance of consistency in the terms between parameters and stated this implied that the term of the MRP should also match the regulatory period (which in general is five years).

The JIA stated that consistency between the risk-free rate proxy and the MRP is paramount from both a theoretical and practical point of view. They consider that at theoretical level there is ‘no debate’ that the term should be the same, and at the practical level ‘no convincing argument’ has been presented for not adhering to consistency.<sup>437</sup>

However, the AER stated it was important to understand that a forward-looking MRP of any term is unobservable. All the regulator, industry stakeholders or academics have to rely on are proxies. If data on shorter term government bond rates are unavailable for long estimation periods or are not preferred for other reasons, then historical market returns based on ten year bond rates may be a more appropriate proxy for a forward looking MRP. This may be the case even where a forward looking MRP of a shorter term is adopted (e.g. the length of the regulatory control period). If this approach is adopted, then historical estimates based on this approach should be interpreted based on the limitations of this approach. This was the AER’s position on the use of market data generally, noting that market data will always be an imperfect proxy for the unobservable WACC parameter that the AER is attempting to measure.

The AER noted that data on five year government bond yields are available since 1969. Historical excess returns relative to these yields for the longest estimation period possible results in an arithmetic average of over 1969-2007 of 5.5 per cent, or over 1969-2008 (to date) of 4.6 per cent.<sup>438</sup> The AER noted that these estimates could be used as an alternative though, at present, historical estimates relative to five year CGS are not statistically significant. Accordingly, this approach was not preferred.

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<sup>437</sup> JIA *Submission in response*, op. cit., September 2008, p.74. Based on the advice of Officer and Bishop, the JIA argued that due to the offsetting effects, there is very little difference in the overall cost of equity using either a five or ten year risk-free rate consistently, but that mixing the maturities of the risk-free rate proxies introduces a bias in the MRP of around 20 basis points (rounded from 18 basis points).

<sup>438</sup> J. C. Handley, *A note of the historical equity risk premium*, Report prepared for the AER, September 2008.

Alternatively, the AER noted that Officer and Bishop had estimated that:

Indicative data on Government bond yields from January 1972 to July 2008 does show an average yield difference between ten year and five year bonds of 18 basis points with there being more positive than negative differences. This suggests that the MRP relative to a five year bond will be slightly higher than for a ten year bond.<sup>439</sup>

Accordingly, the AER considered that 20 bps may be a reasonable estimate of the difference in historical excess returns based on 10 year government bonds compared with five year bonds. Historical excess returns relative to a 10 year risk-free rate should therefore be interpreted in the context that they may underestimate historical excess returns relative to a five year risk-free rate proxy by approximately 20 bps.

The AER concluded that if the MRP is estimated based on historical excess returns, then these historical estimates should be interpreted with regard to the strengths and weaknesses of the underlying data used. More broadly, and as already stated, the forward looking MRP is unobservable. Regardless of the data used, any MRP based on historical data is only a proxy for the forward looking MRP.

The AER proposed to adopt a term of the risk-free rate that matched the length of the regulatory control period, which in general is five years. As historical returns relative to five year CGS were not, at that time, statistically significant, the AER did not advocate historical estimates be estimated in that manner. Rather, following Officer and Bishop's estimate of the difference between 10 and 5 year CGS yields, the AER considered that historical estimates should continue to be estimated relative to 10 year CGS, but interpreted with the understanding that these estimates may underestimate historical estimates relative to five year CGS by approximately 20 bps.

### **Summary of submissions in response to explanatory statement**

The MEU agree that the term of the risk-free rate should reflect the term of the regulatory control period, and consequently there should be some adjustment to how the MRP is calculated.<sup>440</sup>

The JIA contends that there is little, if any, independent empirical analysis where a MRP is calculated using a 5-year term assumption. They argue that consequently, there is no evidence to support the AER's desire to use a MRP with a 5-year term assumption. The JIA argue that this issue is another instance where the AER is departing from commercial practice, and the generally accepted commercial practice is the requisite persuasive evidence for the continued use of the 10-year term assumption for the MRP.<sup>441</sup>

### **Issues and AER's considerations**

As discussed in chapter six, the AER has changed its position on adopting a risk-free rate term that matches the length of the regulatory period, and now considers there is no persuasive evidence to depart from the previously adopted term of 10 years.

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<sup>439</sup> *ibid.*, p.8.

<sup>440</sup> MEU, *Submission in response*, *op. cit.*, 30 January 2009, p.22.

<sup>441</sup> JIA, *op. cit.*, 2 February 2009, pp.69-70.

Consequently, the term of the MRP should also be 10 years, and the term of the risk-free rate proxy used in historical excess return estimates of the MRP should also be 10 years. As noted previously, historical excess return studies generally adopt a 10 year CGS yield as the risk-free rate proxy. While data from pre-1950's did not consistently adopt a 10-year term proxy, it appears the proxy used may have been higher or lower than 10 years, depending on the particular point in time. Consequently, while the quality of this data is not as good as post-1950's data, this earlier data is not expected to produce a bias in either direction.

### **AER's conclusion**

As discussed in chapter six, the AER no longer considers there is persuasive evidence to depart from a 10 term for the risk-free rate. Consequently, for internal consistency, where the MRP is estimated from historical excess returns a risk-free rate proxy with a term of 10 years should also be adopted.

#### **7.5.4.3 Method of averaging returns over multiple periods (arithmetic, geometric, average)**

Historical excess market returns are highly sensitive to the method of averaging returns over multiple periods. For example, Brailsford et al found that, relative to bonds, the historical excess market return over 1958-2005 was 4.0 per cent using a geometric average or 6.3 per cent using an arithmetic average.<sup>442</sup>

If returns vary over time, a geometric average will always be less than an arithmetic average.<sup>443</sup> The greater the volatility in returns the greater the difference between an arithmetic average and geometric average will be. With the level of volatility present in historical stock market returns, a difference of around 200 bps (2 per cent) is common.

In estimating a forward looking parameter from historical data some authors argue for an arithmetic average, some for a geometric average, and some for a weighted average of the two.

### **Summary of position in explanatory statement**

The AER noted that in Australian regulatory practice, the use of an arithmetic average of historical excess market returns is standard, and that this was based on two assumptions:

- that investors 'think' in terms of arithmetic, rather than geometric, averages and therefore investors' expectations will be influenced by arithmetic averages of historical returns, and
- that all returns are independent from each other, in a statistical sense. That is, the MRP in a given year is not influenced by the MRP in a prior year.

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<sup>442</sup> T. Brailsford, J.C. Handley, and K. Maheswaran, op. cit., 2008, p.90.

<sup>443</sup> For example, if an index starts at 100, falls to 80 and then increases again to 100, the arithmetic average return is 2.5 per cent (the average of the initial 20 per cent fall and subsequent 25 per cent rise) and the geometric average return is zero (because the value of the index at the end of the second period is the same as at the beginning of the first period).

The JIA also stated that the choice between an arithmetic or geometric average depends on how investors' expectations are formed on historical returns. The AER noted that Hathaway as well as Gray and Officer had previously (and presumably still) supported the position that investors do 'think' in terms of arithmetic, rather than geometric, averages.<sup>444</sup> The AER was not aware of any evidence to the contrary.

Officer and Bishop noted that the arithmetic average is usually used and stated this is appropriate 'if' all historical observations are treated as independent draws from the same distribution.<sup>445</sup> The AER considered this second assumption may be questionable.

The AER noted that a geometric average is usually adopted when measuring historical performance, whereas an arithmetic average is commonly adopted when estimating a forward looking estimate from historical data. The AER further noted that some authors have argued that the use of an arithmetic average for estimating a forward looking parameter is biased up and a geometric average is biased down and have proposed various methods to average the two. Specifically, the AER noted that:

- Blume has developed an averaging technique where the arithmetic average is adjusted downwards where there are more return intervals in the estimation period than the forecast period, which Blume argues would otherwise lead to an arithmetic average being biased upwards as a measure of a forward looking estimate, and
- Dimson, Marsh and Stuanton have also developed an averaging technique where historical arithmetic averages are adjusted based on the relative historical volatility compared to expected future volatility.

The AER considered there was some merit in the alternatives proposed by Blume, Dimson et al and other experts. However the AER acknowledged that there is no one alternative that is universally accepted and that each involved a certain level of complexity. Therefore on balance, the AER considered that use of an arithmetic average was reasonable. However the AER considered historical estimates based on arithmetic averages should be interpreted with the understanding that they may to some degree overestimate a forward looking MRP.

### **Summary of submissions in response to explanatory statement**

No submission appears to comment directly on this issue or contest the AER's position from the explanatory statement. However, as Officer and Bishop's updated advice and consequently the JIA's submission presents historical averages in arithmetic terms, the AER assumes that the JIA and their advisers maintain their support for the use of an arithmetic average.

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<sup>444</sup> N. Hathaway, *Australian market risk premium*, Capital Research, 2005, pp.18-20; S. Gray, and R.R. Officer, *A review of the market risk premium and commentary on two recent papers*, A report for the Energy Networks Association, 2005, p.9.

<sup>445</sup> B. Officer, and S. Bishop, op. cit., August 2008, p.6.

## **Issues and AER's considerations**

As no new information was contained in submissions on the explanatory statement that has given the AER cause to depart from its position in the explanatory statement, the AER maintains its position on this issue.

### **AER's conclusion**

The AER maintains its position that one of the assumptions underpinning the use of an arithmetic average of historical returns as a proxy for expected returns—that returns in each year are independent—may be questionable.

However while several alternative methods that weight arithmetic and geometric averages have been proposed by various experts, the complexity of these alternatives and the existence of more than one alternative are unlikely to make adoption of these alternatives worthwhile.

Therefore on balance, the AER maintains its position that the use of an arithmetic average is reasonable. However these estimates should be interpreted with the understanding that they may to some degree overestimate a forward looking MRP.

#### **7.5.4.4 Length of estimation period**

The appropriate length of the estimation period is generally determined with regard to a number of factors, including:

- *economic considerations* – longer term data series may be unrepresentative of expectations because they include several structural breaks (i.e. the composition of the market portfolio may have substantively changed over time); shorter term data series may be unrepresentative because they may be influenced by the present stage of the business cycle, or conversely, shorter term data series may reflect the current (and therefore the near future) expectations more accurately, and
- *statistical considerations* – longer term data series may produce a greater number of observations which may generally decrease the standard error and confidence intervals producing a more precise estimate; shorter term data series are likely to include 'higher quality' data as improved data sources have become available over time.

The appropriate length of the estimation period should represent a balance or 'trade-off' between these often competing considerations. Determining the length of the estimation period requires consideration of whether a shorter or longer period should be adopted, and what start and end dates should be considered.

### **Summary of position in explanatory statement**

The AER noted that if the MRP is stable over time, then it might be argued that a longer estimation period is appropriate as increased observations may lead to lower

standard errors and a more precise estimate. However, concerns over data availability and data quality increase the longer the estimation period.<sup>446</sup>

Studies that argue for a shorter estimation period generally consider data covering approximately the last 30 years to be appropriate, though these studies do not generally give a reason for this specific timeframe. Studies that argue for a longer estimation period generally incorporate data from around the last 120 years; presumably as this incorporates all data available. Brailsford et al examined the quality of Australian market return data and government bill and bond data over time, and present estimates of Australian historical excess returns corresponding to specifically determined periods of increasing data quality but of decreasing sample size. The authors considered that identifiable and material changes in the quality of the underlying data occurred in 1883, 1937, 1958 and 1980. The authors also estimated historical excess returns for the 1988 onwards period, representing the period after the introduction of the imputation tax system.<sup>447</sup>

Brailsford et al considered that Australian data prior to 1958 should be used with caution. Concerns over the small sample of firms, exclusion of certain sectors, and government stock price controls result in a probable bias that overstate equity returns up to the mid-1950s. However the most significant concern raised by Brailsford et al related to how dividend yields have been incorporated into historical market returns in previous studies, as discussed in section 7.5.4.1 above.

The MEU argued that using long term historical estimates does not recognise the exogenous changes that have impacted the share market over this time, and consequently historical estimates should only include data from around the last 25 years. For example, the MEU considered that the unexpected asset price inflation present in long term historical averages will led to an upwards biased estimate of a forward looking MRP.<sup>448</sup>

The JIA considered that the principal factors that should be considered include:

- the underlying quality of the data and data source
- the stability and robustness of the estimates, noting that if changes to the length of the estimation period results in volatile estimates, then a longer term period is appropriate, and
- no exclusions of periods within a sample period or exclusion of reliable data at the start of a sample period should be made unless there is strong evidence of a structural break or trend away from the long term average.<sup>449</sup>

The JIA noted reasons why a structural break or trend away from long term estimates could occur include an overall fall in risk or more diversification opportunities. However the JIA argued that structural breaks are difficult to identify, and that

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<sup>446</sup> T. Brailsford, J.C.Handley, and K.Maheswaran, op. cit., 2008, pp.73-97.

<sup>447</sup> ibid., pp.73-97.

<sup>448</sup> ibid., pp.42-43.

<sup>449</sup> JIA, *Submission in response*, op. cit. September 2008, pp.87-88.

identifying them is an empirical question. They also noted that a shorter estimation period would lead to greater confidence intervals.

Overall the JIA considered that a long term average is preferable to a short term average with the only constraint on the start date being data quality issues. The JIA considered data from 1958-2007 should be used as the primary estimate. The start date being based on the data quality issues identified by Brailsford et al in data prior to this date and the end date based on 2007 being the most recent complete calendar year of data. However the JIA considered that historical estimates incorporating data from pre-1958 should be used as a ‘cross-check’.<sup>450</sup>

On the appropriate length of the estimation period, Officer and Bishop considered:

In our view, which has been confirmed by the data we have examined, we should use the longest time series possible, subject to minimising data measurement errors, to estimate the MRP.<sup>451</sup>

The AER noted that estimates over each of the 1883-2008, 1937-2008 and 1958-2008 periods are all statistically significant. In contrast estimates over the more recent periods of 1980-2008 and 1988-2008 are not statistically significant. As noted above, the JIA considered the estimation period starting in 1958 should be used as the primary estimate, whereas estimates over different periods should be used as ‘cross checks’. However, as a balance of the factors noted above, including those raised by the JIA, the AER considered that weight should be applied to each of the three particular long term estimation periods which produce statistically significant results.

As also noted, based on the data quality issues identified by Brailsford et al, the authors considered data before 1958 should be used with caution. The AER agreed with this and exercised this caution by noting that estimation periods that include data from pre-1958 are likely to overstate historical excess returns from this period because of the biases identified by Brailsford et al.

In terms of end dates for the estimation periods, the AER noted that it is generally accepted that incorporating the most available data is appropriate. Officer and Bishop argued this view. However they considered only the most recent ‘full year’ of data should be included. The AER considered this approach was reasonable, though the AER noted the estimates are quite sensitive to the end date.

The AER demonstrated through historical examples that simply adding another year or two of data can have a significant impact on the historical average, even the average from the last 50 years. Moreover, adding another year or two of data to the 20-year average can have a more profound result on the estimate than on the estimate using a 50-year average. The AER cautioned against any ‘mechanistic’ approach to estimating the MRP from historical estimates given the sensitivity of these results.

The AER also noted where it can be demonstrated that the MRP is not stable (statistically) over time—that is, that the MRP is trending up or trending down—it may be possible to use a shorter data set and at the same time lower the standard error

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<sup>450</sup> *ibid.*, p.88.

<sup>451</sup> B. Officer, and S. Bishop, *op. cit.*, August 2008, p.7.

from what it otherwise would be by using certain estimation techniques. Also, for a given time period statistical methods that place greater weight on the more recent data are an alternative to shortening the estimation period.

The AER noted that Hancock assessed the predictive power of various estimation techniques including simple averages, moving averages, exponentially weighted moving averages and Hodrick-Prescott filters.<sup>452</sup> Hancock found that the Hodrick-Prescott filter using a moving average period of 30 years performs the best and produces an expected excess return of 5.6 per cent (at the time of his 2005 study). Hancock considered that this estimation technique (filter) produced trend estimates that are strongly suggestive of a downward move in historical excess returns since the late 1950s. However, Bishop (in 2007) and Officer and Bishop (in 2008) argued that updated data showed this apparent downward trend has been substantially reversed.<sup>453</sup> The AER considered that these alternative techniques have the potential to provide an insight into trends in historical excess returns away from long term averages, though such estimates may also place too much weight on recent data that does not reflect the 'true' unobservable forward looking MRP. On balance, and for simplicity, the AER considered having regard to simple historical averages over a range of estimation periods was reasonable and should be preferred.

In conclusion, the AER considered it was appropriate to consider a range of estimation periods, and in particular, 1883 onwards, 1937 onwards and 1958 onwards. The AER considered the end date of the estimation period should be based on the most recent data. The AER noted that the estimation periods considered in the explanatory statement ended in mid-October, and the AER stated it would update these estimates to include the data for the complete 2008 year for the final decision. As the end date can vary even the long term historical average substantially, the AER considered this further supports the proposition that the MRP should not be based 'mechanistically' on historical averages.

### **Summary of submissions in response to explanatory statement**

The MEU argued that relying on long term historical averages involves a risk that it excludes data which is most relevant to the expected conditions in the near future. It also excludes data which implies that the value of the MRP has fallen in recent decades. The MEU argue that such a fall can be expected given the Australian market will tend towards international market risk premiums due to the greater international economic and trade exposure, causing the MRP is different countries to converge.<sup>454</sup>

Officer and Bishop consider that the longest term period possible is preferred to 'best' reflect the relative weighting of events, especially extreme events. They present estimates for both the 1883 onwards and 1958 onwards periods. Averages for both periods are also presented ending in both 2007 and 2008. For the 1958-2008 period, Officer and Bishop consider, given the magnitude of the 2008 decline, it is more

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<sup>452</sup> J. Hancock, *The market risk premium for Australian regulatory decisions*, South Australian Centre for Economic Studies, 2005, pp.32-34.

<sup>453</sup> S. Bishop., *Market risk premium – commentary on recent papers*, Capital Value, 2007, p.5.

<sup>454</sup> MEU, *Submission in response*, op. cit., 30 January 2009, p.18.



appropriate to give the 2008 data a 1 in 126 year weight rather than a 1 in 50 year weight equal to the other years in that average.

### **Issues and AER's considerations**

The AER notes that, with the exception of the MEU, there is general agreement that primary weight should be placed on long term historical averages. The AER maintains its position that the 1883-onwards, 1937-onwards and 1958-onwards periods are all relevant periods for consideration. Each is a trade-off with the longest term periods more statistically significant and less susceptible to short term fluctuations, though contains some data quality issues. Whereas, the less long term data are the reverse of these issues. However, each of the preferred periods are reasonable, though with their unique strengths and weaknesses.

The AER also maintains its position that the end date should include the most recent full year of data. That is, the estimation period should end in 2008. The AER does not consider that the 2008 data should be excluded completely. As such an approach does not clearly lead to a more representative estimation period. For example, if the 2008 data is excluded because it's a 'bust', then the exclusion of the data for the several years beforehand must be considered on the grounds of being a 'boom'.

Rather, if a change to the standard approach to calculating and having regard to historical estimates is warranted, because of the significant decline in 2008, the AER considers this should instead be considered in the context of:

- whether or not an adjustment should be made to the 2008 data—this issue is discussed in section 7.5.4.6, or
- whether there should be a change in the relative weight placed on historical estimates compared to other estimates of the MRP (i.e. whether a structural break has occurred such that historical estimates are considered less reflective of forward looking expectations)—this issue is discussed in section 7.6

### **AER's conclusion**

The AER maintains its position that weight should be placed on the 1883-2008, 1937-2008 and 1958-2008 estimation periods.

#### **7.5.4.5 Adjustments for imputation credits**

This section addresses if and how historical excess returns should be 'grossed-up' to incorporate the value of imputation credits.

Since 1 July 1987, a dividend imputation tax system has been operating in Australia. Under a dividend imputation tax system, the return to equity holders is potentially comprised of three components – dividends, capital gains, and imputation credits. Imputation credits can be used by certain investors to off-set their personal income tax. This can be thought of as a prepayment of personal income tax at the business level. Imputation credits are therefore valuable as they represent a tax saving for certain investors. If a business fully distributes its imputation credits and these can be fully utilised by investors then the company income tax paid by the firm is effectively merely the withholding of personal income tax at the business level. The value of

imputation credits is referred to as ‘gamma’ and by definition must equal or fall within the boundaries of zero and one.

Significantly, for the required return to equity holders, the value of imputation credits represents that part of the required return that is effectively provided by the government rather than the business. Accordingly, regulated businesses do not need to be compensated for this component in their regulated revenues.

Stock market accumulation indices generally include dividends and capital gains only, and as imputation credits are part of the return to equity holders it is argued that an MRP based on historical excess returns should be ‘grossed up’ to incorporate the value of imputation credits in the overall market return.

### **Summary of position in explanatory statement**

The AER noted that on the issue of measuring the market risk premium under an imputation tax system, Officer, in his seminal 1994 paper, stated:

This raises the important question of whether we can use conventional measures of this risk premium, such as an  $x$  percent premium over the risk-free rate, when the  $x$  percent is based on historical rates under a classical tax system. If the imputation tax does *not* affect the cost of capital on an *after-company tax basis* as I have argued, then we could estimate  $E(r_{jt})$  using historical rates estimated under a classical tax regime. However, where estimates of returns are derived under an imputation tax using equation (16), some personal tax payments will be capitalised into the risk premium which consequently will be lower. In these circumstances, an adjustment (add  $\tau$ ) will be needed to include the personal tax credits so that the cost of equity capital is calculated to reflect an *after-company tax but before-personal tax* return consistent with the definition of cash flows.<sup>455</sup>

The AER stated that from the specification of the ‘building blocks’ and WACC formula in the NER, it was evident that the intended rate of return in the NER is an ‘after-company-before-personal tax’ rate of return.

The AER accepted the legitimacy of ‘grossing-up’ historical excess returns (based on accumulation indices) to include the value of imputation credits. However, as pointed out by Officer, assuming the introduction of the imputation tax system did not change the total required return to equity holders (and rather only the sources of that return where altered), then historical excess returns should not be ‘grossed-up’ before the introduction of the imputation tax system.<sup>456</sup> The issue is therefore restricted to how historical excess returns (based on accumulation indices) should be ‘grossed-up’ to include the value of imputation credits after the introduction of the imputation tax system. In an Australian context, the issue is how should historical excess returns be ‘grossed-up’ after 1987.

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<sup>455</sup> R. R. Officer, ‘The cost of capital of a company under an imputation tax system’, *Accounting and Finance*, vol.34, 1994, p.10.

<sup>456</sup> Officer (1994) argues that in an open capital market, such as Australia, where the size of the market relative to offshore markets implies that Australia is a price taker, the cost of capital would not be expected to change.

The AER noted two approaches that could be used, but these were not the preferred approach of the AER:

- One option would be to only use a period of Australian historical excess returns that completely predates 1987. However, as this would exclude approximately the last 20 years of data, this would not be appropriate unless it could be argued that the MRP had not changed in recent decades.<sup>457</sup>
- A second option would be to use a period of Australian historical excess returns that spans the periods both before and after the imputation tax system without adjustment for imputation credits, but to interpret the results with the knowledge that the historical excess returns would understate to some degree the total return to equity holders in the years after the introduction of the imputation tax system.<sup>458</sup>

The AER noted that this second approach was the approach that was previously promoted by Gray and Officer, who stated:

We note that the effect of franking credits on the estimate of MRP is small relative to both estimation error and the way in which other evidence is reflected in the final MRP estimate. We conclude that (i) it is appropriate to combine data from before and after the introduction of imputation and to express an estimate of the MRP that ignores any adjustment for the value of franking credits, and (ii) that the estimate of 6% that has been adopted by regulatory and market practice is such an estimate. We believe an adjustment to the MRP for franking credits is likely to be less than 50 basis points and to take the MRP to a decimal point, in view of general measurement errors, in our opinion would give a spurious impression of precision in the estimate.<sup>459</sup>

A third option which was preferred by the AER, and now also supported by Officer and Bishop, would be to attempt to adjust or ‘gross-up’ historical excess returns after 1987 to include the return derived from the value of imputation credits distributed, and to average these with estimates before 1987. The AER noted that this requires estimates of the value of imputation credits distributed and an appropriate technique to incorporate them into the historical data, particularly if the data set contains periods before and after the introduction of dividend imputation. This is further complicated as taxation law has also been subject to several adjustments after the introduction of dividend imputation.

The AER stated that it is first important to recognise what the ‘gross-up’ should consist of. To be consistent with the Officer (1994) framework, the historical excess returns (from capital gains and dividends) should only be ‘grossed-up’ to reflect the value of imputation credits *distributed* and not the value of imputation credits *created*. This was recognised by Officer and Bishop (2008) who stated:

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<sup>457</sup> Brailsford et al estimate the arithmetic average historical excess returns, relative to bonds, to be 6.4 per cent over the 1883-1987 period. T. Brailsford, J.C. Handley, and K. Maheswaran, *op. cit.*, 2008, p.90.

<sup>458</sup> Handley estimates the arithmetic average historical excess returns, relative to bonds, to be 6.1 per cent over the 1883-2008 period or 6.0 per cent over the 1958-2008 period.

<sup>459</sup> S. Gray, and R.R. Officer, *A review of the market risk premium and commentary on two recent papers*, A report for the Energy Networks Association, 2005. pp.3-4.

...the term 'gamma' is usually used to reflect the value of \$1 of imputation tax benefits created by the firm however we are concerned with the value of a dollar of imputation tax benefits once distributed given that we are adjusting observed market returns.<sup>460</sup>

The AER agreed with this statement from Officer and Bishop, and noted that, as demonstrated in Officer, in his seminal 1994 paper, it is important to be consistent in the definition of both cash flows and the rate of return. 'Gamma' is used to adjust downwards the corporate income tax building block (i.e. cash flows) for the value of imputation credits created. Accordingly a rate of return is required that also reflects the value of imputation credits created. To achieve this, historical excess returns (from capital gains and dividends) need only be 'grossed-up' for the value of imputation credits distributed. The reason is that the value of imputation credits not distributed (which combined with the value of imputation credits distributed make up the value of imputation tax credits created) can be expected to already be present in the capital gains as investors place a value on this undistributed credits in the belief that they will be distributed in the future. Officer and Bishop agreed with this notion and stated:

Any value to imputation tax benefits retained will be reflected in the share price through an anticipation of when they may be distributed and their value at that this.<sup>461</sup>

That is, the value of undistributed imputation credits will be reflected in the share price (capital gains) and accordingly it is only necessary to add back the value of distributed imputation credits onto the return from accumulation indices. This will lead to a consistent definition of cash flows and the rate of return which is the critical contribution of the Officer (1994) framework.

The AER noted that these 'grossed-up' historical excess returns were first estimated by Brailsford et al and Handley and Maheswaran, which both 'grossed-up' estimates over different time periods ending in 2005. Brailsford et al 'grossed-up' historical estimates for assumed utilisation rates of 0.5 and 1.0, noting that these were chosen for illustrative purposes only. Handley and Maheswaran extended this work by 'grossing-up' for more precise estimates of utilisation rates determined from tax statistics, which averaged 0.71 over the 1990-2004 period.

The AER noted that in both reports the authors urged a cautious approach to the use of their 'grossed-up' estimates. Brailsford et al caution:

We reiterate that because of restrictions on data availability and the short sample period involved, these estimates are considered to be indicative only of the potential impact that imputation might have on the equity risk premium in Australia.<sup>462</sup>

Similarly, Handley and Maheswaran noted:

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<sup>460</sup> B. Officer, and S. Bishop, op. cit., August 2008, p.i.

<sup>461</sup> *ibid.*, p.9.

<sup>462</sup> T. Brailsford, J.C.Handley, and K.Maheswaran, op. cit., 2008, p.92.

In this section, we provide preliminary evidence of the impact of the imputation system on the rate of return to equity holders...<sup>463</sup>

## **Summary of submissions in response to explanatory statement**

The MEU argue that:

The AER also adjusted the MRP for the value of gamma of 0.65 that it had developed. This value for gamma assumes that all of the electricity transport businesses are private companies, rather than the vast majority being government owned. Excluding the impact of government ownership effectively reduces gamma. By using a lower value of gamma than actually applies in for electricity transport, inflates the assessed value of MRP.<sup>464</sup>

## **Issues and AER's considerations**

The MEU's comments appear to be an objection to the value of distributed imputation credits that historical excess returns have been 'grossed-up' by, rather than any issue with the method used to do that 'grossing-up'. Further, the specific issue raised appears to be an objection to the definition of the benchmark network service provider adopted by the AER. The issue of the benchmark is addressed in chapter three. In that chapter, the AER states that it considers the benchmark business, for the purposes of the NER, is a 'pure play' regulated electricity network business without supportive parents.

No issues with the method used to 'gross-up' historical excess returns were raised by other stakeholders, and the AER notes that the method again used by Officer and Bishop in their recent advice to the JIA is consistent with this method.

Historical excess returns over various estimation periods and 'grossed-up' for different values of imputation credits distributed are presented in table 7.2

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<sup>463</sup> J. C. Handley, and K. Maheswaran, 'A measure of the efficacy of the Australian Imputation Tax System', *The Economic Record*, Vol. 84, No. 264, 2008, p.91.

<sup>464</sup> MEU, *Submission in response*, op. cit., 30 January 2009, p.19.

**Table 7.2 Historical excess returns (arithmetic average, relative to 10 year bonds, ‘grossed-up’ for value of imputation credits distributed, per cent)**

Utilisation rate	0.00	0.28	0.5	0.65	1.00
1883-2008	5.9*	6.0*	6.1*	6.1*	6.2*
1937-2008	5.4*	5.5*	5.6*	5.7*	5.9*
1958-2008	5.7	5.9	6.1	6.2*	6.4*
1980-2008	5.0	5.3	5.6	5.8	6.3
1988-2008	3.8	4.3	4.7	5.0	5.6

Source: Handley<sup>465</sup>

\*Indicates estimates are statistically significant at the five per cent level based on a two-tailed t-test.

### **AER’s conclusion**

The AER maintains its position that—for consistency with the Officer (1994) framework which is embedded in the NER—historical excess returns should be ‘grossed-up’ for the value of imputation credits distributed, rather than the value of imputation credits created. Further, that this ‘gross-up- should only be done for historical excess returns after the introduction of the imputation tax system in 1987.

#### **7.5.4.6 Adjustments for unrepresentative data—unexpected or one-off events**

While historical excess market returns are often used as a proxy for the MRP, these returns may not be reflective of forward looking expectations. Even where structural breaks have not occurred in the estimation period, the historical excess returns may not have represented the ‘expected’ MRP at the time due to unexpected returns or one-off events that subsequently occurred. Where structural breaks have occurred, or are expected to be presently occurring, using historical excess returns will also not be a good proxy for a forward looking estimate. Issues involving adjustments to historical estimates to improve the use of historical excess returns as a proxy for a forward looking MRP are raised in this section.

### **Summary of position in explanatory statement**

The AER noted that it has been argued that significant events in the past which are not expected to reoccur in the future should be discounted out of the historical excess market return, in order to estimate a forward looking MRP. For example, after having adjusted the historical data for unexpected or one-off events, Hathaway estimated the current MRP (at time of publication in 2005) to be 4.5 per cent, whereas Hancock

<sup>465</sup> J. C. Handley, *Further comments on the historical market risk premium*, Report prepared for the AER, 14 April 2009, pp.6-9.

estimated the most likely value of the MRP is in between 4.5-5.0 per cent (also at time of publication in 2005).<sup>466</sup>

The AER discussed the specific adjustment proposed by Hathaway and Hancock:

▪ ***Hathaway—One-off increase in PER***

The price-earnings ratio (PER) is calculated as the share price divided by the earnings per share (EPS). Hathaway found that over 1980-1990, the Australian market PER increased from about 9 times to 17 times – meaning that the price of earnings almost doubled over this period.<sup>467</sup> It was concluded that this shift in the PER added 145 bps to the 1965-2005 period historical excess market return. Hathaway noted that some analysts discount this effect out of their MRP estimates on the grounds it was a one-off re-pricing of earnings that will not occur again, though accepting that the current PER represents a fair price for earnings. By contrast, other analysts consider earnings are overpriced and the Australian market PER will mean revert back to some historical norm. The AER noted that recent evidence may support this view given that the PER has declined over 2008. This would imply that the future MRP will be lower than the historical MRP to accommodate this reversion. Hathaway considered the inflation of the PER was a one-off historical event.

▪ ***Hancock—Unexpected gains from a long term downward move in discount rates***

Hancock noted that real interest rates fell around one per cent over the 30 year period from the early 1970's. Hancock argued that on an unchanged earnings outlook, this would have increased stock values by approximately 10 per cent, which in turn may have biased up the 30 year average MRP by approximately one third of a per cent.<sup>468</sup>

▪ ***Hancock—Unexpected introduction of dividend imputation in 1987***

Hancock also argued that the introduction of dividend imputation in Australia in 1987 produced a large unexpected excess return as observed by the excess return of 21 per cent from July to September 1987. Hancock estimated this unexpected event biases up the 30 year average MRP by approximately two thirds of a per cent.<sup>469</sup>

On Hancock's adjustment of the unexpected introduction of dividend imputation, the AER noted that Gray and Officer had previously stated that:

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<sup>466</sup> N. Hathaway, *Australian market risk premium*, Capital Research, 2005; J. Hancock, *The market risk premium for Australian regulatory decisions*, South Australian Centre for Economic Studies, 2005.

<sup>467</sup> N. Hathaway, op. cit., 2005, pp.7-9.

<sup>468</sup> *ibid.*, pp.11-12.

<sup>469</sup> J. Hancock, op. cit., 2005, p.11.

It is quite inconsistent to assume that franking credits have such value that their anticipated introduction drove stock prices up by more than 20%, but then to assume that those same franking credits are irrelevant when they are actually paid.<sup>470</sup>

The AER agreed with Gray and Officer, and stated that it had accordingly presented historical estimates ‘grossed-up’ for the value of imputation credit. However the AER also stated that, clearly if Gray and Officer’s argument is accepted, then the reverse must also be true. That is, it would be quite inconsistent to assume that imputation credits have such value that historical excess returns should be ‘grossed-up’ to incorporate them, but that the large one-off and unexpected capital gain that their introduction caused can simply be overlooked in basing a forward looking MRP on historical estimates.

The AER noted that the adjustments to the historical data proposed by Hathaway and by Hancock had previously been reviewed by Gray and Officer (in 2005) and by Bishop (in 2007).<sup>471</sup> The AER noted that the comments in Officer and Bishop (in their current advice to the JIA) substantially reflected these earlier views. In both cases, the authors argued against the proposed adjustments, arguing they are ‘ad hoc’ and may themselves be a source of bias.

Gray and Officer noted that there are many unique economic events that affect stock returns, and to eliminate all of them would leave a data set of limited use. Gray and Officer further argued that it is because there are unexpected events that a risk premium is required.<sup>472</sup> Bishop argued that a lack of a well developed theory behind what drives the MRP makes events that might lead to bias in the historical data difficult to identify.<sup>473</sup> Each set of authors also note that, except for Hathaway’s acknowledgement of the relationship between the MRP and imputation credits, only events that might bias the historical MRP upwards had been considered, and not events that might do the reverse.

The JIA and Officer and Bishop stated that their general position on adjustments was that a longer estimation period that includes both positive and negative shocks should be used rather than making ‘ad hoc’ adjustments to historical estimates.

The AER considered that it may not be appropriate to make explicit adjustments to historical estimates of the MRP, as suggested by Hathaway and Hancock. However these authors have identified several significant unexpected or one-off historical events that are likely to bias upwards historical estimates as a proxy for a forward looking MRP. Accordingly, the AER concluded that historical estimates should be interpreted in this knowledge.

### **Summary of submissions in response to explanatory statement**

The JIA states that in coming to the AER’s conclusion that historical estimates are more likely to overstate a forward looking MRP—because of the one-off events

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<sup>470</sup> S. Gray, and R.R. Officer, op. cit., 2005, p.29.

<sup>471</sup> S. Gray, and R.R. Officer, op. cit., 2005; Bishop, op. cit., 2007.

<sup>472</sup> S. Gray, and R.R. Officer, op. cit., 2005 pp.25-29.

<sup>473</sup> S. Bishop, op. cit., 2007, pp.6-7.



positively affecting the historical data—the AER does not acknowledge the considerable evidence of events that can lead to an underestimate of the MRP.

The JIA consider:

Examples of such events include the impact of terrorist attacks, a 1 in 126 year credit crunch like 2008 and the October 1987 stock market crash. If weight is to be given, albeit implicitly, to events that provides an historical MRP greater than the average, then surely weight should be given to those below the average. The AER appear to ignore any of these entirely.

The outcome of even implicitly adjusting for alleged one-off events that are upside-related leads naturally to look for arguments that are downside related and the JIA end up with a debate based on opinion rather than fact or a well developed theory of the determinants of an MRP.<sup>474</sup>

The JIA conclude:

If **all** the evidence before the AER is considered, in particular the ample evidence of one-off events that suppress the historical MRP, there is not conclusive evidence either way that one-off historical events bias the historical MRP in either direction.<sup>475</sup>

### **Issues and AER's considerations**

The AER notes that the JIA's position (against adjusting the historical data), is contrary to the position of Officer and Bishop (in relation to their adjustment for the 2008 negative return). However, Officer and Bishop's position on the adjustment for the 2008 data is contrary to its previous position on adjustments for one-off events, generally.

In their current advice, Officer and Bishop contend that stock market booms or declines of 'magnitude' are relatively infrequent, noting that the 2008 decline was the largest negative outcome on record (i.e. over the 126 year data series available). They then argue:

Including this 2008 negative outcome in a short time period would overweight its likelihood of occurrence and provide a misleading number. For example, giving it equal weight to other years in the shorter period 1958-2008 would overweight it, just as might be the case for an unusually large positive event. To expand, the 2008 outcome has a weight of 1 in 51 years in the latter time period compared with 1 in 126 in the 1883 to 2008 time period.<sup>476</sup>

Officer and Bishop then adjust the 2008 data when used in the 1958-2008 period, by giving it a 1/126 weight rather than a 1/51 weight equal to that of the other years. However, Officer and Bishop do not explain how this adjustment is justified given their previous strong stance against making adjustments in either direction, given the lack of a sufficient and objective guiding theory and because of the potential to introduce bias, a view which both authors have consistently held in advice to

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<sup>474</sup> JIA, *op. cit.*, 2 February 2009, pp.88-89.

<sup>475</sup> *ibid.*, p.89.

<sup>476</sup> B. Officer, and S. Bishop, *op. cit.*, January 2009, p.6.

regulators over at least the last several years. For example, Officer and Bishop as recently as August 2008 previously advised that:

...there is no formal way to identify which events to include or exclude. Adjustments are really ad hoc and, by themselves, represent a source of potential bias arising from the researcher's bias. For this reason we do not support ad hoc adjustments.

As noted by Gray and Officer, the MRP arises because there are unexpected economic events. The MRP is a 'reward' for bearing unexpected market wide risks. To exclude market wide events from the data set is to potentially exclude the events that give risk to it in the first place.

Variation in market returns arise from unexpected events. Thus one could argue if the data series were to be adjusted for once off unexpected events than all variation, not just some spikes, should be excluded from the analysis. This clearly is a nonsensical extension of the argument to exclude selected events.<sup>477</sup>

For the reasons in Officer and Bishop's previous advice, the AER continues to consider that explicit adjustments should not be made to the historical data. Rather, the (unadjusted) historical estimates should be interpreted with a view that it may overstate or understate a forward looking MRP, based on an understanding of historical one-off or unexpected events.

The AER accepts that there may be an inverse relationship between the short term historical excess return and the short term forward looking MRP. A devaluation of equity prices may reflect the market's expectations of lower future cash flows, a higher discount rate (including potentially a higher MRP), or both. The reverse reasoning also applied for an appreciation of equity prices. Accordingly, the significant decline in 2008 may, at least in part, reflect an increase in the MRP. However, this increase is more likely associated with the short term MRP, rather than the long term MRP which is relevant to the AER's review. Additionally, as noted above there are various one-off and positive events in the historical data in the opposite direction.

Taking into account all of the potential historical one-off events, it is difficult to determine which direction the potential over or under estimation may be. In this case, taking into account the positive one-off events identified by Hathaway and Hancock, and the negative one-off events identified by the JIA (including the large 2008 decline), the AER agrees that it is not clear whether historical estimates are more or less likely to either overstate or understate a forward looking long term MRP.

### **AER's conclusion**

Given the lack of a guiding theory, and the potential for the introduction of bias, the AER maintains its preference for not explicitly adjusting historical data for potential positive or negative one-off events.

After consideration of the various potential positive and the negative one-off events (including the decline in 2008) identified by the various stakeholders and authors, it is

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<sup>477</sup> B. Officer, and S. Bishop, op. cit., August 2008, pp.38-39.

not clear whether historical estimates are more or less likely to either overstate or understate a forward looking MRP.

### 7.5.5 Historical estimates—results and interpretation

The AER notes that estimates based on historical averages are arguably the most common proxy of the MRP. Historical estimates though strictly not forward looking are generally used to estimate the MRP on the assumption that investors base forward looking expectations on past experience.

The MRP is an expected return which is not directly observable and so must be estimated. In their seminal paper, Mehra and Prescott provide evidence that historical excess returns have been too high in relation to the return on government bonds to be explained by the standard economic models of risk and return without invoking unreasonably high assumptions about the risk aversion of equity holders. Mehra and Prescott label this phenomenon the ‘equity premium puzzle’.<sup>478</sup> Dimson, Marsh and Staunton posit:

Logically, there are two possible resolutions to the puzzle: either the standard models are wrong, or else the historical premium is misleading and we should expect a lower premium in the future.<sup>479</sup>

The authors conclude, as does Siegel, that a forward looking MRP can be expected to be less than historical estimates.<sup>480</sup> This is an important consideration as the NER provides that the AER must have regard to the need for the MRP to be forward-looking and only compensate for non-diversifiable risk.

Where structural breaks have occurred, or are expected to be presently occurring, using historical excess returns may not be a good proxy for a forward looking estimate. While the stock market decline in 2008 was the largest on record, the JIA have not provided persuasive evidence that a structural break has occurred, such that the forward looking long term MRP is expected to significantly higher than the long term historical MRP.

Even where structural breaks have not occurred in the estimation period, the historical excess returns may not have represented the ‘expected’ MRP at the time due to unexpected returns or one-off events that subsequently occurred. After consideration of the various potential positive and the negative one-off events (including the decline in 2008) identified by the various stakeholders and authors, it is not clear whether historical estimates are more or less likely to either overstate or understate a forward looking MRP.

As can be seen in table 7.3, historical excess market returns ‘grossed-up’ for an assumed utilisation rate of 0.65 results in an arithmetic average of between 5.7 and

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<sup>478</sup> R. Mehra, and E. Prescott, ‘The equity premium – A puzzle’, *Journal of Monetary Economics*, Vol. 15, 1985.

<sup>479</sup> E. Dimson, E., P. Marsh and M. Staunton, *The worldwide equity premium – a smaller puzzle*, London Business School, 2006, p.1.

<sup>480</sup> J. Siegel, ‘The shrinking equity premium’, *Journal of Portfolio Management*, Fall, 1999.

6.2 per cent for estimation periods commencing between 1883 and 1958 and finishing in 2008.

The incremental increase of adopting a utilisation rate of 0.65, compared to 0.5, is between 0 and 10 bps, over the estimation periods 1883-2008, 1937-2008 and 1958-2008.

**Table 7.3 Historical excess returns (arithmetic average, relative to 10 year bonds, ‘grossed-up’ for value of imputation credits distributed, per cent)**

Utilisation rate			Lower 95% confidence interval	Upper 95% confidence interval
	0.5	0.65	(0.65)	(0.65)
1883-2008	6.1*	6.1*	3.2	9.0
1937-2008	5.6*	5.7*	1.1	10.3
1958-2008	6.1	6.2*	-0.1	12.4
1980-2008	5.6	5.8	-3.0	14.6
1988-2008	4.7	5.0	-3.5	13.4

Source: Handley <sup>481</sup>

\*Indicates estimates are statistically significant at the five per cent level based on a two-tailed t-test.

Historical excess returns:

- are ‘grossed-up’ for a utilisation rate of 0.65
- and estimated over a range of estimation periods that the AER considers appropriate (1883-2008, 1937-2008, 1958-2008)

all fall close to 6 per cent, with some estimates above and some below. Specifically these estimates fall within the 5.7 to 6.2 per cent range.

The AER notes that there are wide confidence intervals around these estimates. For these long term estimation periods, the lower 95 per cent confidence intervals for these estimates are in the range of -3.5 to 3.2 per cent. Whereas the upper 95 per cent confidence intervals for these estimates are in the range of 9.0 to 12.4 per cent.

The AER also continues to note Gray and Officer have previously advised in advice commissioned by the ENA that:

We recognise that it is likely that the MRP is not stationary and likely to vary under different economic conditions. However, the fact that there is no adequate theory underlying the variability of MRPs makes it dangerous to

<sup>481</sup> J. C. Handley, *Further comments on the historical equity risk premium—Report prepared for the AER*, 14 April 2009, p.9.

adjust an MRP estimate simply because another year or two or three of data alter the estimated mean. For example, a year ago the 30-year mean excess return was less than 6%, leading some to call for a reduction in the MRP used by Australian regulators. Now, the most recent 30-year mean return is 7.7%. We do not advocate increasing the MRP now for the same reason we did not advocate reducing the MRP estimate last year. The problems of theory and measurement of MRPs suggest a conservative approach – a regulator should be very careful about making any changes without compelling evidence.<sup>482</sup>

That is, even when the latest (30 year) historical estimates were 7.7 per cent, Gray and Officer did not advocate increasing the MRP from 6 per cent. The AER noted that the 7.7 per cent was not ‘grossed-up’ for imputation credits. Given the latest historical estimates over a range of long term estimation periods, even after ‘grossing-up’ for imputation credits, are now substantially less than 7.7 per cent, following the approach of Gray and Officer might suggest that there is not persuasive evidence to depart from 6 per cent.

However, as historical estimates only accurately describe what has occurred in the past, the question must also be asked to what extent these historical estimates are likely to provide an accurate reflection of forward looking expectations. This issue is discussed further in section 7.6

#### **7.5.6 Cash flow based measures**

Cash flow based measures of the MRP generally employ a dividend discount model. One such model is the dividend growth model (i.e. Gordon growth model or DGM) which values a stock by estimating the next dividend to be paid and then assumes dividends per share will increase in perpetuity by a constant growth rate.

- Rearranging the equation the implied cost of equity can be derived from the current share price and an assumed constant growth rate in dividends per share.
- Replacing individual stock parameters for market parameters implies that the MRP *equals* the next period’s market dividend yield *plus* expected market growth rate in dividends per share *minus* the risk-free rate.

The merit of this approach then relies on how well these expected parameters can be forecast, and the validity of the underlying model.

#### **Summary of position in explanatory statement**

The AER noted that Officer and Bishop, in advice submitted on the issues paper referenced two sources for implied MRPs based on dividend growth models – Harris and Marston and Bloomberg.

Officer and Bishop stated that they understood that Bloomberg is the only source of forward looking MRP estimates in Australia. The authors stated their understanding that Bloomberg’s estimates do not include any explicit adjustment for imputation credits. These estimates ranged between 4.5 to 8.6 per cent between 2004-2008, with the upper bound being a recent estimate (though Officer and Bishop considered this

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<sup>482</sup> S. Gray, and R.R. Officer, *A report for the Energy Networks Association*, op. cit., 2005 pp.10-11.

apparent upwards trend could easily change). From a theoretical perspective, the authors noted there is nothing wrong with using cash flow measures but considered that it would require great confidence in the derived MRPs. Officer and Bishop considered cash flow measures do not provide a better forward looking estimate than historical estimates.<sup>483</sup>

The AER stated that Bloomberg may be the only source of Australian MRP cash flow measures derived from combining the implied cost of equity from individual stocks. However other sources exist that use alternative methods. The AER noted that other studies begin with market wide forecasts rather than the summing of implied values from individual stocks. Generally the expected market growth rate in dividends per share is proxied with analysts' short term forecasts of market wide earnings per share growth, or long term expectations of gross domestic product (GDP) growth (or both, where earnings per share forecasts are expected to converge with GDP growth forecasts over a certain time period).

For example, the AER noted that Davis (in a 1998 study) based the market growth rate in dividends per share on the expected GDP growth rate and produces forward looking MRP estimates of between 4.5 to 7.0 per cent.<sup>484</sup> Lally (in a 2002 study) based the growth rate on the expected weighted average growth in earnings per share for Australian companies which was then assumed to converge towards the long run expected GDP growth rate over a period of 5 to 20 years. This approach produced forward looking MRP estimates of between 4.0 to 5.7 per cent.<sup>485</sup> The AER noted that these estimates from both Davis and Lally were both explicitly 'grossed-up' for imputation credits with Davis adopting an utilisation rate of 0.5 and Lally adopting 1.0.

The AER noted that according to Officer and Bishop, Harris and Marston estimated the next dividend to be paid and earnings per share from a consensus of analysts' forecasts for individual stocks that were then value weighted to form a forward looking MRP estimate, which averaged 7.14 per cent.<sup>486</sup>

The AER noted that the 7.14 per cent estimate from Harris and Marston referenced by Officer and Bishop was based on consensus forecasts of earnings per share over five years to derive the growth rate in dividends per share which was then assumed to continue in perpetuity. However, the AER noted that Lally explains why assuming short term earnings forecasts will continue in perpetuity is inappropriate and likely to bias upwards the resultant estimates:

One commonly used approach to the estimation of the expected growth rate in dividends per share (g) is to employ analysts' forecasts for earnings per share over the next few years (see Harris and Marston, 1992, 2001). However Cornell (1999, Ch.4) observes that these short-term forecasts are typically in excess of reasonable estimates of the long-run growth in GDP. Since

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<sup>483</sup> *ibid.*, pp.14-15.

<sup>484</sup> K. Davis, *The weighted average cost of capital for the gas industry*, Report prepared for the ACCC and ORG, 18 March 1998, p.15-16.

<sup>485</sup> M. Lally, *The cost of capital under dividend imputation*, Prepared for the ACCC, 2002, pp.29-34.

<sup>486</sup> B. Officer, and S. Bishop, *op. cit.*, August 2008, p.14.

dividends are part of GDP, the indefinite extrapolation implies that dividends will eventually exceed GDP, and this is logically impossible.<sup>487</sup>

That AER also noted that the estimates from Harris and Marston are also for the US, not Australia, and this was not clearly explained by either Officer and Bishop or the JIA.

The AER also noted a more recent estimate, from 2006, was from AMP Capital Investors, who based the growth rate on the expected long-run GDP growth rate, similar to Davis. AMP Capital Investors estimated the forward looking Australian MRP for the next 5-10 years to be ‘around 3.5 per cent’ (specifically 3.8 per cent), 1.9 per cent for the US and 2.4 per cent for the ‘world’. AMP Capital Investors considered an extra 1 to 1.5 per cent could be added for imputation credits resulting in a ‘grossed-up’ Australian MRP of around 4.5 to 5.0 per cent.<sup>488</sup>

The AER noted that, on a general point, each of the cash flow measures above employ a long-run expected GDP growth rate as the sole or part proxy for the expected growth rate of dividends per share. The AER pointed out that Lally has noted:

Since the long-run growth rate in dividends per share cannot exceed the long-run growth rate in aggregate dividends, and the latter cannot exceed the long-run growth rate in GDP, the resulting estimate of the market risk premium is an upper bound on the true value.<sup>489</sup>

That is, because of the proxy selected for the expected growth rate in dividends per share each of the resulting estimates are an upper bound, rather than a point estimate, of a forward looking MRP derived from cash flow measures. The resultant estimates should therefore be interpreted accordingly.

The AER concluded that cash flow measures, including measures that have been explicitly ‘grossed-up’ to include the value of imputation credits, generally produce forward looking estimates of the MRP of around or below 6 per cent. Theoretical basis of using cash flow measures is relatively sound and these measures are arguably more forward looking, as required by the NER, compared to historical estimates. From a practical perspective, however, the resulting estimates can be quite sensitive to the particular forecast assumptions adopted, limiting to some extent the precision that these measures can produce. The AER considered cash flow measures can provide a useful ‘cross-check’ on the MRP derived alternative measures, though due to their limitations should be used with caution. The AER concluded that regard to cash flow measures of the MRP did not provide persuasive evidence to depart from the previously adopted MRP of 6 per cent.

The JIA also noted the advice of Officer and Bishop and considered that the high variability of forward looking estimates derived from cash flow measures and the

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<sup>487</sup> *ibid.*, p.31.

<sup>488</sup> AMP Capital Investors (2006), *The equity risk premium – is it enough?* Oliver’s insights, Ed.13, 4 May.

<sup>489</sup> M. Lally, *The cost of capital under dividend imputation*, Prepared for the ACCC, 2002, p.31.

relative lack of sources of estimates limits this method to that of a useful ‘cross-check’ on the reasonableness of the MRP derived from other methods.<sup>490</sup>

### **Summary of submissions in response to explanatory statement**

Officer and Bishop note cash flow based measures from Bloomberg for a range of countries including Australia. They note that between 2004 and July 2008 the results for Australia increased from 4.5 per cent to 8.6 per cent, though moderated to 8.0 per cent by January 2009. Officer and Bishop note that they do not believe the Bloomberg estimates include an allowance for imputation credits. They estimate the current Bloomberg estimates for Australia adjustment for a theta of 0.65 to be 9.1 per cent. They note that these can be considered long term estimates, however Officer and Bishop continue to support long term historical estimates be used as the primary estimate. They recommend a MRP of 7 per cent.

CEG also estimate the MRP based on a similar approach to that used by AMP Capital Investors, but with updated data. Using this approach, CEG estimate the current cost of equity to be around 16 per cent. Deducting the current yield on CGS of around 4 per cent, they estimate the MRP to be around 12 per cent. CEG consider this is a long term estimate of the MRP.

### **Issues and AER’s considerations**

One of the limitations with cash flow measures, as acknowledged by CEG, is that they relate to a very specific point in time. As CEG previously stated:

Nonetheless, it is important to note the limitations of a DGM analysis in accurately determining the ‘true’ market cost of equity. Firstly, the market cost of equity is not a static number but moves around based on investors’ perceptions of market risk and their willingness to be exposed to this risk. It may be that the timing of a DGM study happens to coincide with a period of high/low perceived risk for the market generally or for utilities specifically. That is, a DGM study estimates the cost of equity at a particular point in time—it does not imply that this is always the cost of equity. For these reasons it is appropriate to treat the DGM analysis as a cross-check on other methods for estimating the cost of capital (and vice versa).

A related issue to this ‘point in time’ issue is the reliability of the estimates. In this sense, the AER is referring to DGM analysis producing significantly different results that do not appear to be fully explained by economic conditions, even where the different ‘points in time’ are relatively close.

For example, assuming dividends per share grow at 2.5 per cent pa in perpetuity (approximately equal to inflation) beyond the forecast period:

- as at June/July 2008—CEG estimate the implied MRP from cash flow measures at 8.9 per cent, whereas
- as at November 2008—CEG estimate the implied MRP from cash flow measures at 14.2 per cent

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<sup>490</sup> JIA, *Submission in response*, op. cit., September 2008, p.96.



That is, following CEG's approach to cash flow measures leads to a 60 per cent increase in the implied MRP in the space of only four to five months.

In contrast:

- as at July 2008—Bloomberg estimates the implied MRP from cash flow measures at 8.6 per cent, whereas
- as at January 2009—Bloomberg estimates the implied MRP from cash flow measures at 8.0 per cent.

That is, following Bloomberg's approach to cash flow measures leads to a 7 per cent decrease in the implied MRP in the space of six months. Of particular concern is that CEG's and Bloomberg's different approaches to cash flow measures led to the implied MRP moving in different directions over a relatively similar timeframe. This does not necessarily imply that either approach is better than the other, but rather, demonstrates the inherent unreliability of these measures.

The AER notes that for at least several years in a row, prior to 2008, MRP estimates derived using the approaches such as those used by Bloomberg and CEG estimated the forward looking MRP to be well below 6 per cent. Taking these types of cash flow measures into account, regulators considered there was some evidence to lower the MRP below 6 per cent, however, in the interests of regulatory certainty and stability, and placing primary weight on long term historical estimates, regulators consistently maintained a MRP of 6 per cent.

The AER notes that as of late, the Bloomberg estimates and CEG estimates (using the AMP Capital Investors approach) have changed from well below 6 per cent to well above 6 per cent. However, just as regulators were wary to lower the MRP below 6 per cent based on these types of estimates, so should the regulator be wary to raise the MRP above 6 per cent based on the same type of estimates. The AER considers the Bloomberg and CEG estimates provide some evidence that the MRP (perhaps even the medium term MRP) is above the long run historical MRP, however it does not, in of itself, provide persuasive evidence to depart from 6 per cent.

The AER reiterates the views of the JIA and Officer and Bishop (in their submission on the issues paper) who at that time considered that the high variability of forward looking estimates derived from cash flow measures and the relative lack of sources of estimates limits this method to that of a useful 'cross-check' on the reasonableness of the MRP derived from other methods.<sup>491</sup>

### **AER's conclusion**

The AER considers the Bloomberg and CEG estimates provide some evidence that the MRP (perhaps even the medium term MRP) is above the long run historical MRP. This issues is discussed further in section 7.6.

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<sup>491</sup> JIA, *Submission in response*, op. cit., September 2008, p.96.

### 7.5.7 Survey measures

Surveys of market practitioners may also be used to estimate the MRP. As participants are generally surveyed on their expectations, surveys have the benefit of being a forward looking measure consistent with the CAPM, and the NER requirement to have regard to the need for the rate of return to be forward looking rate of return.<sup>492</sup> However the use of surveys in a regulatory setting involves a number of issues. These issues include:

- lack of replicability and difficulty in determining who to survey including ensuring that survey responses are free of bias, and
- difficulty in weighting results of differing surveys.

Where regulators have used surveys in estimating the MRP, survey results have generally been used as a ‘cross-check’ on the reasonableness of the estimate derived from other measures of the MRP rather than as the primary estimate itself.

#### Summary of position in explanatory statement

The AER considered that survey measures generally have the benefit of being forward looking and may better reflect prevailing conditions in the market for funds compared to long term historical averages—both of which are desirable attributes and relevant considerations in this review.<sup>493</sup> This position was similar to that of the JIA who considered that checking the reasonableness of historical estimates of the MRP is important due to their low statistical precision, and that surveys of market practitioners can provide such a cross-check.<sup>494</sup>

In contrast, the MEU considered that little weight should be placed on survey measures as they may only reflect the ‘desired outcome’ of the surveyed participant.<sup>495</sup> The AER acknowledged this was a possibility with surveys, in general, but the AER had no reason to believe that the responses to the particular surveys considered by the AER would be biased either positively or negatively (as qualified in relation to the KPMG survey).

In advice to the JIA. Officer and Bishop provided a summary of the following five different surveys:

- Kester, Chang, Echanis, Haikai, Isa, Skully and Wang (1999)
- Jardine Fleming Capital Partners (2001)
- Lonegran (2001)
- KPMG (2005), and

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<sup>492</sup> NER, cls. 6.5.4(e)(1) and 6A.6.2(j)(1).

<sup>493</sup> NER, cls. 6.5.4(e)(1) and 6A.6.2(j)(1).

<sup>494</sup> JIA, *Submission in response*, op. cit., September 2008, p.95.

<sup>495</sup> MEU, *Submission in response*, September 2008, p.47.

- Truong, Partington and Peat (2005).

Officer and Bishop did not generally comment on the relative merits of each survey. The exception to this was the Jardine Fleming Capital Partners study which Officer and Bishop considered should not be considered because ‘participants were asked the wrong question’.

Of the surveys mentioned above, as the studies by Jardine Fleming Capital Partners, KPMG and Truong et al detail the actual MRP assumption adopted in the valuation report or survey, the AER considered it appropriate to focus on these. The remaining two surveys are more general in nature and do not detail the assumptions adopted for individual WACC parameters. The AER also identified a fourth survey, by Capital Research, and added this study to the group of surveys considered.<sup>496</sup>

The AER noted that Truong et al report on their survey of capital-budgeting practices used by Australian listed companies in 2004. Truong et al found that:

- Of the business that responded to the survey, 47 per cent adopt a MRP of 6 per cent and 22 per cent adopt an MRP of less than 6 per cent
- the average MRP adopted by Australian listed companies surveyed was 5.94 per cent, and
- 15 per cent of responses also stated that their MRP was adjusted for the value of imputation tax credits. Of the remaining 85 per cent of responses that did not adjust for imputation credits, the main reasons given were that it was too difficult; should have a very small impact; or was unnecessary as the market already adjusts stock prices for the value of imputation credits and so this will already be reflected in the cost of capital estimate.<sup>497</sup>

Table 7.4 displays the survey responses from Truong et al.

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<sup>496</sup> The AER noted that interested parties could comment on the potential use of this survey in their submissions in response to the explanatory statement.

<sup>497</sup> G. Truong, G. Partington and M. Peat, ‘Cost of capital estimation and capital budgeting practices in Australia’, *Australian Journal of Management*, Vol. 33, No. 1, June 2008, p.155.

**Table 7.4 MRP adopted by Australian firms in capital budgeting**

MRP	No. of responses	% of total
3.0% – 5.0%	4	11%
5.0% – 5.5%	4	11%
6.0%	18	47%
6.5% – 7.0%	7	18%
6.0% – 8.0%	3	8%
Other	2	2%
<b>Average (5.94%)</b>	<b>38</b>	<b>100%</b>

Source: Truong, Partington and Peat (2008)<sup>498</sup>

The AER also noted that KPMG reviewed 118 independent reports on takeovers between 2000-2005 finding that of the reports that employed a CAPM framework to estimate the cost of equity:

- 76 per cent adopted a MRP of 6.0 per cent, and
- 97 per cent adopted a MRP of between 6.0 and 7.0 per cent.

While KPMG found that none of these reports made an adjustment for the value of imputation credits, neither did any report attribute their choice of value for the MRP to their decision on imputation credits.<sup>499</sup>

Table 7.5 displays the results from KPMG.

<sup>498</sup> *ibid.*

<sup>499</sup> KPMG, *Cost of capital – market practice in relation to imputation credits*, August 2005, p.15.

**Table 7.5 MRP adopted in independent expert valuation reports**

MRP	No. of reports	% of total
< 6%	-	-
6.0%	25	76%
6.0% – 6.5%	3	9%
7%	4	12%
8%	1	3%
> 8%	-	-
<b>Average (5.94%)</b>	<b>38</b>	<b>100%</b>

Source: KPMG (2005)<sup>500</sup>

The JIA cautioned against relying on independent expert reports—such as those by Lonegran and KPMG—claiming that valuers will tend towards the lower end of plausible estimates as to avoid potential litigation as ‘people who rely on valuations will often sue if the value is too high but are exceedingly unlikely to sue if the valuation is too low’.<sup>501</sup> However, the AER rejected this assertion, noting that in order to derive a conservatively low valuation, valuers would be using a conservatively high discount rate (or conservatively low cash flow forecasts). Accordingly, if the 6.2 per cent average MRP in KPMG’s survey of independent expert reports is biased, it is biased up, not down, and is likely to overstate a forecast looking MRP commensurate with prevailing conditions in the market for funds.

The AER further noted that Capital Research report the MRP adopted in a number of broker ‘dailies’, mostly from 2006. The average MRP adopted in the broker reports cited was 5.09 per cent, with eleven of the twelve reports adopting a MRP less than 6 kper cent.<sup>502</sup> Table 7.6 displays the results from Capital Research.

<sup>500</sup> *ibid.*

<sup>501</sup> JIA, *Submission in response*, op. cit., p.95.

<sup>502</sup> Capital Research, *Telstra’s WACC for network ULLS and the ULLS and SSS businesses – Review of reports by Prof. Bowman – Associated Professor Neville Hathaway*, March 2006, p.17.

**Table 7.6 MRP adopted in broker ‘dailies’**

<b>Broker</b>	<b>Valuation</b>	<b>MRP</b>
CitiGroup	Wattyl 2006	5.0%
CitiGroup	Mirvac 2006	5.5%
Goldman Sachs JB Were	Computershare 2006	5.6%
JP Morgan	HPA 2006	5.4%
Merrill Lynch	Sky City 2006	4.5%
UBS	Funtastic 2006	5.0%
Macquarie Equities	Great Southern Plantations 2005	4.5%
Goldman Sachs JB Were	Iluka Resources 2004	6.0%
ABN Amro	David Jones 2002	4.5%
CitiGroup	Amcor 2002	5.0%
BBY	Sirtex Medical 2001	5.0%
<b>Average (5.09%)</b>		<b>5.09%</b>

Source: Capital Research (2006)<sup>503</sup>

The AER considered that surveys measures of the MRP across different years, different survey respondents or sources, and different authors illustrate that the majority of market participants adopt a MRP of 6 per cent, or sometimes less than this estimate. The AER further considered that surveys measures strongly indicate that a MRP of 6 per cent is by far the most commonly adopted value of market practitioners

Overall Officer and Bishop considered that survey evidence is fairly limited, but in the surveys that they reviewed, the MRP commonly fell in the 6-8 per cent range.<sup>504</sup> The JIA considered that—assuming no value is attributable to imputation credits—surveys of financial professionals, including Chief Financial Officers, independent expert reports and other users of financial data support a MRP of 6 per cent.<sup>505</sup>

### **Summary of submissions in response to explanatory statement**

The JIA state that in the current market conditions, survey data may prove to be a better guide to a forward looking MRP compared to historical excess returns.

However, the JIA raise three issues concerning the AER’s treatment of survey data in the explanatory statement. These are:

<sup>503</sup> *ibid.*

<sup>504</sup> B. Officer, and S. Bishop, *op. cit.*, August 2008, pp.16-18.

<sup>505</sup> *ibid.*, p.78.

- that the AER presented and considered only half the relevant conclusions from the survey evidence when reaching its conclusion
- that the AER selectively reported the survey data itself, leading to a misleading impression of a downward bias from 6 per cent, and
- concerns regarding the reliability of the Capital Research survey identified by the AER.<sup>506</sup>

These three concerns are detailed and responded to in the following section.

### **Issues and AER's considerations**

The JIA assert that the AER has only considered half the relevant conclusions from the survey evidence—that is, that 6 per cent is by far the most commonly adopted MRP—and the other relevant conclusion not considered by the AER is that a value of zero is by far the most commonly adopted gamma. The JIA assert that:

...when the implications of the survey data are examined in full, the surveys strongly support the original JIA submission that an MRP of 6% can only be sustained on the evidence before the AER **in combination with a low or zero gamma.**<sup>507</sup>

The JIA assert an alternative approach would be to gross up the survey material for the value of imputation credits assumed by the AER (0.65), and that this adjustment would require a MRP of 7 per cent.

Presumably, the JIA are implying that survey participants' choice of MRP (with 6 per cent being the most common) was contingent on their choice of gamma (with zero being the most common). Further, that if the majority of survey participants adopted a positive gamma, they would have adopted a higher MRP (i.e. higher than 6 per cent).

The AER does not agree with this contention. As clearly stated in the explanatory statement:

- Truong et al found that 15 per cent of responses stated that their MRP was adjusted for the value of imputation tax credits. And that of the remaining 85 per cent of responses that did not adjust for imputation credits, the main reasons given were that it was too difficult; should have a very small impact; or was unnecessary as the market already adjusts stock prices for the value of imputation credits and so this will already be reflected in the cost of capital estimate.<sup>508</sup>

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<sup>506</sup> JIA, op. cit., 2 February 2009, p.90.

<sup>507</sup> *ibid.*, p.91.

<sup>508</sup> G. Truong, G. Partington and M. Peat, 'Cost of capital estimation and capital budgeting practices in Australia', *Australian Journal of Management*, Vol. 33, No. 1, June 2008, p.155.

- KPMG found that while none of the reports surveyed made an adjustment for the value of imputation credits, neither did any report attribute their choice of value for the MRP to their decision on imputation credits.<sup>509</sup>

Given these findings, the AER maintains its view that the relevant conclusion from survey evidence is the MRP adopted.

In the explanatory statement, the AER stated survey evidence indicates the majority of market participants adopt a MRP of 6 per cent, or sometimes less than this estimate—and that a MRP of 6 per cent is by far the most commonly adopted value of market practitioners.

The JIA argue that this conclusion is based on a selected reporting of the surveys, and that:

In fact, a balanced assessment of the correct survey evidence provided by KPMG suggests the opposite conclusion should be drawn. That is the majority of market participants adopt a minimum MRP of 6%, or sometimes **more** than this estimate.<sup>510</sup>

The AER does not accept this conclusion of the JIA. However, the AER would accept the conclusion that while sometimes market participants adopt a MRP above or below this value, 6 per cent is by far the most commonly adopted MRP by market participants as shown in table 7.7.

**Table 7.7 MRP adopted by Australian firms in capital budgeting**

MRP	Truong et al <sup>511</sup>	KPMG
< 6%	22%	-
6%	47%	76%
> 6%	26%	24%
< 6-7%	n/a	-
6-7%	n/a	97%
> 6-7%	n/a	3%
<b>Average</b>	<b>5.94</b>	

Source: Truong, Partington and Peat (2008)<sup>512</sup>

On the Capital Research survey also considered by the AER, the JIA state:

<sup>509</sup> KPMG, *Cost of capital – market practice in relation to imputation credits*, August 2005, p.15.

<sup>510</sup> JIA, op. cit., 2 February 2009, p.91.

<sup>511</sup> These figures do not add to 100 per cent as 2 per cent of survey participants indicated a MRP of ‘other’.

<sup>512</sup> *ibid.*



The JIA reviewed the commentary prepared by Capital Research and cannot find an articulation of the sample selection process and method. The survey appears to cover the period 2001 to 2006 yet only reports 11 observations. The JIA cannot assess the basis for the data or sample selection. In these circumstances, the JIA consider that this should be put aside until the results can be verified or the sample selection process described to provide comfort that the results are derived from a random process.<sup>513</sup>

As the JIA contend that the sample selection process and method cannot be confirmed from available material—and the consideration or non-consideration of the Capital Research survey does not change the AER’s position on the overall conclusion drawn from survey evidence—the AER has chosen to exclude the Capital Research survey from consideration.

### **AER’s conclusion**

Surveys measures of the MRP across different years, different survey respondents or sources, and different authors illustrate that (while market participants sometimes adopt a MRP above or below 6 per cent) 6 per cent is by far the most common MRP adopted by market participants. However the AER notes that each of the surveys considered were conducted several years ago. Accordingly, similar surveys of a forward looking MRP conducted in the present environment might lead to a different outcome.

### **7.5.8 Other issues**

#### **7.5.8.1 Consistency in cash flows and rate of return**

#### **Summary of position in explanatory statement**

In its issues paper, the AER noted that Gray and Hall had (in a paper published in 2006) derived a deterministic relationship between the gamma, MRP and assumed tax rate. Using this relationship, the authors argued that the standard values adopted by Australian regulators for these parameters of 0.5, 6 per cent, and 30 per cent, respectively, are inconsistent as these values imply a dividend yield almost twice that observed in the market.<sup>514</sup> Gray and Hall argued the most straightforward and complete way to resolve this inconsistency was to set the value of gamma to zero. If gamma was set to zero, the authors claimed the MRP can then be based on historical capital gains and dividends alone, while maintaining consistency with the CAPM framework.<sup>515</sup>

However, in the issues paper the AER also noted that the inconsistency alleged by Gray and Hall had been disputed by Lally and by Truong and Partington. Lally noted that there is no inconsistency, as amongst other reasons, the observed and implied dividend yields quoted in Gray and Hall are not comparable as the observed yields are based on data that largely predates dividend imputation.<sup>516</sup> Truong and Partington

<sup>513</sup> JIA, op. cit., 2 February 2009, p.91.

<sup>514</sup> S. Gray, and J.Hall, ‘Relationship between franking credits and the market risk premium’, *Accounting and Finance*, Vol.46, 2006, pp.405-428.

<sup>515</sup> *ibid.*, pp.405-428.

<sup>516</sup> M, Lally, ‘Relationship between franking credits and the market risk premium: a comment’, *Accounting and Finance*, Vol.48, 2008, pp.143-151.

argued that instead of setting the gamma to zero, recognising that retained imputation credits may have a positive value removes the inconsistency.<sup>517</sup>

In the issues paper, the AER asked stakeholders to comment on whether or not a gamma, MRP and tax rate of 0.50, 6 per cent and 30 per cent were inconsistent with each other, for the reasons claimed by Gray and Hall. However, no submissions on the issues paper commented on this issue. In the explanatory statement, the AER concluded that the lack of response appeared to indicate that stakeholders had accepted the counter arguments against the reasoning of Gray and Hall put forward by Lally and/or by Truong and Partington.

### **Summary of submissions in response to explanatory statement**

The JIA ‘strongly supports’ the AER’s position on the importance of consistency in the cash flows and the rate of return in accordance with the Officer framework.

However, the JIA state that the AER incorrectly concludes that stakeholders accept that the alleged consistency argued by Gray and Hall has been satisfactorily resolved.

The JIA commissioned SFG (Professor Gray) to respond to this issue. The JIA state:

In fact, Professor Gray considers that the inconsistency between the MRP and the value of gamma is even more pronounced by the AER proposing an MRP of 6% and a value of gamma of 0.65. Furthermore, the AER has misunderstood the work of Lally, Truong and Partington and the implications arising from these studies.<sup>518</sup>

The JIA summarise Gray and Hall findings as follows:

Specifically, Gray and Hall (2006) show that within the Officer framework estimates of  $[\text{gamma}] = 0.5$  and  $\text{MRP} = 6\%$  and  $T = 30\%$  require that 18% of the required return on equity must come from franking credits. If, for example, the required return on equity is 12%, a return of 2.2% must come from franking credits. Even if distributed franking credits are valued at 60% of face value, the franking credit yield must be 3.6% ( $= 2.2\% / 0.6$ ). But with every \$1 of cash dividends, only 43 cents of franking credits can be distributed even if fully franked. So, even if all dividends were fully-franked, the dividend yield would have to be more than 8% ( $= 3.6\% / 0.43$ ). But observed dividend yields are in the order of 4.5%. Therefore, within the Officer framework estimates of  $[\text{gamma}] = 0.5$ ,  $\text{MRP} = 6\%$  and  $T = 30\%$  would require dividend yields that are implausibly high. The dividend yields of Australian firms are simply not high enough to justify setting gamma as high as 0.5<sup>519</sup>

The JIA note that Gray and Hall, in their reply to the Lally and Truong and Partington, argue that the proposed reconciliations in those papers require the abandonment of the Officer framework that forms the basis of the Australian regulatory system.

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<sup>517</sup> G. Truong and G. Partington, op. cit., 2008, pp.153-158.

<sup>518</sup> JIA, op. cit., 2 February 2009, p.93.

<sup>519</sup> ibid., p.94.

The JIA conclude that the alleged inconsistency identified by Gray and Hall remains an important issue is one of the reasons the JIA has focused on the need for consistent assumptions across WACC parameters. Further, the JIA conclude that this issue reinforced the JIA's argument that gamma should be at the lower end of the zero to one range and that with a gamma greater than 0.2—and with a view to the current economic climate—the MRP should be 7 per cent.

### **Issues and AER's considerations**

The AER commissioned Associate Professor Handley to critique the alleged inconsistency purported by Gray and Hall.

Handley agrees with Lally and Truong and Partington that the alleged inconsistency can be resolved, however considers there is a more direct explanation for Gray and Hall's conclusions and one which does not require any parameters to be changed to restore any apparent internal consistency.<sup>520</sup>

Gray and Hall take the previously adopted WACC parameters of a MRP of 6 per cent, gamma of 0.5, and statutory tax rate of 30 per cent and derive a deterministic relationship under the Officer framework that results in an implied dividend yield from these parameters. Gray and Hall then compare this implied dividend yield against that generally observed in the market, finding that the implied dividend yield is significantly higher than generally observed yields. From this Gray and Hall that a MRP, gamma and statutory tax rate of 6 per cent, 0.5 and 30 per cent are internally inconsistent.

However, Handley notes that a key assumption underlying the Officer framework is that all cash flow streams—including associated imputation credits—are perpetuities which means that 100 per cent of the free cash flow and 100 per cent of the associated imputation credits generated in each period are fully distributed at the end of that period.

As Handley explains, in other words, the Officer framework assumes the return to equity holders consists of only two, rather than three components—dividends and franking credits—and therefore, for a given total return, it is assumed that businesses will pay high dividend yields.

Handley accepts that the implied dividend yields are clearly higher than those generally observed, but state that while Gray and Hall:

...conclude that this indicates a problem with the standard set of parameters. In fact it has nothing to do with the parameters—rather the source of the difference between the larger implied and smaller observed yields is the perpetuity assumption which holds in Officer's model, but which we know does not hold in practice. In short, Officer's model assumes returns are in the form of franked dividends only, there are no capital gains and therefore dividend yields are naturally high whereas observed returns reflect dividends, the value of franking credits and capital gains.<sup>521</sup>

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<sup>520</sup> J. C. Handley, op. cit., 14 April 2009, pp.14-23.

<sup>521</sup> *ibid.*, p.21.

Handley concludes that, in his opinion, there is no inconsistency in the previously adopted parameter estimates, and therefore data on observed dividend yields and effective tax rates do not impose bounds on the value of franking credits as suggested by Gray and Hall, nor is there a need to set gamma to zero.

The AER notes that Handley's analysis has been performed in relation to the previously adopted parameters (ie 6 per cent MRP and 0.5 gamma), however the AER considers that his conclusion still holds under the AER's adopted parameters of a 7 per cent MRP and 0.65 gamma. This conclusion is reached as while the increase gamma would have heightened the alleged inconsistency, the increase in the MRP would have lessened it.

### **AER's conclusion**

The AER considers that Handley was satisfactorily resolved the alleged inconsistency purported by Gray and Hall.

### **7.5.8.2 Other indicative measures of the MRP**

Section 7.5.6 discusses the use of forward looking cash flow based measures (using the dividend growth model) to estimate the MRP, including Officer and Bishop's views on these measures. However, in their recent advice Officer and Bishop also raise several additional current or future looking indicators of the MRP. These are discussed in this section.

### **Summary of position in explanatory statement**

In its issues paper, the AER sought stakeholder comment on a number of issues associated with historical excess return, survey and dividend growth model estimates of the MRP. The AER also asked if there were any other measures of the MRP that should be considered.

As stakeholders did not propose any additional measures, and the AER was not aware of any other commonly used measures, the AER's analysis was confined to historical excess return, survey and dividend growth model estimates of the MRP.

### **Summary of submissions on explanatory statement**

In Officer and Bishop's current advice, commissioned by the JIA in response to the explanatory statement, the authors note that the current economic circumstances are 'most unusual', noting that the stock market return in 2008 was the lowest on record. They argue:

As a consequence, we see a need to add more weight to the prevailing market conditions and forward evidence than we might otherwise consider.<sup>522</sup>

Officer and Bishop note three additional indicators of the MRP, not included in their previous advice, being:

- stock market return volatility

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<sup>522</sup> B. Officer, and S. Bishop, *Market risk premium—Further comments—Prepared for ENA, APIA and Grid Australia*, January 2009, p.7.

- implied MRP from forwards markets contracts
- implied MRP from the spread on corporate debt

Officer and Bishop note that investors require a positive expected return for bearing risk, and consequently the large negative observed market return in 2008 does not imply a negative forward looking MRP. Rather:

There is a likely inverse relationship between a realised MRP a forward looking MRP. A decline in stock market returns arises from either a downgrading of expected cash flows for all stocks and /or an increase in the average discount rate. It is most likely that forecast expected cash flows have declined and the discount rate has increased. Since there was a decline in the 10 year CGB rate over 2008 (from 6.34% to 4.01%) and given the evidence on increased market volatility, it is most likely that the underlying MRP has increased substantially, at least in the shorter term.<sup>523</sup>

Officer and Bishop also note that MRP estimates can be derived from forward markets contracts—such as options on Share Price Index (SPI) contracts—though require making a number of assumptions.

Officer and Bishop note that an example of this approach is used by JF Capital Partners (JFCP). JFCP note that a common assumption of asset pricing models is that there is a constant price per unit of risk, with JFCP estimating that 43 bps per unit of risk is appropriate for the CAPM. Officer and Bishop state that the implied volatility from SPI contracts is currently 42 per cent, and conclude that the current implied MRP from such observations is 18 per cent (42 per cent multiplied by 43 bps). They note that they have also estimated the implied volatility for a 12 month option at 38 per cent, suggesting a MRP of 16 per cent.

Officer and Bishop also note that the rise in credit spreads for BBB rated corporate bonds. They note that the average spread to December 2006 was 122 bps, whereas the average spread for the 2008 calendar year was 295 bps, ‘well above the prior average’.<sup>524</sup> They argue that:

Corporate debt is a risky asset and can be priced according to the CAPM. In this context, the rise in the spread can be explained by either an increase in the MRP, an increase in the beta or some combination.<sup>525</sup>

Officer and Bishop estimate that, assuming the MRP to December 2006 was 6 per cent, then this implies a debt beta of 0.2 to explain an average spread of 120 bps. Assuming the debt beta has not changed, an average spread of 300 bps implied a MRP of 15 per cent.

Officer and Bishop conclude that the above measures suggest that the prevailing short to medium term MRP is well above 6 per cent. But they conclude that these measures do not change their recommendation (from advice submitted on the issues paper) for a MRP of 7 per cent.

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<sup>523</sup> B. Officer, and S. Bishop, *op. cit.*, January 2009, p.8.

<sup>524</sup> *ibid.*, p.7.

<sup>525</sup> *ibid.*, p.8.

## **Issues and AER's considerations**

The AER responds, in turn, to Officer and Bishop's comments on each of the three additional indicators of the MRP they've raised in their recent advice.

### ***Stock market return volatility***

The AER agrees with Officer and Bishop that there is a likely inverse relationship between a short term observed excess return and a forward looking MRP. This provides a good reason against using the observed return from 2008 (or any other single year) as a measure of a forward looking MRP. However, it is partly for this reason that where historical excess returns are used it is a long term historical average which is preferred.

The AER also notes that Officer and Bishop consider the negative 2008 observed return was most likely attributed to a decrease in market wide cash flows and an increase in the market average discount rate (which the authors further attribute to an increase in the MRP given the decrease in CGS yields during that period). That is, Officer and Bishop do not solely attribute the 2008 return to an increase in the MRP.

The magnitude of the 2008 return may provide a reason to prefer historical average excess returns over the longest period (from 1883 onwards), rather than from more recent periods (putting aside the data quality issues with the older data), however it does not, of itself, appear to provide persuasive evidence that the forward looking long term MRP will be significantly above the historical long term average observed excess return. That is, it does appear to provide persuasive evidence that a structural break has occurred in the MRP (which would cause less weight placed on long term historical estimates) and consequently potentially provide persuasive evidence from a departure from the previously adopted MRP of 6 per cent.

### ***Implied MRP from forward markets contracts***

On MRP estimates implied from forward market contracts, Officer and Bishop:

Such estimates are only valid for the time period implied by the option or the forward period. We might expect that, although variable, such an estimate of the rate might approach (from above or below) an equilibrium value over time such as that implied by the 'long term average' estimate of MRP.<sup>526</sup>

The 18 per cent appears to be a very short term estimate of the MRP, and the 16 per cent is an estimate for the next 12 months (i.e. over 2009). Given the above quote from Officer and Bishop, and that the relevant MRP for the AER's WACC review is the medium-long term MRP, it is not clear to what extent the estimates quoted by the authors provide much guidance of the MRP over the relevant MRP.

Further, on the approach of JFCP, Officer and Bishop state:

JFCP then fade this estimate of the current MRP to the 'equilibrium' MRP (derived from long-term historical average) over a number of years for their valuations of equity.<sup>527</sup>

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<sup>526</sup> *ibid.*

<sup>527</sup> *ibid.*

However, Officer and Bishop do not state how many years this is faded over, what long term estimate it is faded towards, or what the overall conditional long term MRP is from JFCP's approach. The absence of this overall estimate from Officer and Bishop's report is conspicuous as—if any estimate from this approach was relevant to the AER's review—it would be that one. Officer and Bishop make the statement that:

While we are not advocating this approach to estimating an MRP at this time, we make the point that 6.0% is clearly well below the prevailing shorter term (and longer term) forward MRP.<sup>528</sup>

However, the AER cannot verify the forward looking longer term MRP from this approach, nor does the AER even know what this forward looking longer term MRP is, given the lack of details in Officer and Bishop's report. Given this, and consistent with the AER approach to evidence across other parameters, the AER has placed limited weight on this estimate.

#### ***Implied MRP from the spread on corporate debt***

The AER notes that as Officer and Bishop's estimates appear to be based on 8 year corporate bonds, the implied MRP is at least a 8 year forward looking MRP (as opposed to the short term implied MRPs noted above). Officer and Bishop's 15 per cent estimate relied on the assumption that the debt beta had not increased in recent time from the historical average. They note that the rise in corporate bond spread would still be consistent with a forward looking MRP of 6 per cent if the debt beta had risen from 0.2 to 0.5. However they conclude:

It is not clear whether the beta of debt, the MRP of both have changed to explain the spread in the context of the CAPM. However an increase in the MRP can be expected given the change in volatility apparent in the equity and options markets.<sup>529</sup>

The AER considers it is reasonable to assume that the debt beta may have increased, and that this provides a partial explanation for these results, meaning the implied MRP is less than the 15 per cent calculated by Officer and Bishop. Further, the AER notes that Officer and Bishop qualify their results, stating:

There is limited history on corporate bond data consequently we see our analysis as indicative. Equally we have not replicated the analysis for other rated bonds.<sup>530</sup>

#### **AER's conclusion**

The AER considers that these additional indicative measures of the MRP raised by Officer and Bishop provide some evidence that the prevailing short term MRP is likely to be above the long term historical MRP. However, they do not provide persuasive evidence that the long term forward looking MRP, over the period relevant to the AER's review, is likely to be substantially above the long term historical MRP.

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<sup>528</sup> *ibid.*, p.8.

<sup>529</sup> *ibid.*

<sup>530</sup> *ibid.*

## 7.6 AER's conclusion

Consistency between each of the WACC parameters is important. In relation to the MRP, this includes consistency between the conceptual definition of the term of the risk-free rate and the term of the MRP (and its constituent components). This position is supported by the JIA.

As the AER is maintaining a 10-year term for the risk-free rate, for internal consistency, the term of the MRP should also be 10 years. As the NER require the AER to have regard to the need for the rate of return to be forward looking, it is a 10 year forward looking perspective that is therefore of relevance.

The NER also require the AER to have regard to the need for the rate of return to be commensurate with prevailing conditions in the market for funds. However, these two requirements are not competing, but rather, when read together, are a requirement to have regard to the need for the MRP to reflect the prevailing expectations of a 10 year MRP, as at the relevant point in time, with that point in time being at the time of the reset determination (rather than at the time of the WACC review). Notwithstanding this statement, the AER has taken into account current financial conditions (at the time of this WACC review) to the extent that these conditions are expected to prevail over the period to which the outcomes of this WACC review apply. Accordingly, the AER should determine each parameter, including the MRP, in such a way as it is relevant for a 10 year perspective from the commencement of the next regulatory control period for each service provider affected by this review.

This means that the AER should determine each parameter, including the MRP, in such a way as it is relevant for a 10 year perspective from the commencement of the next regulatory control period for each service provider affected by this review.

For parameters such as the nominal risk-free rate, the adoption of a method (rather than a value), enables this parameter to be updated at the time of the reset determination and produce a rate which reflects the forward looking expectations prevailing at the time of the reset determination. That is, the risk-free rate is not stable over time, but varies, and the adoption of a method (rather than a value) for this parameter enables individual reset determinations to adopt either a higher or lower risk-free rate depending on the forward looking expectations prevailing at the time of the determination.

Similarly, it may be reasonable to consider that the MRP is not stable over time either, but varies with different economic conditions. For example, CEG consider there is academic literature supporting an inverse relationship between the MRP and the yield on government bonds (which are the proxy for the risk-free rate). As CGS yields are currently at historically low levels, this would suggest the current MRP is above the forward looking long term MRP. However, rather than suggesting a method for the MRP that would encapsulate this time-varying dimension, CEG recommend this is a reason for the AER not to reduce the equity beta from the previously adopted value(s).

However, the integrity of each individual WACC parameter is important. This integrity includes that the MRP is a measure of market-wide non-diversifiable risk, whereas the equity beta is a measure of the benchmark efficient NSP's relative



exposure to non-diversifiable risk compared to that of the market. To the extent that the current MRP is above the forward looking long term MRP, the AER does not agree that it is appropriate to address this issue via the equity beta.

Further, the view of the AER and the JIA's advisers (Professor Officer and Dr Bishop) is that there is no adequate method to 'automatically' update the MRP at the time of each determination, like there is for the nominal risk-free rate.

Having established that the MRP should be a value that reflects the forward looking long term MRP, the AER turns to whether there is persuasive evidence to depart from the previously adopted MRP of 6 per cent.

The premise of the JIA's initial submission on the MRP seemed to be an assertion that the previously adopted MRP of 6 per cent was initially determined by Australian regulators without having regard to the value of imputation credits. Therefore it was 'incorrect' and needed to be 'corrected'. In the explanatory statement, the AER demonstrated that regulators did have regard to the value of imputation credits in initially setting a MRP of 6 per cent. Accordingly no 'correction' was needed.

Nonetheless, the AER continues to agree with the legitimacy of the value of imputation credits forming part of the MRP. Accordingly, the issue was and continues to be not whether a 6 per cent MRP needs to be 'corrected' for imputation credits, but rather, after 'grossing-up' historical excess returns for the value of imputation credits, among the other measures and matters considered, whether or not 6 per cent remains a reasonable estimate of the MRP having had regard to the relevant factors.

Rather than placing sole weight on any particular measure of the MRP, it is common practice to have regard to each measure, tempered by an understanding of the strengths and weaknesses of each measure, in determining a 'final' MRP. The AER considers this is an appropriate approach in the context of having had regard to the need for persuasive evidence, and is consistent with past regulatory practice. Following this approach leads the AER to place primary weight on long term historical estimates of the MRP, though also placing some weight on other measures such as cash flow based estimates and surveys.

The most recent long term historical average excess returns:

- 'grossed-up' for a utilisation rate of 0.65
- estimated (for the most part) relative to the yield on 10 year CGS, and
- estimated over a range of long term estimation periods (1883-2008, 1937-2008, 1958-2008)

fall close to 6 per cent, with some estimates slightly above and some slightly below. Specifically, this leads to a range of historical excess returns between 5.7 and 6.2 per cent.

However, the AER notes that the above range, if the estimation periods had instead concluded at the end of 2007, would have been between 6.6 and 7.2 per cent. The difference that simply adding an extra year can make to even the long term historical

estimates is a valid reason not to ‘mechanistically’ adopt historical estimates as the forward looking MRP.

The AER also notes that there may be an inverse relationship between the short term historical excess return and the short term forward looking MRP. A devaluation of equity prices may reflect the market’s expectations of lower future cash flows, a higher discount rate (including potentially a higher MRP), or both. Accordingly, the significant decline in 2008 may, at least in part, reflect an increase in the MRP. While this increase is more likely associated with the short term MRP, rather than the long term MRP, it is still relevant to the extent that current conditions may prevail into the foreseeable future.

Consistent with past regulatory practice, the AER considers that primary weight should continue to be placed on long term historical estimates of the MRP. However, the AER acknowledges that the use of historical estimates should be considered in light on the additional uncertainty caused by the global economic and financial crisis.

On cash flow measures, the AER notes that for at least several years in a row, prior to 2008, MRP estimates derived using these types of measures such as those used by Bloomberg and CEG estimated the forward looking MRP to be well below 6 per cent. Taking these types of cash flow measures into account, regulators considered there was some evidence to lower the MRP below 6 per cent, however, in the interests of regulatory certainty and stability, and placing primary weight on long term historical estimates, regulators consistently maintained a MRP of 6 per cent.

As of late, Bloomberg estimates and CEG estimates have changed from well below 6 per cent to well above 6 per cent. This provides some evidence of an increase in the MRP, however, just as regulators were wary to lower the MRP below 6 per cent based on these types of estimates due to issues with the reliability of these measures, so should regulators be wary to raise the MRP significantly above 6 per cent based on the same type of estimates. Bloomberg and CEG estimates provide some evidence that the MRP (perhaps even the medium term MRP) is above the long run historical MRP, however it does not, in of itself, provide persuasive evidence to depart from 6 per cent.

The AER notes that:

- Long term historical estimates (1883-2008, 1937-2008, 1958-2008), ‘grossed-up’ for a 0.65 value of imputation credits, produce a range of 5.7 to 6.2 per cent— however, while not the preferred estimation period, the AER notes that this range would have been 6.6 to 7.2 per cent had the estimation period ended in 2007,
- Survey measures strongly indicate that a MRP of 6 per cent is by far the most commonly adopted value by market practitioners—though these surveys were before the global financial crisis
- Cash flow based measures currently indicate a forward looking MRP well above 6 per cent, however up until 2008 these measures consistently indicated a forward looking MRP well below 6 per cent.

The AER considers that prior to the onset of the global financial crisis, an estimate of 6 per cent was the best estimate of a forward looking long term MRP, and accordingly, under relatively stable market conditions—assuming no structural break has occurred in the market—this would remain the AER’s view as to the best estimate of the forward looking long term MRP.

However, relatively stable market conditions do not currently exist and taking into account the uncertainty surrounding the global economic crisis, the AER considers two possible scenarios may explain current market conditions:

- that the prevailing medium term MRP is above the long term MRP, but will return to the long term MRP over time, or
- that there has been a structural break in the MRP and the forward looking long term MRP (and consequently also the prevailing) MRP is above the long term MRP that previously prevailed.

Whilst it cannot be known which of these scenarios explain current financial conditions, both are possible, and both suggest a MRP above 6 per cent at this time may be reasonable. However, having regard to the desirability of regulatory certainty and stability, the AER does not consider that the weight of evidence suggests a MRP significantly above 6 per cent should be set.

Accordingly, the AER considers that a MRP of 6.5 per cent is reasonable, at this time, and is an estimate of a forward looking long term MRP commensurate with the conditions in the market for funds that are likely to prevail at the time of the reset determinations to which this review applies.

Based on the weight of evidence, the AER considers there is persuasive evidence to depart from the previously adopted MRP of 6 per cent, and that a MRP of 6.5 per cent is an outcome that is consistent with the National Electricity Objective.

In determining the value of the MRP, the AER has also taken into account the revenue and pricing principles. The AER considers the MRP of 6.5 per cent for a benchmark efficient NSP:

- together with values, methods and a credit rating for the other parameters, provides a service provider with a reasonable opportunity to recover at least the efficient costs and provides a service provider with effective incentives for efficient investment, and
- is appropriate having regard to the economic costs and risks of the potential framework in under and over investment.

On this basis, the AER considers that its proposed value achieves an outcome that is consistent with and is likely to contribute to the achievement of the NEO.<sup>531</sup>

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<sup>531</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

## 8 Equity beta

### 8.1 Introduction

The equity beta measures the standardised correlation between the returns on an individual risky asset or business with that of the overall market. In essence, it represents the ‘riskiness’ of the business’ returns compared with that of the market. Risk results from the possibility that returns will differ from expected returns (the greater the uncertainty around the returns of a business, the greater its level of risk). As it is assumed under the CAPM that investors can diversify away business-specific risk, investors will only require compensation for bearing non-diversifiable or systematic risk. Sources of non-diversifiable risk may include risk associated with factors such as changes in real GDP, inflation, currency and commodity prices, and real long-term interest rates. A business’ sensitivity or exposure to these risks will depend, among other things, on its business activities and its level of financial leverage.

The equity beta (or a particular asset or business) scales the MRP up or down to reflect the risk premium—over and above the risk-free rate—equity holders would require to hold that particular risky asset or business as part of the investor’s well-diversified portfolio.

An equity beta of one implies that the business’ returns have the same level of systematic risk as the overall market. An equity beta less than one implies the business’ returns are less sensitive to systematic risk than the overall market, and an equity beta greater than one implies the business’ returns are more sensitive.

### 8.2 Regulatory requirements

#### 8.2.1 Matters the AER must have regard to under the NER

In undertaking a review of the WACC parameters, the NER sets out several matters that the AER must have regard to. Of particular relevance to the review of the equity beta are:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing regulated transmission or distribution services (as the case may be)
- the need for the equity beta to be based on a benchmark efficient transmission or distribution network service provider (as the case may be)
- the need to achieve an outcome that is consistent with the NEO, and

- the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it<sup>532</sup>.

The AER's reasoning as to why these matters appear particularly relevant, while the other matter listed in the NER appears to be of lesser value to the review of the equity beta, is discussed in chapter three on the regulatory framework.

In addition, as discussed in chapter three, the AER has decided to take into account the revenue and pricing principles. The revenue and pricing principles which are directly relevant to this review are:

- providing a service provider with a reasonable opportunity to recover at least the efficient costs
- providing a service provider with effective incentives in order to promote efficient investment, and
- having regard to the economic costs and risks of the potential for under and over investment.

### **8.2.2 Previously adopted value**

As with all other WACC parameters, the equity beta is not directly observable. As a result, it must be estimated by reference to proxies and cannot be determined with certainty. Therefore, in addition to the other relevant factors, the AER must have regard to the need for persuasive evidence before adopting a value that differs from the value or method that has previously been adopted for it.

The NER deemed the initial value of the equity beta for all TNSPs and the NSW and ACT DNSPs to be 1.0.<sup>533</sup> For the remaining DNSPs, the NER did not deem an initial value of the equity beta and the previously adopted values in these jurisdictions are those from the most recent distribution determination.

As illustrated in table 8.1, for the purposes of the NER, the previously adopted value of the equity beta for TNSPs in all jurisdictions and DNSPs in NSW, ACT and Victoria is 1.0. The previously adopted value for DNSPs in Tasmania, Queensland and South Australia is 0.9.

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<sup>532</sup> NER, cls. 6.5.4(e) and 6A.6.2(j).

<sup>533</sup> NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

**Table 8.1: Previously adopted value – equity beta**

Service provider	Source	Equity beta
Transmission (all jurisdictions)	NER	1.00
Distribution (NSW)	NER	1.00
Distribution (ACT)	NER	1.00
Distribution (Tasmania)	OTTER (2007)	0.90
Distribution (Victoria)	ESC (2006)	1.00
Distribution (Queensland)	QCA (2005)	0.90
Distribution (South Australia)	ESCOSA (2005)	0.90
<b>Overall range</b>		<b>0.90 or 1.00</b>

Source: NER<sup>534</sup>, OTTER<sup>535</sup>, ESC<sup>536</sup>, QCA<sup>537</sup>, ESCOSA<sup>538</sup>.

Table 8.1 outlines the previously adopted value of the equity beta, for the purposes of the NER, for electricity distribution and transmission network service providers.

In considering whether or not there is persuasive evidence to depart from these values, among the other regulatory requirements, the AER considers it is useful to have regard to past regulatory practice more generally. The AER has taken into account past regulatory practice for both electricity and gas distribution, given the similar (or equivalent) nature of the issues involved across the two sectors. Notwithstanding, the AER recognises that there may be differences between the two sectors in relation to the equity beta subject to this review.

Table 8.2 below outlines the equity beta adopted by jurisdictional regulators in the most recent electricity and gas distribution determinations for each jurisdiction.

<sup>534</sup> NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

<sup>535</sup> OTTER, op. cit., September 2007, p.152.

<sup>536</sup> ESC, op. cit., October 2006, p.332.

<sup>537</sup> QCA, op. cit., April 2005, p.97.

<sup>538</sup> ESCOSA, op. cit., April 2005, p.161.

**Table 8.2: Past regulatory practice – equity beta in electricity and gas distribution determinations**

Regulator (year)	Sector	Asset beta <sup>539</sup>	Debt beta	Gearing	Equity beta (range)	Equity beta (final)
ESC (2008)	Gas	N/A	N/A	60.0%	0.50-0.80	0.70 <sup>540</sup>
OTTER (2007)	Electricity	N/A	N/A	60.0%	N/A	0.90
ESCOSA (2006)	Gas	N/A	N/A	60.0%	0.80-1.00	0.90
QCA (2006)	Gas	0.55	0.12	60.0%	N/A	1.10
ESC (2006)	Electricity	N/A	0.00	60.0%	N/A	1.00
QCA (2005)	Electricity	0.45	0.10	60.0%	N/A	0.90
ESCOSA (2005)	Electricity	N/A	0.00	60.0%	N/A	0.90
IPART (2005)	Gas	0.30-0.40	0.00	60.0%	0.80-1.00	N/A
ICRC (2004)	Gas	0.40	0.06	60.0%	0.90-1.09	N/A
IPART (2004)	Electricity	0.35-0.45	0.00-0.06	60.0%	0.78-1.11	N/A
ICRC (2004)	Electricity	0.40	0.06	60.0%	N/A	0.90
<b>Estimate (low-high)</b>	<b>Energy</b>	<b>0.30-0.55</b>	<b>0.00-0.12</b>	<b>60.0%</b>	<b>0.50-1.11</b>	<b>0.70-1.10</b>

Source: ESC<sup>541</sup>, OTTER<sup>542</sup>, ESCOSA<sup>543</sup>, QCA<sup>544</sup>, IPART<sup>545</sup>, ICRC<sup>546</sup>.

The equity beta is driven by estimates of the asset beta and gearing, and to a much lesser extent, the debt beta. Jurisdictional regulators have adopted similar ranges or point estimates of the asset beta of between 0.30-0.55 (where an asset beta has been specified), though differing to some degree between decisions. All regulators, since at least 2004, have adopted a 60 percent gearing ratio, and all but one has adopted a debt beta of either 0.00 or 0.06 (where a debt beta has been specified). This has resulted in

<sup>539</sup> Care should be taken in comparing asset betas adopted by different regulators as these differences may in part reflect different approaches to adjusting for financial leverage (i.e. different de-levering / re-levering approaches). However as regulators have adopted consistent benchmark gearing levels (60 per cent), the resultant equity betas can be broadly compared across regulators.

<sup>540</sup> While the ESC determined the appropriate equity beta to be 0.70, it then provided the distributors with an additional allowance as a transitory measure to reduce the impact of the reduction in the equity beta from the previous value of 1.00. The additional allowance effectively sets the distributors' equity beta at 0.80.

<sup>541</sup> ESC, op. cit., 7 March 2008, p.461-476; ESC, op. cit., October 2006, pp.345-357.

<sup>542</sup> OTTER, op. cit., September 2007, pp.148-151.

<sup>543</sup> ESCOSA, op. cit., June 2006, pp.68-71; ESCOSA, op. cit., April 2005, pp.132-142.

<sup>544</sup> QCA, op. cit., May 2006, p.62; QCA, op. cit., May 2006, p.92; QCA, op. cit., April 2005, p.129.

<sup>545</sup> IPART, op. cit., November 2005, p.69; IPART, op. cit., April 2005, p.104; IPART, op. cit., June 2004, p.218.

<sup>546</sup> ICRC, op. cit., October 2004, p.8; ICRC, op. cit., March 2004, p.70.

equity beta ranges of between 0.50 and 1.11 and point estimates of between 0.70 and 1.10. In the most recent electricity and gas determinations, jurisdictional regulators have all adopted point estimates of the equity beta below 1.00.

### **8.3 Summary of position in explanatory statement**

Taking into account the nature of the industry and key features of the *ex ante* regulatory regime under the NER, the AER considered that the exposure of a benchmark efficient NSP to the systematic risk components of business risk and financial risk would, overall, be more likely to be less than that of the market than above it. That is, based on conceptual reasoning, the AER considered it was more likely that the equity beta of a benchmark efficient NSP would be less than one, than above one.

The AER did not consider that there was compelling evidence to suggest that the equity beta should differ based on the form of control (revenue cap vs. price cap). The MEU and JIA agreed on this position.

The AER examined empirical evidence from Australian and foreign data, and considered that:

- Given the differences between estimating equity betas using discrete and continuous returns are minimal, it is appropriate to use the standard approach, which is to use continuous returns.
- It is appropriate to examine Australian data from the post ‘technology bubble’ period onwards.
- It is also appropriate to examine equity beta estimates using weekly observations as well as equity beta estimates that use monthly observations.
- Regard should be had to foreign estimates of equity betas as a cross check on the beta estimates derived from domestic data.
- Individual equity beta estimates should not be used to inform a forward looking equity beta for a benchmark efficient NSP. Rather, primary weight should be placed on portfolio estimates of equity betas.
- If confidence intervals were to be considered it would be appropriate to consider both the lower and upper bounds generated by the estimation as it is equally likely that a ‘true’ equity beta point estimate may be observed at the lower or upper bound. Given that the point estimates generated by regressions are more likely to represent the ‘true’ point estimate the AER has given greater weight to point estimates than confidence intervals.
- Neither the Blume nor Vasicek adjustments (assuming a ‘prior belief’ of one) should be applied in a regulatory context as either adjustment is likely to introduce an upwards bias in the beta estimates.



- That having regard to the need for persuasive evidence does not translate into a specific statistical hypothesis that would require the selection of a particular set of standard errors to create confidence intervals for the equity beta point estimates.
- The empirical evidence considered by the AER suggests that the equity beta of a benchmark efficient NSP is in the range of 0.44 (i.e. the average portfolio estimated by the AER for Australian businesses post ‘technology bubble’) to 0.68 (i.e. the average portfolio estimated by the ACG for the JIA using a five-year estimation period).

In considering the empirical evidence, the AER’s approach to reviewing the equity beta was to take a balanced approach to the application and interpretation of market data by having regard to the strengths and weaknesses of the market data available. In reviewing the equity beta, as for the other parameters, the AER had given consideration to other factors, such as the importance of regulatory stability in order to promote efficient investment, so as to contribute to the National Electricity Objective. Consequently, whilst the market data in isolation presents a strong case for establishing an equity beta at a point consistent with the above range, the AER had taken a broader view in the context of the National Electricity Objective and having regard to the current financial environment.

Finally, the AER noted the JIA position that the use of the Sharpe Lintner CAPM may understate an equity beta which is less than one. While the AER had concerns over some of this analysis on the alleged biases of the Sharpe CAPM, the AER considered that even if these biases were valid, the AER had not adopted a ‘mechanical’ approach in applying the empirical beta estimates derived from regression analysis using the Sharpe CAPM.

Accordingly, the AER considered that there was persuasive evidence to depart from either the previously adopted equity beta of 1.00 or 0.90. In accordance with the NER, the AER considered that an equity beta of 0.80:

- was supported by the most recent available and reliable empirical evidence, which the AER considered was persuasive in support of adopting a lower equity beta
- was likely to promote efficient investment in providing prescribed transmission services or standard control services in current market conditions, and
- was an appropriate estimate of a forward looking rate commensurate with prevailing conditions in the market for funds for a benchmark efficient network service provider

On this basis the AER considered the proposed value is consistent with the National Electricity Objective.<sup>547</sup>

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<sup>547</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

## 8.4 Summary of submissions in response to explanatory statement

In response to its explanatory statement, the AER received submissions on the equity beta of a benchmark efficient NSP from:

- the APA Group
- the Energy Networks Association (ENA)
- the Energy Supply Association of Australia (ESAA)
- Envestra
- the Financial Investors Group (FIG)
- the JIA
- the MEU
- NSW Treasury
- RARE Infrastructure
- United Energy, and
- a range of equity market participants

The MEU argues that the equity beta for a benchmark efficient NSP should be set at 0.56.<sup>548</sup> By contrast, the JIA propose that the equity beta should be set at 1.0.<sup>549</sup> The JIA's submission is supported by advice provided by the ACG, CEG and SFG which examine different aspects of deriving the equity beta of a benchmark efficient NSP.<sup>550</sup> The ENA/JIA have provided a subsequent submission which argues that the 'global financial crisis' has resulted in abnormal observations and uncertainty making it difficult to depart from the previously adopted value (which it argues as 1.0).<sup>551</sup> The FIG submits that the AER should leave the equity beta unchanged (which according to the FIG means setting it at 1.0).<sup>552</sup>

Submissions from the APA Group, the ESAA, Envestra, NSW Treasury, RARE Infrastructure and United Energy support the positions taken in the JIA submission. Submissions focus on the following issues:

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<sup>548</sup> MEU, *Submission in response*, op. cit., January 2009, p. 27.

<sup>549</sup> JIA, *Submission in response*, op. cit., February 2009, p. 95.

<sup>550</sup> *ibid.*

<sup>551</sup> JIA, *Submission in response*, op. cit., 19 March 2009, p. 2.

<sup>552</sup> FIG, *Submission in response*, op. cit., January 2009, p. 39.

- disagreeing with the AER’s conceptual position on the equity beta of a benchmark efficient NSP being less than one due to the benchmark NSP having greater financial risk than the market
- the usefulness of the CAPM model for the purposes of informing the equity beta of a benchmark efficient NSP and the potential use of adjustments or the dividend growth model
- the impact of the global financial crisis on the cost of equity (and subsequently the equity beta)
- the selection of comparator businesses operating in Australia and abroad used to inform the equity beta for a benchmark efficient NSP
- the exclusion of businesses or outlier events (such as mergers and acquisitions)
- unrepresentative events, the length of the estimation period and the frequency of observations
- the examination of thin and thick trading, the interpretation of R-squared statistics and confidence intervals, the stability of equity beta estimates, and the interpretation of simulation analyses, and
- the general robustness of empirical equity beta estimates.

## **8.5 Issues and AER’s considerations**

The AER’s considerations in estimating the equity beta of a benchmark efficient NSP involve an analysis of the following conceptual and empirical issues and are set out below in the following order:

- conceptual issues—the definition of non-diversifiable risk, and the expected exposure of a benchmark efficient network service provider to systematic risk given the nature of the industry and regulatory regime
- empirical estimates (data issues)—selection of Australian and foreign comparator businesses
- empirical estimates (methodological issues)—including length of estimation period, frequency of observations, treatment of outliers, and application of Blume or Vasicek adjustments
- empirical estimates (results and interpretation)—results and interpretation of empirical estimates
- other conceptual or empirical issues—use of the Sharpe-Lintner CAPM

This is followed by the AER’s conclusion in section 8.6.

## 8.5.1 Conceptual issues

The conceptual issues considered in this section are the definition of non-diversifiable risk and the expected degree of exposure of a benchmark efficient NSP to non-diversifiable risk given the nature of the industry and the regulatory regime.

### 8.5.1.1 Definition of non-diversifiable risk

As is consistent with CAPM theory and the wording of the NER, the WACC is only intended to compensate for the non-diversifiable risk. The NER defines the rate of return as:

The rate of return for a [network service provider] for a regulatory control period is the cost of capital as measured by the return required by investors in a commercial enterprise with a similar nature and degree of **non-diversifiable risk** as that faced by the [network] business of the provider...[emphasis added]<sup>553</sup>

It is necessary, therefore, to have an understanding of what non-diversifiable (systematic) risk is. To the extent that compensation for diversifiable risk is appropriate, this compensation should not be provided through the WACC but through other mechanisms.

### Summary of position in explanatory statement

The AER noted that an individual risky asset, in this case a service provider, can be characterised by its expected return and its expected level of risk (i.e. expected variability in returns). Both the return and variability in returns of the service provider will be affected by business-specific and market-wide risk factors.

Over a given time period, some business-specific factors would have a positive impact on the return of the service provider, whereas others would have a negative impact. By holding a well-diversified portfolio of risky assets these business-specific factors are expected to cancel each other out. The AER stated this is the reason a benchmark efficient NSP should not be compensated for diversifiable (non-systematic) risk through the WACC. In contrast, the market-wide factors are likely to impact all businesses (though to differing degrees) and cannot be completely eliminated by diversification. Accordingly, it is appropriate that investors in a benchmark efficient NSP be compensated for the non-diversifiable risk of the nature and degree faced by a benchmark efficient NSP and commensurate with the risk involved in providing regulated services.

The AER considered that the non-diversifiable or systematic risk of a business will depend on the sensitivity of its returns to these market-wide or macroeconomic risk factors. The degree of this sensitivity is reflected in the equity beta. An equity beta of one implies that the business' returns have the same degree of sensitivity to these factors as the overall market. An equity beta less than one implies the business' returns is less sensitive than the overall market, and an equity beta greater than one implies the business' returns is more sensitive.

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<sup>553</sup> NER, cls. 6.5.2(b) and 6A.6.2(b).

A business' overall non-diversifiable risk will in turn be comprised of business (or asset) risk and financial risk. There appeared to be broad agreement among stakeholders on this point.

The AER noted that it had reviewed some of the standard finance literature (such as that covered at a graduate or intermediate level in finance courses in Australian universities) covering the macroeconomic risk factors that constitute and therefore affect systematic risk. In the AER's view, this literature indicated that the macroeconomic risk factors that effect systematic risk include changes or volatility in:

- inflation
- gross domestic product (GDP) growth
- interest rates
- commodity prices and exchange rates, and
- tax laws.<sup>554</sup>

#### **Summary of submissions in response to explanatory statement and AER's considerations**

No submissions commented on this issue. As no new information was contained in submissions on the explanatory statement that has given the AER cause to depart from its position in the explanatory statement, the AER maintains its position on this issue.

SFG's comments on the effect of financial leverage on the equity beta are addressed in section 8.5.1.2.

#### **AER's conclusion**

As is consistent with CAPM theory and the wording of the NER, the equity beta should only compensate service providers for exposure to non-diversifiable (systematic) risk, and not compensate for diversifiable (non-systematic) risk. Non-diversifiable risk refers to the macroeconomic or market-wide risk factors that effect the returns of all businesses in the economy—though to varying degrees—and include factors such as changes or volatility in inflation, GDP growth, interest rates, commodity prices and foreign exchange rates and changes in tax laws.

The equity beta set by the AER should reflect the exposure of a benchmark efficient NSP's returns to these macroeconomic risk factors, and not that faced by any actual individual TNSP or DNSP.

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<sup>554</sup> G. Peirson, R. Brown, S. Easton and P. Howard, *Business finance*, 8<sup>th</sup> ed., McGraw-Hill, 2002 p.214; F. Reilly, and K. Brown, *Investment analysis and portfolio management*, 7<sup>th</sup> ed., Thomson South-Western, 2003, p.244.

### **8.5.1.2 Expected exposure of benchmark efficient NSP to non-diversifiable risk – nature of industry and effect of regulatory regime**

Some of the features of the regulatory regime are the ‘CPI minus X’ (CPI-X) approach to escalating revenue or prices and the rolling forward of the asset base. Additionally, service providers may be under a revenue cap, a price cap, or some combination of the two. Further, the electricity industry is categorised by demand that is fairly price inelastic.

In this section, the AER considers what affect the nature of the industry and regulatory regime would be expected to have, from a conceptual basis, on the exposure of a benchmark efficient NSP to non-diversifiable risk.

#### **Summary of position in explanatory statement**

The AER considered that regulated utilities face a lower degree non-diversifiable business risk, compared to the market, which is primarily driven by the stable cash flows of regulated utilities. This in turn is driven by both the nature of the industry, such as the relatively high demand inelasticity of electricity to price, and by the protection of the regulatory regime.

The regulatory regime for electricity transmission and distribution network service providers includes design features such as:

- The annual adjustment of a service provider’s revenue or prices by CPI-X, where CPI represents actual lagged inflation and X represents a value or values pre-determined and set for the length of the regulatory period. This adjustment eliminates nearly all of a benchmark efficient NSP’s exposure to inflation risk, and therefore lowers its exposure to systematic risk.
- The rolling forward of the service provider’s RAB, rather than the re-valuing or re-optimisation of the RAB at each reset. Under the ex-ante regime actual capex is rolled into the RAB, without any ex post prudency assessment.<sup>555</sup> This approach means that at the end of each regulatory period a benchmark efficient NSP’s prices and / or revenues are adjusted back to reflect their underlying cost base. This means that any increase in costs from forecast due to changes in GDP (which may effect the growth in peak demand), or from changes in commodity prices are automatically rolled into the RAB. The AER considered this was highly likely to reduce exposure to systematic risk compared with the market in general. The AER noted that the initial capex forecast would already include a forecast of commodity prices, for example, if commodity prices were expected to increase then an allowance for this would already have been made.
- The inclusion of pass-through provisions allowing the service provider’s regulated revenue or prices to be adjusted for certain unexpected, and generally uncontrollable changes in costs such as the introduction of a new tax or a change

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<sup>555</sup> In some regimes, such as telecommunications a RAB can potentially be re-optimised at each review, such as under a total service long run incremental cost (TSLRIC) approach, however, this is not the case under the NER.

in the tax rate of an existing tax. This is likely to reduce exposure to systematic risk compared with the market in general.

The AER's views were similar to that of MEU. Given the nature of the regulated electricity network industry, the MEU considered that NSP's face virtually no competition risk, very low investment risk, and have very stable cash flows due to the regulatory resets occurring only every five years. The MEU listed a number of changes to the regulatory regime that it considered has lowered the risk faced by service providers. Most of these changes related to a move from an 'ex post' to 'ex ante' regime, and included:

- The regulator must accept any and all capex incurred which must be automatically rolled into the regulatory asset base, never to be assessed for subsequent prudency.
- If the regulator approves a capex allowance for a particular project, but the NSP defers that project, it may seek a second allowance for the same project in the next regulatory period.

On the other hand, the JIA argued that the existence of regulation created risk, and these risks are non-diversifiable, though the type of regulation is likely to be a second order consideration. The JIA further considered:

- any attempt to 'quantify' a change in non-diversifiable risk due to a change in the regulatory regime will be lost in estimation error and noise in the data
- though 'perceptions' of risk are likely to have increased since the 1990s due to the departure of US businesses as owners and concerns that regulatory decision-making is being regarded by investors as 'increasingly aggressive'.<sup>556</sup>

However, the JIA also concluded that it would be reasonable to assume that a utility business was likely to have less non-diversifiable risk than the market, because of the more stable nature of energy demand in relation to the rest of the economy.<sup>557</sup>

Through having regard to both the nature of the industry and regulatory regime, the AER considered there were strong conceptual reasons to suggest that the exposure of a benchmark efficient NSP to non-diversifiable risk due to business activities would be less than that of the market. That is, the asset beta of a benchmark efficient NSP would be less than the asset beta of the market. There appeared to be general agreement, from both the MEU and JIA, on this point.

On the other hand, the JIA argued that the benchmark level of gearing (60 per cent), is higher than the market average (around 35 per cent), therefore an equity beta of one already recognises that a service provider is exposed to less business risk, but greater financial risk, than the overall market.

The AER noted that there appeared to be an assumption that a business' exposure to financial risk is determined by financial leverage alone. However, the AER notes that

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<sup>556</sup> JIA, *Submission in response*, op. cit., p.123.

<sup>557</sup> *ibid.*, p.124.

an additional aspect of the regulatory regime is that the cost of debt is based on prevailing market conditions as sourced from a reliable data service provider at the time of the determination. The AER considered this ‘pass-through’ nature of borrowing costs was likely to reduce exposure to financial risk, compared to an unregulated business (or the market in general) with the same benchmark level of gearing. That is a benchmark regulated electricity network service provider with gearing of 60 per cent, may face lower financial risk compared to a business operating in a competitive market that also had a 60 per cent level of gearing.

On balance, the AER considered that the exposure of a benchmark efficient NSP to business risk and to financial risk overall, was likely to be less than that of the market. In other words, the equity beta was likely to be less than one.

The AER also noted that the form of control may also influence a regulated service provider’s sensitivity to market-wide factors. The form of control refers to the particular revenue or price control function that determines a regulated service provider’s total regulated revenue. The AER noted that all TNSPs are under a revenue cap form of control, whereas for all DNSPs the form of control mechanism is determined by the AER as part of the reset process.<sup>558</sup>

The AER noted that one of the main differences between the forms of control is the effect of actual demand on the total revenue of the service provider. Under a revenue cap, the total regulated revenue does not change based on actual demand. Whereas, under any of the other forms of control the total revenue of the service provider is affected by actual demand to some degree depending on the precise form of the revenue or price control function. Essentially the difference between the control mechanisms is a service provider’s sensitivity to volume risk.

The AER noted firstly that the relevant volatility was volatility in returns, rather than volatility in revenue. Accordingly, to the extent that demand and costs are related, then a price cap could lead to a lower, or at least equivalent, exposure to non-diversifiable risk.

Secondly, the AER noted that the relevant risk is non-diversifiable risk and not total risk. The AER considered it was arguable as to whether volume risk is or is not a systematic risk factor as this depends on whether it is industry specific or market wide. For example, volume risk driven by the weather may not be a systematic risk factor.

The MEU considered that, at the most basic level, a revenue cap had a lower risk profile. However, the MEU also considered that a service provider under a price cap has an incentive to understate its demand forecasts at the time of the reset in order to gain a higher unit price, and consequent higher revenues, and presumably returns, during the period. On balance, the MEU considered there was only a marginal difference between the two forms of control on exposure to systematic risk

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<sup>558</sup> For DNSPs, the allowed control mechanisms under cl. 6.2.5 of the NER are: a schedule of fixed prices; caps on the prices of individual services; caps on the revenue to be derived from a particular combination of services; tariff basket price control (i.e. weighted average price cap); revenue yield control (i.e. average revenue cap); or a combination of any of the above.



Due to a paucity of data, the JIA considered it is not possible to distinguish a difference in exposure to non-diversifiable risk due to a particular control mechanism. Though the JIA noted analysis by the ACG on the form of regulation in the US provided estimates for incentive regulation and rate-of-return that were ‘practically indistinguishable’. The JIA considered this supported a proposition that it is not possible at this stage to discern empirically that the particular control mechanism makes a material difference such as to justify a different equity beta for service providers under different control mechanisms.<sup>559</sup>

The AER noted that neither the MEU nor JIA considered it appropriate to set a different equity beta based on the form of control, though the reasons given appeared to differ to some degree. The AER agreed that there were not compelling reasons or evidence to suggest a benchmark efficient NSP’s exposure to systematic risk changes significantly under different control mechanisms, such that different equity betas would be appropriate.

### **Summary of submissions in response to explanatory statement and AER’s considerations**

The AER continues to consider that the systematic risk of the business activities faced by a benchmark regulated electricity network service provider is likely to be significantly less than that of the average business (i.e. the market average) due to the nature of the regulated electricity network industry and the regulatory regime. The JIA agrees, at least, that a benchmark NSP’s exposure is likely to be less than the market average. That is, there is agreement that the asset beta of a benchmark efficient NSP is likely to be less than the asset beta of the market.

However, the AER notes that there appears to be some confusion over what it stated in its explanatory statement over exposure of a benchmark efficient NSP to financial risk. For example, SFG contends:

After correctly noting that the equity beta is made up of two components (the risk of the firm’s business activities [asset beta] and the amount of financial leverage), the AER then proposes that the benchmark firm would score lower on both components.<sup>560</sup>

SFG appear to have misunderstood the position of the AER. The AER accepts that as the benchmark regulated electricity network service provider is assumed to be 60 per cent geared, whereas the average business in the Australian market is around 35 per cent geared, it is likely that the benchmark regulated electricity network business has greater exposure to financial risk than the average business.

However, the AER’s position in its explanatory statement was that a benchmark regulated electricity network service provider with gearing of 60 per cent, may face lower financial risk (i.e. interest rate risk or the risk of financial distress) compared to a business operating in a competitive market that was also 60 per cent geared. This was reasoned based on the ‘pass through’ nature of borrowing costs for regulated

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<sup>559</sup> *ibid.*, p.124.

<sup>560</sup> SFG, *The reliability of empirical beta estimates: Response to AER proposed revision of WACC parameters*, Report prepared for ENA, APIA and Grid Australia, 1 February 2009, p.10.

utilities and the high price inelasticity of electricity. That is, a regulated utility can pass through much higher borrowing costs through higher prices and not expect its profitability to diminish. In contrast, if a business in a competitive market was faced with much higher borrowing costs it would likely have to wear some of those higher cost (as attempting to pass those costs through via higher prices may lead to lower profitability caused by a loss of market share or consumers substituting away from the produce or service).

However, it appears as though the JIA and SFG would also disagree with the position in the previous paragraph. SFG states:

In my view, the AER's reasoning on this point has misconstrued the way that financial leverage affects the equity beta. The second component of equity beta has nothing to do with interest rate risk or any sort of borrowing of "financial risk" as the AER claims on p.193 of the Explanatory Statement. Rather, the second component of equity beta is the amount of financial leverage and it affects equity beta via the formula set out above...<sup>561</sup>

SFG attempt to demonstrate through a simple example that it is financial leverage and not financial risk that influences the equity beta. SFG argue that this example shows that:

...even if all of the risks and costs pertaining to the firm's debt finance could be immediately "passed through" to customers and indeed even if all borrowing was completely risk free and a rate that was perfectly known well in advance, financial leverage would still affect the beta in exactly the same way.<sup>562</sup>

SFG also states that the AER criticises the particular formula for not adequately reflecting financial risk, yet uses the same formula to de-lever and re-lever its equity betas estimates.

According to the formula used by the JIA, the ACG, Henry and the AER, the equity beta can be broken down into two components—a component due the service provider's business risk (determined by its asset beta)—and a component due to financial risk that is proportional to the service provider's debt-to-equity (D/E) ratio.

The AER's position from the explanatory statement, which it maintains, is that the use of this formula (set out in section 8.5.3.2) is a perfectly reasonable approach to de-lever and re-lever the beta estimates of energy stocks, particularly as the actual gearing of these comparator businesses and the assumed benchmark level of gearing are not significantly different to each other.

However, this linear relationship between financial leverage and the equity beta may not hold if the debt beta does not equal zero or if there are market imperfections. In reality, the systematic risk being borne by equity holders will only increase approximately linearly with the proportion of debt to equity within a certain range of D/E ratios. The AER's criticisms in its explanatory statement were directed at the JIA's use of this formula to de-lever the market equity beta (from 1.0 to 0.7) and re-

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<sup>561</sup> *ibid.*, p.11.

<sup>562</sup> *ibid.*

lever this market asset beta to a market equity beta geared at 60 per cent (from 0.7 to 1.6). In this case, the actual and benchmark gearing levels differ significantly.

To clarify the AER's position, the AER considers that it is unlikely that an (even approximate) linear increase in systematic risk being borne by equity holders would occur if the market moved from its current level of gearing to one double its current level. At this level of gearing, systematic risk on debt is likely to be much higher and the required return on debt could increase significantly to reflect this (i.e. at this extreme an approximate linear relationship may not hold). This would imply that the required return to equity (and therefore equity beta) is likely to increase less than linearly.

In summary, the AER has no issue with using the formula in section 8.5.3.2 to de-lever and re-lever equity beta estimates—as the actual level of gearing of the comparator businesses considered and the benchmark level are similar. However, the AER considers that the example given by the JIA of de-levering the market equity beta and re-levering it to the benchmark level of gearing is likely to overstate the implied market asset beta re-levered to the benchmark level of gearing.

Further, in commenting on the AER's position in the explanatory statement, the JIA states:

Importantly, in reaching such a conclusion before undertaking its empirical analysis, the AER runs the risk of compromising its own objectivity in the assessment of the empirical analysis.<sup>563</sup>

The AER does not agree that the preliminary view on the equity beta in its explanatory statement based on conceptual considerations negatively impacted on the AER's objectivity in reviewing the empirical beta estimates. Rather, the AER formed a hypothesis based on conceptual considerations which was then tested objectively against the empirical evidence.

### **AER's conclusion**

The AER maintains its position that due to the nature of the industry and the regulatory regime the asset beta of a benchmark efficient NSP is likely to be significantly less than the market asset beta.

The AER also considers that due to the higher level of gearing the financial risk of a benchmark regulated electricity NSP is likely to be greater than a business with the market average level of gearing.

However, these two effects (i.e. business risk and financial risk) may well act to offset each other, and the AER acknowledges that the net effect on the equity beta of a benchmark efficient NSP is unclear. Accordingly, the AER considers conceptual considerations do not give grounds to form a conclusive view on the equity beta of a benchmark efficient NSP.

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<sup>563</sup> JIA, op. cit., 2 February 2009, p.111.

## **8.5.2 Empirical estimates – choice of comparator businesses**

### **8.5.2.1 Australian comparators**

Consistent with the approach described in section 3.4.6, the AER considers that ‘pure play’ regulated electricity networks operating in Australia without parent ownership should be considered a benchmark efficient NSP. As there are no businesses which reflect this benchmark, the AER has examined the available market evidence from businesses which are considered to be close comparators to the benchmark business to inform the equity beta estimates. As privately-owned and government-owned businesses do not trade on the stock market, it is not possible to empirically estimate the equity betas of these businesses.

#### **Position in the explanatory statement**

The AER noted in its explanatory statement that regulators and interested parties have examined equity beta estimates of both Australian businesses and foreign businesses (due to the small number of listed Australian businesses). The AER considered that given foreign businesses are subject to different regulatory regimes and market conditions that the equity beta estimates derived from foreign data should be afforded less weight than the equity beta estimates derived from Australian data.

In examining equity betas of Australian businesses as a first step, publicly listed electricity businesses were included into the sample. This provided the AER with two businesses (SP AusNet and Spark Infrastructure). The AER then considered other businesses which owned electricity networks (AGL and the DUET group). However, the AER considered that a sample of four firms is unlikely to provide a robust equity beta estimate and therefore included gas businesses as it considered that gas businesses are reasonable but not perfect comparators. In particular, the AER included the following businesses in its sample:

- Alinta (1 January 2002 to 17 August 2007)
- the APA Group (1 January 2002 to 1 September 2008)
- Australian Gas Light (1 January 2002 to 31 October 2006)
- the DUET Group (13 August 2004 to 1 September 2008)
- Envestra (1 January 2002 to 1 September 2008)
- GasNet Australia Group (1 January 2002 to 17 November 2006)
- Hastings Diversified Utilities Fund (17 December 2004 to 1 September 2008)
- SP AusNet (16 December 2005 to 1 September 2008), and
- Spark Infrastructure (2 March 2007 to 1 September 2008).

#### **Submissions in response to the explanatory statement**

The MEU raises two major criticisms about the sample used for estimating the equity beta of a benchmark efficient NSP. One major criticism the MEU has regarding the

AER's assessment of the WACC parameters, is the failure to recognise the wide extent of government ownership of the electricity transport businesses. A second criticism is that the AER analysis seems to move far too readily between the electricity transport industry and energy transport as a whole (i.e. between electricity and gas).<sup>564</sup>

The MEU argues that the AER has biased a number of its assessments (especially credit rating and equity beta) to reflect a gas transportation industry, which has less security of revenue and a higher risk of sales underperforming due to changing weather conditions than does the electricity transport industry, which has a much lower risk of underperforming sales impacted by weather.<sup>565</sup>

The MEU also argues that the massive element of trading in electricity transport assets as reflected in Alinta would have increased the equity beta.<sup>566</sup>

The JIA observe since 2001 the number of listed Australian energy infrastructure businesses has increased. However, the JIA argue that with merger activity and a range of other events, the set of comparables available for electricity transmission and electricity distribution is both sparse and imperfect. In particular:

- many of the comparables only have relatively short time periods in which data can be observed, and
- many of the comparables are businesses which primarily focus on non-electricity infrastructure assets, thus potentially compromising their suitability as comparables.<sup>567</sup>

On the other hand, in support of including AGL in the sample of comparator businesses the JIA argue that a majority of AGL's activities were in fact regulated and AGL's retail business has been regulated and, to a significant degree, this is still the case. The JIA note that full retail contestability (FRC) did not start until 2002 and even now, substantial parts of the customer base take, or can take, 'safety net' tariffs, even with FRC in place. The JIA also argue to the extent that AGL had non-regulated businesses they were a small proportion of its assets and cash flow.<sup>568</sup>

The JIA contend that while AGL represents the only available comparable until 1997 it has an established history of regulation and expectation on the part of investors. The JIA submit that not surprisingly its beta had been stable and can be considered reasonably reliable (based on confidence intervals and R<sup>2</sup> statistics). AGL therefore provides a strong basis for prior expectation about the equity beta for regulated energy businesses. The JIA also submit that SFG demonstrates this stability by its graph of

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<sup>564</sup> MEU, *Submission in response*, op. cit., 30 January 2009, p. 9.

<sup>565</sup> *ibid.*, p. 10.

<sup>566</sup> *ibid.*, p. 23.

<sup>567</sup> JIA, *Submission in response*, op. cit., 2 February 2009, pp. 97-98.

<sup>568</sup> *ibid.*, pp. 109-110.

AGL equity betas from 1980 to 1990 (a time when AGL was regulated under rate of return regulation).<sup>569</sup>

The JIA observe that the AER has excluded the data relating to AGL, Alinta and GasNet from its data set for a period of time. The JIA argue that this creates a significant weakness in the AER's portfolio analysis as these businesses have significantly more stable data than many other companies in the data set, which tend to have shorter data series.<sup>570</sup> The JIA consider that removing these companies when under takeover threat seems arbitrary as the APA Group was also under takeover threat in 2007 but has not been removed from the AER's data set. The JIA argue that more generally takeovers, mergers, asset sales and changes of ownership are relatively commonplace occurrences such that removal of an entire data series to take account of specific and identifiable occurrences may bias the results.<sup>571</sup>

The JIA note Henry and the AER excluded Alinta and GasNet completely but they did not exclude AGL. The JIA argue this exclusion of two out of three companies affected by takeover activity for a period is arbitrary, particularly when Henry could have done as ACG propose and remove data for the period in which merger activity was taking place.<sup>572</sup>

Envestra notes that there are no listed companies with more than five years history in the sample, and only Envestra, as a regulated gas utility has a 10-year history in the sample.<sup>573</sup>

The FIG observes in valuing AGL's then network assets as part of the acquisition of those assets by Alinta in 2006, Grant Samuel used an equity beta range of 0.8 to 0.9.<sup>574</sup>

NSW Treasury submits that it has concerns that:

- there are only a limited number of energy utility companies traded on the Australian Stock Exchange
- these companies have a relative short listing period, and
- these businesses are not always directly comparable to regulated electricity networks.<sup>575</sup>

### **Issues and AER's considerations**

As discussed in sections 4.4 and 8.5.2, the AER is aware that the presence of gas businesses may result in a conservative estimate of the equity beta for electricity

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<sup>569</sup> *ibid.*, p. 110.

<sup>570</sup> *ibid.*, pp. 111-112.

<sup>571</sup> *ibid.*, 112.

<sup>572</sup> *ibid.*

<sup>573</sup> Envestra, *Submission in response*, op. cit., 28 January 2009, p. 8.

<sup>574</sup> FIG, *Submission in response*, op. cit., 29 January 2009, p.34.

<sup>575</sup> NSW Treasury, *Submission in response*, op. cit., 28 January 2009, p. 7.

network businesses. This is based on a view that regulated gas businesses may have a higher level of business risk arising from such factors as higher volume risk. This contrasts with the ACG's view that that gas and electricity networks have a similar level of systematic risk.<sup>576</sup> Further, as discussed in section 4.4 the AER considers that gas businesses are a close but not perfect comparator which can be used when there are an insufficient number of closer comparator businesses.

The AER observes that the JIA's own consultant, SFG, notes:

I do not suggest that these estimates alone would provide a robust and reliable basis for estimating the beta of the benchmark business. However, it is my view that these estimates are relevant to the estimation of the equity beta for the benchmark firm and should be considered.<sup>577</sup>

The AER agrees with SFG and considers that examining the beta estimates for an individual business (e.g. AGL) would be an unreliable basis for determining the equity beta of a benchmark efficient NSP. The AER also notes that from at least 1999 to 2006, approximately a third of AGL's total earnings before interest and taxes is from foreign (e.g. New Zealand or Chile) or unregulated activities.<sup>578</sup> Accordingly, placing sole reliance on AGL to set an equity beta for a benchmark efficient NSP may result in a too conservative outcome. On the issue of the retail activities of AGL, the AER does not consider that the regulated standard contract 'safety nets' from FRC effectively reduced AGL's un-diversifiable risk. These standard contracts effectively provided a price cap in a market where retailers compete for customers. Accordingly, it could be argued that these standard contracts more than likely increased AGL's business risk and its corresponding equity beta. That said the FIG highlighted that Grant Samuel used an equity beta in the range of 0.8 to 0.9 for the valuation of AGL's network assets, and observes that the proposed value of 0.8 is within this range. However, the AER recognises that one business (AGL) should not be solely relied upon to determine the equity beta of a benchmark efficient NSP. Furthermore, the AER has not ignored AGL's estimated equity betas in its analysis, as the AER has:

- included AGL into the averages of individual equity beta estimates, and
- requested that Associate Professor Henry estimate time varying portfolios which incorporate AGL (noting the limitations of estimates which use the pre and post 'technology bubble' period – 1990 to 2008), and
- included the ACG's averages and portfolio estimates (which both include AGL in the sample).

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<sup>576</sup> ACG, op. cit., 17 September 2008(b), p. 19.

<sup>577</sup> SFG, *Report prepared for ENA, APIA and Grid Australia*, op. cit., 1 February 2009, p. 40.

<sup>578</sup> This can be verified by examining AGL's concise reports. For example, see AGL, *The Australian Gas Light Company – Annual Report 1999*, Concise Report, 26 August 1999. AGL did not acquire the Victorian distribution network until 1996 – see Rann, A., *Background paper 21 – Electricity Industry Restructuring – A Chronology*, Background Paper 21 1997-98, Science, Technology, Environment and Resources Group <<http://www.aph.gov.au/library/Pubs/bp/1997-98/98bp21.htm>>, 30 June 1998, Accessed on: 26 February 2009. AGL did not have an interest in ActewAGL until 2000 – ActewAGL, *Our business*, About us – website, <<http://www.actewagl.com.au/about/company/default.aspx>>, Accessed on: 26 February 2009.

The AER also considers that market conditions over two decades ago are unlikely to represent prevailing conditions in the market for funds going forward given differences in the business composition of AGL and the Australian economy, but also differences in the regulation of financial markets since this time. On this basis the AER does not agree with the JIA's assertion that there is a strong prior basis to assume that market evidence from AGL from earlier periods could be reliably used to estimate a forward-looking equity beta for a benchmark efficient NSP.

In response to the explanatory statement, the JIA note that the AER's removal of Alinta, GasNet and AGL, and not the APA Group, was arbitrary.<sup>579</sup> This view is supported by the JIA's consultant the ACG.<sup>580</sup> The ACG argues that it would have been more appropriate to remove observations which the AER considered were affected by merger announcements or takeover speculation.<sup>581</sup> The ACG has modified the data by removing observations for AGL, Alinta and GasNet in its estimates of the equity beta for these businesses.<sup>582</sup> The AER observes that the ACG has also made no adjustment to the APA Group data for merger and acquisition activity.<sup>583</sup> The AER considered in its explanatory statement that the APA Group's equity prices were not significantly affected by merger and acquisition activity as there was constant speculation over its activities. The AER also notes that the adjustments undertaken by the ACG to remove certain data points for GasNet, Alinta and AGL do not substantially affect the average equity beta estimates. In particular, the decrease in Alinta's equity beta estimate is offset by an increase in AGL's equity beta estimate.<sup>584</sup> Notwithstanding that the exclusion of some data for GasNet, Alinta and AGL does not substantially affect the equity beta estimate the AER will consider the ACG's estimates in informing its view on the equity beta for a benchmark efficient NSP.

In response to the view that there are a limited number of businesses in the sample to estimate the equity beta, the AER notes that consistent with past regulatory practice, the AER has also had regard to estimates from overseas jurisdictions. In particular, the AER examined beta estimates derived from a sample of electricity, and combined gas and electricity networks operating in the United States to confirm that the Australian equity beta estimates were appropriate. However, as discussed in section 8.5.2.2, the AER has placed limited weight on foreign estimates and has used the foreign estimates to confirm the upper bound of the domestic equity beta estimates. The AER also notes, as already discussed in this section, the short trading histories of businesses when using the Australian data and addresses this issue by examining equity beta estimates that use weekly observations. The AER considers that increasing the frequency of observations for the Australian data provides an alternate set of equity beta estimates to compare with the equity beta estimates that use monthly observations (see section 8.5.3.5).

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<sup>579</sup> JIA, *Submission in response*, op. cit., 2 February 2009, pp. 111-112.

<sup>580</sup> ACG, *Report to the Energy Networks Association, Grid Australia and the Australian Pipeline Association*, op. cit., January 2009(b), pp. 24-25.

<sup>581</sup> *ibid.*, p. 24.

<sup>582</sup> *ibid.*, pp. 24-25.

<sup>583</sup> The AER observes that the ACG reports that the number of observations is the same for the APA Group in both the adjusted and unadjusted samples. ACG, op. cit., January 2009(b), p. 25.

<sup>584</sup> ACG, op. cit., January 2009(b), p. 25.



The AER has received submissions from interested parties on the appropriateness of using weekly observations and the AER's response to submissions can be found in section 8.5.3.5. Further, the AER notes that its revised equity beta is above the upper end of the range of the majority of point estimates derived by the ACG, Henry and the AER.

### **AER's conclusion**

In forming its view on Australian benchmark businesses, the AER:

- Is aware that the presence of gas businesses in the domestic sample may result in a conservative estimate of the equity beta of a benchmark efficient NSP.
- Considers gas businesses are a close but not perfect comparator.
- Agrees with SFG and considers that examining the beta estimates for an individual business may be an unreliable basis for determining the equity beta for a benchmark efficient NSP.
- Therefore considers the sole reliance on AGL to estimate the equity beta of electricity network businesses may not provide a reliable estimate of the equity beta for a benchmark efficient NSP. However, the AER notes that it has not ignored AGL's estimated equity betas in its analysis.
- Observes that the exclusion of some data for GasNet, Alinta and AGL does not substantially affect the average equity beta estimate (where the overall average is unaffected, and changes from 0.63 to 0.67 in the sample which includes trading histories greater than five years).<sup>585</sup> That said the AER has considered the ACG's estimates in informing its view on the equity beta for an efficient benchmark NSP.
- Notes that consistent with past regulatory practice, the AER has also had regard to estimates from overseas jurisdictions to confirm that the equity beta estimates suggested by the Australian data are appropriate.
- Recognises the short trading histories of businesses when using the Australian data and to address this issue, the AER has used weekly observations.

#### **8.5.2.2 Foreign comparators**

The AER noted in its explanatory statement that it has been standard practice by regulators and interested parties to examine foreign comparators as a cross-check. This is due to the perceived limitations of the data obtained from the Australian market (such as the number of firms and the reduction in the number of observations due to mergers and acquisition activities). Based upon advice from the ACG, the JIA have placed primary weight on domestic betas and use foreign comparators as a check to ensure that Australian estimates are broadly consistent with foreign estimates.<sup>586</sup>

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<sup>585</sup> *ibid.*

<sup>586</sup> JIA, *Submission in response*, op. cit., 2 February 2009., pp. 98-99.

### **Position in the explanatory statement**

Unlike the gearing ratio and the credit rating, the equity beta can only be estimated using data from stock prices (and not from government owned or unlisted businesses). Therefore, due to the more restricted sample available, the AER examined equity beta estimates of foreign comparators to ensure that the Australian equity beta estimates are reasonable.

The ACG argued that the market gearing in the United States is higher (40 per cent gearing for the United States market and 34 per cent for the Australian market) and therefore the equity betas estimated from United States data needs to be adjusted upwards. The AER considered the adjustment that the ACG used for differences in market gearing between countries may be inappropriate as it fails to account for any differences in debt betas between countries. In particular, this difference may offset the bias and need for the specific adjustment to equity betas estimated from United States data discussed in the ACG report. Further, the AER noted that the ACG found that accounting for differences between cross sectoral weights between the United States and Australia offset the upward bias which may have been due to differences in market gearing. Therefore, the AER considered that the unadjusted equity beta is likely to provide a conservative cross-check for the Australian data.

The AER noted that differences in the regulation of businesses, the regulation of the domestic economy, geography, business cycles, weather and a number of other different factors are likely to result in differences between equity beta estimates for similar businesses between countries. Therefore, the AER exercised caution when examining foreign beta estimates for the purposes of estimating an equity beta for a benchmark efficient NSP. Given these differences the AER considered that using businesses that operate electricity networks obtained from the UBS Utilities Index is sufficient. These businesses included:

- the CH Energy Group Incorporated
- CentrePoint Energy
- Energy East
- NiSource Incorporated
- New Jersey Resources
- NSTAR
- Northeast Utilities
- Pepco Holdings Incorporated
- Sierra Pacific, and
- the UIL Holding Corporation.

Given the problems the AER and the JIA identified with standard errors (and consequently confidence intervals) combined with the difference in measuring systematic risk between countries, the AER considered that confidence intervals for foreign stocks are likely to be less useful for the purposes of informing the upper and lower bounds of the foreign equity beta estimates. Therefore, the AER placed limited weight on the confidence intervals for foreign equity betas to inform the equity beta for an Australian benchmark efficient NSP.<sup>587</sup> The AER considered that it is appropriate to use the point estimates of foreign equity betas as a cross check on the reasonableness of the Australian equity beta estimates.

The AER considered that examining equity betas of gas businesses that do not also include electricity networks in the United States is unnecessary as there are a sufficient number of businesses (which involve both electricity and gas network activities) to obtain a reliable estimate of the equity betas representative of an electricity network business operating in the United States.

### **Submissions in response to explanatory statement**

The JIA note that the ACG concludes that the US estimates are broadly consistent with the Australian data, but that the Australian estimates of 0.7 to 0.9 should be adopted as central estimates that reflect the regression analysis.<sup>588</sup>

### **Issues and AER's considerations**

No new information was contained in submissions on the explanatory statement that has given the AER cause to depart from its position in the explanatory statement on the AER's selection of foreign comparators. The AER only received submissions from interested parties on comparisons of the United States equity beta estimates with the Australian equity beta estimates.

However, the AER observes that the JIA's consultant, the ACG, comments on the AER's approach and interpretation of the ACG's results. The ACG raises three criticisms:

- First, the AER focused solely on the portfolio equity beta and ignored the average of the individual business equity betas.
- Second, the AER's use of the ACG's set of comparable entities is inconsistent with its earlier decision to have regard only to electricity network businesses. Contrary to the AER's assertion, including gas businesses in the sample of foreign comparators reduces the measured equity beta as the simple average of the electricity only sample would imply a higher equity beta.
- Third, there is no basis for the AER to conclude that the quantified factors that could lead to differences between the United States and Australian mean that the

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<sup>587</sup> This is to be distinguished from using confidence intervals to consider the level of asset specific risk or the precision of the equity beta estimates.

<sup>588</sup> *ibid.*

equity beta for the same activity in Australia is likely to be lower than in the United States.<sup>589</sup>

In response to the first criticism, the AER did not ignore the individual averages but acknowledges it placed less weight on these equity beta estimates. The AER agrees with the ACG that more weight should be given to the average of individual equity betas in light of interested parties' submissions and the views of Associate Professor Henry. The AER has considered the average of equity betas in this final decision. This is discussed further in section 8.5.3.8.

In response to the second criticism, the AER stated that a range of equity beta estimates should be considered to determine the equity beta. That said, the portfolio estimates of equity betas may be preferable over a simple average, as confidence intervals can be estimated to provide guidance on the amount of weight the AER places on the United States estimates. The AER acknowledges that the ACG's portfolio, which the AER relied upon to inform its position, comprised gas businesses which was inconsistent with its earlier discussion which considered that the United States sample as sufficiently large to only consider electricity and businesses with a combination of gas and electricity network assets. The AER continues to hold this view as there are a sufficient number of United States comparators to exclude gas only businesses from the sample. The AER notes that it has addressed this issue in the final decision by examining portfolio estimates provided by Associate Professor Henry that exclude gas only businesses from the analysis. The results from this analysis are reported in section 8.5.4. That said the AER has also considered the ACG's equity beta estimates that include gas only businesses in this final decision.

The AER also acknowledges the ACG's third criticism and now accepts that it is difficult to determine whether equity betas estimated using businesses trading in the United States provide more or less conservative estimates compared to estimates derived from Australian data. This is due to there being a number of offsetting factors that are quantifiable<sup>590</sup> and qualitative<sup>591</sup>, and assumptions that would have to be applied to the United States data to account for the net effect of these factors. Given the presence of the additional uncertainties and the indeterminate nature of the adjustments that may be required to make the United States equity beta estimates more comparable with the Australian equity beta estimates, the AER continues to place a limited amount of weight upon the United States equity beta estimates.

### **AER's conclusion**

In making its conclusions on foreign comparators, the AER:

- Considers no new information was contained in submissions on the explanatory statement that has given the AER cause to depart from its position in the explanatory statement on the sample of foreign comparators.

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<sup>589</sup> ACG, *Report to the Energy Networks Association, Grid Australia and the Australian Pipeline Association*, op. cit., January 2009(b), p. 26.

<sup>590</sup> The ACG flags sectoral differences between markets, gearing differences between markets and differences between tax regimes as quantifiable factors that may result in differences between equity beta estimates. *ibid.*, pp. 26-27.

<sup>591</sup> For example differences in investor attitudes, differences between regulatory regimes.

- Maintains the view as there are a sufficient number of United States comparators to exclude gas only businesses from the sample. The AER considers that businesses which either own or operate electricity networks are closer comparators than businesses that solely own or operate gas networks. The AER notes that Henry has updated the portfolio estimates from United States data to exclude gas only businesses. The results from this analysis are reported in section 8.5.4. That said the AER has also considered the ACG estimates that include gas only businesses in its sample.
- Notes that given the presence of the additional uncertainties and the indeterminate nature of the adjustments that may be required to ensure the United States equity beta estimates are comparable with the Australian equity beta estimates, the AER continues to place a limited amount of weight upon the United States equity beta estimates (i.e treating the estimates as a check on the adopted beta estimate).

### **8.5.3 Empirical estimates – methodological issues**

As discussed in its explanatory statement, the AER gave consideration to a broad range of methodological issues when examining equity beta estimates. Before an estimate can be derived, the AER identified the following issues that must be addressed:

- use of discrete or continuous returns
- method used to de-lever the equity beta from the actual level of gearing (to obtain an asset beta) and re-lever to the benchmark level of gearing
- approach to gearing (e.g. presence of double leveraging, and treatment of stapled securities)
- length of estimation period and frequency of observations
- treatment of outliers
- testing of estimation results
- calculation of portfolio or average equity betas, and
- use of the Blume or Vasicek adjustments.

#### **8.5.3.1 Discrete or continuous returns**

Returns are generally calculated as the change in price plus the receipt of dividends, relative to the initial price. Discrete returns assume that the change in price and the receipt of dividends occurs at the end of each time period. Continuous returns assume that the change in price and receipt of dividends occur on a continuous basis throughout the period.

The ACG has noted previously that some of the advantages of continuous returns are that:

- continuous returns can be aggregated over different periods of time, and

- are more likely to be normally distributed and are therefore less subject to errors.<sup>592</sup>

The ACG has also noted that continuous returns are commonly applied when estimating betas.<sup>593</sup>

***Position in the explanatory statement and final decision***

The AER requested Associate Professor Henry to estimate equity betas using both discrete and continuous returns for the purposes of sensitivity testing.

The AER observed that there was not a significant difference between the estimated equity beta using continuous and discrete returns. When estimating equity betas for the ESC, the ACG considered that continuous returns are the standard approach when estimating equity betas.<sup>594</sup>

Given that the differences between estimating equity betas using discrete and continuous returns are minimal, the AER considered that it was appropriate to use the standard approach, which is to use continuous returns.

No new information was contained in submissions in response to the explanatory statement that has given the AER cause to depart from its position in the explanatory statement on the use of continuous returns.

**8.5.3.2 Accounting for leverage**

***De-levering / re-levering***

The AER notes that it is generally accepted that the choice of de-levering and re-levering formula, in general, does not make a significant difference to the resultant estimates, so long as the same formula is adopted for both de-levering and re-levering. The AER also notes that the use of the same formula across the ACG’s current and recent reports, and Associate Professor Henry’s report, also allows for ease of comparison across the various reports.<sup>595</sup>

To implement this approach, the ACG and Associate Professor Henry, have multiplied the raw equity beta estimates by the following factor (omega):

$$\omega = \frac{(1 - \bar{G})}{(1 - 0.60)} \Rightarrow \bar{G} = \frac{\bar{D}}{(\bar{D} + \bar{E})}$$

where:

D= the book value of net debt

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<sup>592</sup> ACG, *Empirical evidence on proxy beta values for regulated gas distribution activities*, Report to the Essential Services Commission of Victoria, June 2007, p. 30.

<sup>593</sup> *ibid.*, p. 40.

<sup>594</sup> *ibid.*, p. 40.

<sup>595</sup> The AER notes that in its current report for the JIA, the ACG also present equity betas de-levered and re-levered using the Monkhouse formula. However, the ACG adopted a debt beta of 0.1 in this report, rather than the preferred debt beta of the AER and ACCC of zero.

E = the market value of equity

***Position in the explanatory statement and final decision***

While the market value of equity can be observed continuously, the book value of debt can only be observed in reports from the businesses, which are published semi-annually. Associate Professor Henry has utilised these published book values of debt and market values of equity at the time of publication of the book values of debt. In his most recent report Henry has used annual values rather than semi-annual values as the Bloomberg data for semi-annual gearing is unavailable prior to the ‘technology bubble’. This data was sourced from Bloomberg and provided by the AER to Henry. The ACG has adopted the same approach, however has interpolated monthly book values of debt for the periods in between publication. The AER in its explanatory statement considered both methods are acceptable and should make little difference to the resultant estimates.

The AER considers that no new information was contained in submissions on the explanatory statement that has given the AER cause to depart from its position in the explanatory statement on the approach to de-levering and re-levering equity betas.

***Double leveraging and stapled securities***

The issue of double leveraging and stapled securities relates to the adjustment of reported levels of gearing. The AER has discussed this issue and its position from the explanatory statement and final position in section 5.5.1 of this final decision. Double leveraging arises where businesses have owners which take out company loans on the behalf of the businesses. This creates an additional layer of debt which is unaccounted for in annual reports. The ACG made adjustments or accounted for double leveraging in its recent work for the ESC and the JIA.<sup>596</sup>

Stapled securities refer to businesses where the shareholders hold loan notes stapled to shares in the business. The owner pays the loan note holder interest. However, in the event of default all debts and moneys owed by the company have to be paid before the holder of the loan note is paid. Therefore, the holder of the loan note bears residual risk and on this basis some businesses treat loan notes stapled to securities as equity. On the other hand other businesses (e.g. Spark Infrastructure and Envestra) record loan notes as debt. The ACG in its analysis adjusted the values of net debt to account for companies that record stapled securities as debt (by treating the stapled security as equity rather than debt). The AER examined the impact of double leveraging and loan notes on re-levered equity beta estimates using the ratios calculated in chapter 5 of its explanatory statement (i.e. 64.0 per cent for Envestra and 58.5 per cent for Spark Infrastructure).<sup>597</sup>

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<sup>596</sup> ACG, *Report to the Essential Services Commission of Victoria*, op. cit., June 2007, p. 56; ACG, *Report to Energy Networks Association, Grid Australia and Australian Pipeline Industry Association*, op. cit., 17 September 2008 (b), p. 22; and ACG, *Report to Energy Networks Association, Grid Australia and Australian Pipeline Industry Association*, op. cit., 17 September 2008(a), p. 21

<sup>597</sup> AER, *Explanatory statement*, op. cit., 11 December 2008, p. 73.

### ***Calculation of gearing***

As discussed in section 5.5.1, the AER considered in its explanatory statement and in its final position that the book valuation of gearing is an equally valid proxy as the ‘market gearing’ measures taken from Bloomberg. However, the AER notes that the Standard and Poor’s Industry Report Cards do not list levels of gearing for all the businesses required for this analysis (e.g. Spark Infrastructure, Hasting Diversified Utilities Fund). Therefore, the AER has used the ‘market gearing’ ratios recorded in the Bloomberg database. The AER notes that the ACG has used the average level of gearing of each business over the return window that the equity beta has been measured.<sup>598</sup> The AER also notes that Associate Professor Henry has used the averaging approach to re-lever the equity beta estimates. Henry has also adjusted the value of debt for loan notes and ‘see through’ gearing for the sample businesses which are applicable.

The JIA argues that the use of net debt is appropriate for de-levering and re-levering the equity beta, as cash has an asset beta of zero.<sup>599</sup> The AER disagrees with the ACG’s position on using the ‘net debt concept’ as it considers that it would be inconsistent to use a level of gearing for an actual business which adjusts for net debt while the level of gearing of a benchmark efficient NSP is based on gross debt. The AER’s reasons for rejecting the JIA’s position on net debt for the level of gearing of a benchmark efficient NSP are given in section 5.5.1 of the final decision. That said, the AER observes that the ACG’s individual re-levered equity beta estimates are similar to Associate Professor Henry’s re-levered estimates and are therefore unlikely to be material.

### **8.5.3.3 Treatment of outliers**

As equity betas examine the systematic risk of an individual stock or a portfolio of stocks relative to the market’s systematic risk there are generally two recognised sources that may create outlier observations. These include:

- business-specific events (e.g. merger announcements) and
- events that are ‘unrepresentative’ of the market (e.g. the ‘technology bubble’).

Accordingly, if there are any outlier observations in either the market data related to the returns of the business and the returns of the equity portfolio, the estimates of the equity beta may not be reliable.

#### ***Business-specific outliers***

Given that outliers can bias the estimate of the equity beta, there are different approaches that have been used to remove these observations. One approach has been to remove observations based upon prior knowledge. An example of this approach would be removing observations from Alinta over a specified period of time given that the speculation over the buyout of the business was likely to create biased observations. However, the AER considers that caution should be exercised as this approach can be subjective and if such an approach is taken it is preferable to

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<sup>598</sup> ACG, *op. cit.*, 17 September 2008 (b), p. 33.

<sup>599</sup> JIA, *Submission in response*, *op. cit.*, January 2009, p.48



compare estimates with and without the outlier observations. The other approach that has been adopted in past regulatory practice involves using econometric techniques which attempt to reduce the impact of outlier observations. Examples of these techniques include:

- Re-weighted Ordinary Least Squares (re-weighted OLS – applies weights to outlier observations), and
- Least Absolute Deviation (LAD – rather than minimising the sum of squared errors, LAD minimises the absolute value of the residuals).<sup>600</sup>

### **Position in the explanatory statement**

The AER noted that the results of the ACG report indicate that the equity beta estimates provided by the re-weighted OLS technique generally result in a lower estimate of the equity beta than the OLS or LAD estimates.<sup>601</sup>

The AER considered that accounting for outlier observations is likely to assist with informing the AER of the equity beta of a benchmark efficient NSP. For example, accounting for outliers by using re-weighted OLS or LAD where the stock prices may be affected by merger and acquisition activity may decrease the likelihood of a biased equity beta estimate. However, given that these techniques may be arbitrary in nature, the AER considered it was appropriate to compare the sample with and without the suspected outlier observations removed.

To account for possible business-specific outliers the AER considered it was appropriate to:

- examine OLS results that include and exclude observations or businesses which may be biased by the acquisition announcements (by removing businesses from portfolios), and
- by applying the LAD and re-weighted OLS<sup>602</sup> approaches and examine the results against the OLS results.

The AER considered that these approaches assist in assessing the impact of outlier observations on equity beta estimates.

### **Submissions in response to explanatory statement**

The JIA note the AER excluded the data relating to AGL, Alinta and GasNet from its data set for a period of time. The JIA argue the exclusion creates a significant weakness in the AER's portfolio analysis.<sup>603</sup>

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<sup>600</sup> This is also referred to as least absolute variation (LAV).

<sup>601</sup> ACG, op. cit., 17 September 2008(b), p.42.

<sup>602</sup> The AER notes that it has not requested that Associate Professor Henry conduct re-weighted OLS regressions. That said the AER has considered the re-weighted OLS regressions provided by the ACG in support of the JIA's submission.

<sup>603</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 111.

### **Issues and AER's considerations**

As already discussed in section 8.5.2.1, the AER has and will continue to consider the ACG's estimates which include these businesses. Further, the AER observes that the removal of observations from the AGL, Alinta and GasNet data sets has had a limited impact on the overall equity beta estimates provided by the ACG on behalf of the JIA (i.e. a difference of -.05 to 0.02).

No new information was contained in submissions on the explanatory statement that has given the AER cause to depart from its position in the explanatory statement on the appropriateness of examining both LAD and re-weighted OLS techniques to account for the impact of business-specific outliers.

### **AER's conclusion**

In forming its views addressing business specific outliers, the AER:

- Observes that the removal of observations from the AGL, Alinta and GasNet data sets has a limited impact on the overall equity beta estimates provided by the ACG on behalf of the JIA (i.e. a difference of -0.05 to 0.02).<sup>604</sup> No new information was contained in submissions on the explanatory statement that has given the AER cause to depart from its position in the explanatory statement on the appropriateness of examining both LAD and re-weighted OLS techniques to account for the impact of business-specific outliers.

### ***'Unrepresentative' events***

Events are considered 'unrepresentative' when the market conditions during this period are unlikely to be reflective of the market going forward. Accordingly, 'unrepresentative events' are generally removed from the sample, or a sampling period that does not overlap with unrepresentative events in estimating forward looking estimates of equity betas. For example, it has been argued that in the United States, the 'technology bubble', where market indices were driven upwards by telecommunications, media and technology stock prices from the late 1990s to 2001 resulted in a period where equity betas for energy businesses reached historical lows. During this period it has been considered that the prices of energy businesses were not driven by technology stock prices, unlike the market index. As a result, regulators have treated this period as a one-off unrepresentative event and excluded this period for the purposes of estimating the corresponding period for both the market and businesses/portfolio being examined.

### **Position in the explanatory statement**

In examining longer period data (i.e. greater than six years), the AER considered it was appropriate to treat the 'technology bubble' as an 'unrepresentative event' and exclude it from the sample as this is consistent with previous regulatory practice. That said, the AER observed that for the majority of the period prior to the technology boom that only two energy network businesses (AGL and Envestra) traded on the stock market and therefore the period prior to the technology bubble may not provide a robust industry average of equity beta estimates.

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<sup>604</sup> ACG, op. cit., Januray 2009(b), pp. 22 and 25.

The AER also considered that the available evidence did not conclusively indicate whether the impacts of the ‘commodities boom’ or ‘sub-prime crisis’ should be considered as structural changes or ‘unrepresentative events’. To the extent that these events may be unrepresentative, the application of re-weighted OLS and the LAD techniques should address the presence of shorter-term unrepresentative events.

### **Submissions in response to the explanatory statement**

The MEU notes in developing the equity beta, the decision was made to exclude data for the ‘Tech Boom’ as it provided a distinctive bias in reducing the value for equity beta for regulated utilities.<sup>605</sup>

The MEU argues that to exclude the ‘Tech Boom’ in isolation from the many other exogenous factors which have both increased and decreased the equity beta of firms providing utility services when other market movements (e.g. crashes of 1987 and 2008, mining boom of 2007) clearly have had an equal if not greater impact on stock prices.<sup>606</sup>

The MEU also argues in counterpoint to this exclusion, the AER specifically includes the impact of the recent ‘global financial situation’ in the assessments, and this has resulted in the recent increase in equity beta, again providing a bias in favour of the regulated firms.<sup>607</sup>

Envestra argues that the data used for equity beta is from the 2002-2007 credit bubble period, which is now widely acknowledged by governments and financial markets participants to have underpriced risk. Envestra also argues that the AER cannot have reflected the prevailing market conditions into its proposed parameter values, notwithstanding the minor adjustment to the equity beta.<sup>608</sup>

### **Issues and AER’s considerations**

The AER considers that no new information was contained in submissions by the MEU in response to the explanatory statement that has given the AER cause to depart from its position in its explanatory statement on the exclusion of the technology bubble.

The AER notes that it received submissions referring to the period from 2002 to 2007 as the mining boom, and observes that Envestra has now linked this period to the credit bubble period. The AER acknowledges that if there has been an undepricing of risk across the market as a whole, this may have an effect on estimated equity betas. However, it is unclear to the AER whether the 2002-2007 period will be unrepresentative of prevailing market conditions over the next ten years. Further, the AER observes that the JIA have relied upon empirical estimations conducted by the ACG that include this period to support its position. The AER’s approach to prevailing market conditions is discussed in section 3.4.5 of this final decision.

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<sup>605</sup> MEU, *Submission in response*, op. cit., 30 January 2009, p. 19.

<sup>606</sup> *ibid.*

<sup>607</sup> *ibid.*

<sup>608</sup> Envestra, *Submission in response*, op. cit., 28 January 2009, p. 2.

The AER notes that in response to the submissions it received from the JIA it instructed Associate Professor Henry to examine data from January 1<sup>st</sup> 1990 to the most recent date possible. Henry notes that due to events associated with the GFC, estimates after September 2008 any estimates after this period are unlikely to be consistent with the CAPM as an equilibrium pricing model and should be excluded from consideration.<sup>609</sup> That said the AER has also considered the ACG's updated results which have been provided in support of the JIA's submission which demonstrate that the global financial crisis has had minimal impact on the estimated equity betas from the ACG's previous report that estimated equity betas up until May 2008 (see section 8.5.4.3).

### **AER's conclusion**

In response to submissions on unrepresentative events, the AER:

- Considers that no new information was contained in submissions by the MEU in response to its explanatory statement that has given the AER cause to depart from its position in the explanatory statement on the exclusion of the technology bubble.
- No evidence has been provided to demonstrate whether the 2002-2007 period will be unrepresentative of prevailing market conditions over the next ten years.
- Observes that the JIA have relied upon empirical estimations conducted by the ACG that include this period to support its position.
- Has also considered the ACG's updated results for this period which have been provided in support of the JIA's submission (although Henry has advised that observations that are post September 2008 may be inconsistent with the assumptions in the CAPM).

#### **8.5.3.4 Length of estimation period**

In determining an appropriate length of the estimation period, there is generally considered to be a trade-off between the potential loss in relevance of older data in reflecting forward looking expectations (which would suggest a shorter period), and having sufficient observations in order to obtain a robust and statistically reliable equity beta estimate (which would suggest a longer period). In estimating equity betas, the common data series providers generally use an estimation period of five years (using monthly observations).

The appropriate frequency of observations is addressed in the section **8.5.3.5**.

#### **Position in the explanatory statement**

In determining the appropriate estimation period, the AER recognised the balance that needed to be struck between statistical precision (suggesting a longer period) and data relevance (suggesting a shorter period). The AER also considered that an appropriate period is one for which a reasonable number of comparator firms are available for the

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<sup>609</sup> O. Henry, op. cit., 23 April 2009, p. 8.

purpose of constructing averages and portfolio estimates. The AER considered using all available data subsequent to the ‘tech boom’ provides the appropriate balance. This resulted in a preferred estimation period from 1 January 2002 to 1 September 2008.

### **Submissions in response to explanatory statement**

The JIA contend that the periods of estimation used by the AER are too short, especially in light of the very significant data inadequacies for the period the AER has adopted. In particular, the AER’s rationale for not including data prior to the tech bubble lacks rigour.<sup>610</sup>

The JIA argue that the AER’s rationale is that prior to the ‘tech bubble’ that the only comparable business is AGL (and briefly Envestra), and the lack of other comparables means such a heavy weighting towards AGL is inappropriate, particularly when it had a large proportion of non-regulated activities. The JIA consider that there are a number of errors in this ‘superficially appealing logic’.<sup>611</sup>

First, a majority of AGL’s activities were in fact regulated. AGL’s retail business has been regulated and, to a significant degree, still is. Full retail contestability (FRC) did not start until 2002. The JIA submits that even now, substantial parts of the customer base take, or can take, ‘safety net’ tariffs even with FRC in place. To the extent that AGL had non-regulated businesses they were a small proportion of its assets and cash flow.<sup>612</sup>

Second, the JIA submits that AGL has been regulated since 1935. The form of regulation applied until 1990 had been rate of return regulation. Thereafter, the form of regulation applied was CPI-X price path regulation. While it represents the only available comparable until 1997 it has an established history of regulation and expectation on the part of investors.<sup>613</sup>

The JIA conclude that given the very real statistical problems with the post tech bubble data and the resulting poor reliability of equity beta estimates, the pre tech bubble estimates for AGL should be given serious consideration and included in the data sets used in calculating beta estimates. Moreover, it should be recognised as an important reference point when assessing appropriate equity betas for electricity infrastructure businesses.<sup>614</sup>

The JIA argue that the AER’s rejection of data from before the technology bubble does not reflect an objective consideration of the need to use all possible information, especially when the other data available is so poor. In light of the opinions of SFG

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<sup>610</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 109.

<sup>611</sup> *ibid.*

<sup>612</sup> *ibid.*, pp. 109-110.

<sup>613</sup> *ibid.*, p. 110.

<sup>614</sup> *ibid.*

and the ACG, and the JIA's reasoning, the rationale for simply taking data from 2002 is superficial and should be revisited.<sup>615</sup>

Envestra contends that the data used by the AER to inform its estimates for the equity beta and credit rating is from the 2002-2007 credit bubble period, which is now widely acknowledged by governments and financial market participants to be a period which under-priced risk.<sup>616</sup>

The ESAA argue that the sharp movement of the equity beta to a lower value is based on a data series that contains no long term Australian listed regulated stock, making it difficult to establish how persuasive evidence exists to move from previously determined higher values.<sup>617</sup>

NSW Treasury states that the AER acknowledges the trade-off between the potential loss in relevance of using older data in reflecting forward looking expectations (which NSW Treasury argues would suggest a shorter period), and having sufficient observations in order to obtain a robust and statistically reliable equity beta estimate (which NSW Treasury argues would suggest a longer period).<sup>618</sup>

### **Issues and AER's considerations**

The AER notes the NSW Treasury's observation that the tradeoff between using longer and shorter term data has been recognised by the AER in its explanatory statement and this trade-off has been considered in view of the JIA's response in this final decision.

Envestra argues that the 2002-2007 period is unlikely to be representative of prevailing market conditions and the ACG asserts that a longer sampling period is likely to cover a period that accounts for different macroeconomic conditions.<sup>619</sup> However, it is unclear whether the period prior to the 'technology bubble' is more reflective of prevailing market conditions going forward when compared to the post 'technology bubble' period. The AER's consideration of Envestra's view is detailed in section 8.5.3.3. The AER considers that there is likely to be a trade off when determining a time length that represents prevailing market conditions. The ACG states that a shorter time period may not capture the range of potential macroeconomic factors. However, the AER notes that this is merely one consideration as there are other considerations when deciding upon the length of the estimation period includes changes in:

- the regulation of financial markets

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<sup>615</sup> *ibid.*

<sup>616</sup> Envestra, *Submission in response*, op. cit., 28 January 2009, p. 2.

<sup>617</sup> ESAA, *Submission in response*, op. cit., 4 February 2009, p. 3.

<sup>618</sup> NSW Treasury, *Submission in response*, op. cit., 28 January 2009, p. 7.

<sup>619</sup> Envestra, *Submission in response*, op. cit., 28 January 2009, p. 2; and ACG, *Report to the Energy Networks Association, Grid Australia and the Australian Pipeline Association*, op. cit., January 2009(b), p. 21.

- ownership structures of different businesses (i.e. if the new owners that acquire assets are involved in businesses that have higher levels of financial and business risks), and
- the number of listed close comparator businesses.

The AER considers that it is a matter of judgement in determining the amount of weight to attribute to pre and post ‘technology bubble’ estimates, or other sampling periods. That said the AER has had regard to equity beta estimates from all of the available sampling periods.

The AER does not agree with the JIA’s arguments based on advice from the ACG and SFG that a greater amount of weight be afforded to AGL’s equity beta estimates. The AER’s reasons are discussed in section 8.5.2.1 of this final decision. That said the AER has considered the longer period provided by the ACG that includes AGL in informing its range of point estimates where AGL has an equal weight in the sample.

The AER also notes that the use of portfolios that have changing weights attributed to each business from one observation to the next due to businesses either being introduced part way through the sample period or businesses being removed part way through the sample period, introduces measurement error. Associate Professor Henry has attempted to address this issue by ensuring the constituents in the portfolio did not change throughout the estimation period. This resulted in five portfolio estimates of the equity beta and resulted in an estimation period that was shorter than the post ‘technology bubble’ period. The AER acknowledges that the shortened time period is less than its preferred period specified in its explanatory statement of the longest period post the tech bubble. Accordingly, the AER in its explanatory statement placed significant weight on its portfolio estimate over a six year and eight month period. However, as the constituents of this portfolio changed over time the AER understands that this portfolio may be subject to a degree of measurement error. The AER’s consideration of portfolio estimates is discussed in further detail in section 8.5.3.8 of this final decision.

The AER considered equity beta estimates derived by the ACG for the period covering the pre and post ‘technology bubble’ and did not reject data from this period as claimed by the JIA and the ESAA in considering equity beta estimates in its explanatory statement. For this final decision the AER has instructed Henry to estimate foreign equity betas for the period covering before and after the ‘technology bubble’. The AER has given consideration to these estimates and the ACG’s estimates in informing its estimate of the equity beta for this final decision.

Henry has not updated the estimates for the post ‘technology bubble’ period from his previous report as he has advised that it may be reasonable to consider recent months as unrepresentative due to the CAPM assuming that there is equilibrium in the equity market.<sup>620</sup> This is discussed in section 8.5.3.3. That said, the AER has examined the

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<sup>620</sup> O. Henry, op. cit., 23 April 2009, p. 8.

ACG's updated estimates and notes the Australian energy estimates have only increased by a range of 0.01 to 0.09.<sup>621</sup>

### **AER's conclusion**

In forming its views on the length of the estimation period, the AER:

- Notes there is a tradeoff between using longer and shorter term data and it is a matter of judgement as to the amount of weight it gives to different sampling periods.
- Does not agree with the JIA's position, that a greater amount of weight should be applied to AGL's equity beta estimate due to its longer sampling period (see section 8.5.2.1).
- Acknowledges that the shorter time period used to estimate Henry's balanced portfolios is less than the preferred period specified in its explanatory statement. In the explanatory statement, the AER placed significant weight on its portfolio estimate over a six year and eight month period. That said, the AER in this final decision has had regard to equity beta estimates from all of the available sampling periods.
- Considered equity beta estimates derived by the ACG for the period covering the pre and post 'technology bubble' and did not reject data prior to the 'technology bubble' as claimed by the JIA in considering equity beta estimates in its explanatory statement. The AER continues to give consideration to these estimates in informing its estimate of the equity beta for this final decision.
- Has examined the ACG's updated estimates and notes the Australian energy estimates have only increased by a range of 0.01 to 0.09.

#### **8.5.3.5 Frequency of observations and thin and thick trading**

The frequency of observations is commonly referred to as the return period. The return period most commonly used by commercial services is monthly. However, given the number of sample firms for the Australian market and the length of the estimation period, it is likely that a weekly or daily return period may improve the precision of equity beta estimates.

The AER notes that under most circumstances (except in the presence of thick trading) increasing the frequency of the data to weekly or daily data is likely to increase the precision of the estimated equity beta. However, a daily return period is likely to be influenced by once off events, or due to the presence of 'thick' or 'thin' trading and contain more noise than less frequent data. This creates a trade off between noise and precision when considering the precision of the equity beta estimate.

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<sup>621</sup> ACG, *Report to the Energy Networks Association, Grid Australia and the Australian Pipeline Association*, op. cit., January 2009(b), p. 22.



## **Position in the explanatory statement**

### ***Frequency of observations***

The AER based on the recommendation of Associate Professor Henry examined equity beta estimates using weekly observations. This was due to the short trading life of a number of Australian stocks in the sample (i.e. Spark Infrastructure). That said given it is standard practice to examine monthly data, the AER also considered ACG's monthly estimates in forming a view on the equity beta.

### ***Thin and thick trading***

The AER based on the recommendations of Associate Professor Henry considered that the Dimson approach be used to examine the effects of thin and thick trading. Associate Professor Henry considered that the Dimson approach was preferred to the Scholes-Williams approach as there was little danger of omitted variables bias and the calculation of the standard error in the Dimson approach was relatively straightforward.<sup>622</sup>

## **Submissions in response to explanatory statement**

### ***Frequency of observations***

The JIA observe that the use of weekly data over monthly data by Henry and the AER is a reflection of the paucity and scarcity of the data. The JIA argue that effectively Henry has been forced to use weekly data as opposed to monthly data because there is insufficient data to derive meaningful results. The JIA contend that the use of weekly data will derive less accurate results than those derived from monthly data.<sup>623</sup>

The JIA also observe that the use of monthly observations has long been accepted as the preferred frequency by finance academics and practitioners as it provides the most reliable estimates. The JIA argue that this is because there is a sufficient length of time required for the relationship with market movements to be established, while still providing sufficient data points for meaningful regression estimates that minimise statistical noise.<sup>624</sup>

The JIA contend that Henry and the AER have been forced to adopt weekly estimates because much of the data is for periods that would otherwise be considered too short because of the limited number of data points. Notwithstanding that the weekly data provides sufficient data points, it produces less reliable results than monthly data and is being used over a period, which is too short to provide a sound basis for equity beta estimates.<sup>625</sup>

The JIA note that the ACG comments that:

The AER acknowledges that using weekly observations to estimate betas is not consistent with standard practice. We note that using weekly observations

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<sup>622</sup> O. Henry, *Econometric advice and beta estimation*, Report to the ACCC/AER, November 2008, p. 15.

<sup>623</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 111.

<sup>624</sup> *ibid.*

<sup>625</sup> *ibid.*

is more likely to be susceptible to bias than when monthly estimates are used where stocks are traded less than the (value-weighted) average of listed entities, which is likely to be the case for some of the in the set of comparable entities. In addition, it is not clear that the use of weekly data improves the overall statistical performance of the model that is used to estimate the betas.<sup>626</sup>

### ***Thin and thick trading***

The AER did not receive any submissions on thin and thick trading from interested parties.

## **Issues and AER's considerations**

### ***Frequency of observations***

The JIA contend that weekly data provide less reliable results than monthly data due to the presence of noise. The AER observes that two of the JIA's consultants (the ACG and SFG) assert that the use of weekly data, which increases the frequency of observations, either does not improve the robustness and reliability of the results, or is susceptible to thin trading.<sup>627</sup> However, the AER observes that neither of the JIA's consultants conducted any testing to demonstrate that the use of weekly observations has resulted in equity beta estimates that could be considered less reliable or robust than the estimates derived from monthly data.

Associate Professor Henry has only found weak evidence of thin trading in the OLS estimate of one stock and one portfolio (the APA Group and P1' (2002 to 2008) respectively).<sup>628</sup> Henry reiterates with respect to the selection of weekly observations, that there is a tradeoff between the noisy nature of the daily data and the lack of degrees of freedom in the monthly data and the best compromise would appear to be the use of data sampled at the weekly frequency.<sup>629</sup> That said, the AER has considered the ACG's and Henry's monthly estimates to inform the estimated equity beta of a benchmark efficient NSP.

### ***Thin and thick trading***

The AER considers that no new information was contained in submissions on the explanatory statement that has given the AER cause to depart from its position in the explanatory statement on the application of the Dimson approach.

## **AER's conclusion**

### ***Frequency of observations***

The AER observes that neither of the JIA's consultants conducted any testing to demonstrate that the use of weekly observations has resulted in equity beta estimates that could be considered less reliable or robust than the monthly data. That said, the AER has considered the ACG's and Henry's monthly estimates to inform the estimated equity beta of a benchmark efficient NSP.

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<sup>626</sup> *ibid.*

<sup>627</sup> SFG, *op. cit.*, 1 February 2009(a), p. 35; and ACG, *op. cit.*, January 2009(b), p. 8.

<sup>628</sup> O. Henry, *op. cit.*, 23 April 2009, pp. 18-19 and 29-32.

<sup>629</sup> *ibid.*, p. 48.

### ***Thin and thick trading***

The AER maintains that the Dimson approach is appropriate for testing the presence of thin and thick trading.

#### **8.5.3.6 Robustness, precision and stability of equity beta estimates**

The AER recognises that empirically derived equity betas are based upon estimation techniques using historical data. If all the factors driving systematic risk remained constant over time, then it is likely that the historical estimates of the equity beta could be considered a reliable forward looking estimate. However, when examining the systematic risk of businesses or portfolios relative to the market, this relationship is unlikely to be perfectly constant over time, as different events (i.e. economic shocks) are likely to have different effects on the systematic risk of both businesses and the market. Therefore a number of different techniques have been used to test the precision and stability of beta estimates. These are:

- examining the adjusted R-squared of the estimates<sup>630</sup>
- using confidence intervals to generate an upper bound estimate of the equity beta
- testing for the presence of autocorrelation and heteroskedasticity in the errors of the regression
- testing for thin and thick trading effects (used to examine the robustness of the point estimate), and
- examining the stability of equity beta estimates over time.

### ***R-squared***

The R-squared statistic measures the percentage of variation in the dependent variable that can be explained by movements in the independent variables in the regression. Similar to the issue with outlier observations and unrepresentative events it has been argued that a low R-squared statistic indicates that there is a significant amount of noise which is likely to provide a biased equity beta estimate.

### **Position in the explanatory statement**

The AER considered that the simulation analysis of the equity beta conducted by the SFG cannot be applied to the empirical estimation of the equity beta since the true value of the equity beta is assumed in the former but truly unknown in the latter.

The AER considered that it was inappropriate to consider that empirical equity beta estimates with an R-squared value of less than ten per cent are negatively biased when the ‘true value’ of the equity beta is not known. Given the unknown nature of the ‘true

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<sup>630</sup> The AER is aware that the magnitude of the R-squared is normally used to examine the percentage of the variation of the dependent variable can be explained by the variation in the independent variables. However, the AER notes that interested parties have argued that the adjusted R-squared or R-squared can be used to examine the precision of the equity beta estimates. The AER has considered this view in section 8.5.3.6 of this final decision.

value', the AER considered that it was not known as to whether the point estimate of the equity beta was positively or negatively biased (if at all).

The AER considered that as the CAPM estimates systematic market risk faced by the business relative to the market risk but not the total business risk. Therefore, a focus on the R-squared statistic may not be appropriate in the context of determining the reliability of estimated equity betas. In particular, it was noted that the R-squared is a measure of the model's power to explain total business risk but not a direct measure of the precision or stability of the beta point estimate. It was considered that the stability of the equity beta estimates are best assessed by applying sequential and recursive estimates, Hansen's test, and, confidence intervals.

### **Submissions in response to explanatory statement**

The JIA argue the period between 1998 and 2008 was affected by the 'technology bubble' (i.e. 1998 to 2001) and low market volatility (i.e. 2002 to 2008) with consequent poor statistical data properties for estimating equity betas, as reflected in low R-squared statistics.<sup>631</sup>

The JIA note that SFG identified that the R-squared statistic has two roles:

- to provide a measure of the extent to which variation in the dependent variable (individual company returns) are related to the independent variable (market returns), and
- to provide a measure of the 'signal-to-noise ratio' and the consequent reliability of the estimate. That is, where R-squared is low there is an increasing likelihood that the estimate will not be correct because the financial 'signal' is obscured by statistical 'noise'.<sup>632</sup>

The JIA contend SFG demonstrated conclusively that where the R-squared statistic is low there is a very high probability that the estimate will be biased downwards.<sup>633</sup>

The JIA note SFG also highlighted the problems with relying on confidence intervals when R-squared statistics are low. The level of uncertainty about the estimates associated with a low R-squared also applied to the confidence intervals associated with these statistics, and that these confidence intervals would need to be widened when the R-squared statistics are low.<sup>634</sup>

The JIA argue the AER has not recognised or estimated the impact of low R-squared results and the quality of comparables.<sup>635</sup>

The JIA contend R-squared statistics are a useful tool in interpreting equity beta estimates. The JIA state that the AER has an incomplete understanding of the role of

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<sup>631</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 99.

<sup>632</sup> *ibid.*, p. 100.

<sup>633</sup> *ibid.*

<sup>634</sup> *ibid.*

<sup>635</sup> *ibid.*, p. 113.

R-squared statistics in interpreting equity beta estimates. The JIA submits that while the AER acknowledges that low R-squared statistics make it more difficult to obtain statistically reliable estimates, it focuses on identifying the extent to which market returns influence stock returns, but does not correctly determine the role and impact of low R-squared estimates obscuring the true equity beta. The JIA argue that where an R-squared is low the role of statistical noise becomes significant and any estimate of correlation becomes increasingly suspect.<sup>636</sup>

The JIA also contend that two key statements from the SFG report that summarise the issues are:

Again, the key point (about which there appears to be general agreement) is that in circumstances where the R-Squared statistic is low “it is difficult to obtain statistically reliable estimates.” In my view, this alone should lead one to (a) compute and report R-squared statistics, as is standard practice whenever using regression analysis, and (b) apply great caution in affording material weight to the resulting estimate where the R-squared statistic is low.

....

In summary, my earlier report shows that beta estimates less than 1.0 are more likely to be below the true beta than above it and are therefore downwardly biased. When the JIA obtain a beta estimate that is less than 1.0 the JIA know that it is more likely to have been affected negatively by estimation error. Consequently, the JIA’s best estimate of the true value of beta is higher than the estimated value. The AER argues that it is reasonable to hold an a priori view that the equity beta of the benchmark firm is less than 1.0 based on “empirical and conceptual evidence.” In my view, the “empirical” evidence is circular and the “conceptual” evidence is based on flawed reasoning and does not contradict the existence of bias in any event.<sup>637</sup>

The JIA submit that the AER misunderstands the reason why a focus on low R-squared results is needed. The JIA state that clearly where the R-squared is not low, there is no problem and where R-squared is low there is a problem. Importantly, the equity beta estimates on which the AER is basing its decision have a large number of low R-squared results.<sup>638</sup>

The JIA argue that the AER also misconstrues the role of the simulation analysis used by SFG. It has mistakenly drawn the conclusion that the SFG simulation is an alternative method of estimating equity beta. The JIA states this is incorrect as the SFG simulation is used to cross check the validity of the beta estimates by comparing the results to those of a simulation where the true values are known. This cross-check is particularly important where the data is of such low quality that the results are open to question, as it is in this case.<sup>639</sup>

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<sup>636</sup> *ibid.*, pp. 113-114.

<sup>637</sup> *ibid.*, p. 114.

<sup>638</sup> *ibid.*

<sup>639</sup> *ibid.*

## Issues and AER's considerations

The AER considers that the JIA may have misunderstood the AER's position in its explanatory statement. The AER did not explicitly or implicitly consider the simulation analysis as an alternative method of estimating the equity beta. The AER's analysis of SFG's work focused upon the interpretation of R-squared statistics, the focus on low R-squared statistics and the assumptions used in its simulation analysis. The AER considered that the simulation analysis conducted by SFG did not provide sufficient grounds for the AER to apply an adjustment to the empirically estimated equity betas when the R-squared of the actual estimation is low. The AER considered:

- that simulation analysis and subsequent adjustments to the actual equity beta estimates (where the R-squared is low) relies upon the assumption that the true value of the equity beta is known (i.e. value of 1 is used in the simulation), and
- the use of R-squared to demonstrate bias or imprecision in the equity beta estimate was inappropriate.

The AER notes that SFG conducted two simulation analyses, one simulation examined the relationship between the R-squared and reliability of equity beta estimates, and the other simulation examined bias in empirically estimated equity betas and relates to the use of the Vasicek adjustment. The AER's consideration of issues relating to adjustments for bias in the estimate is discussed in section 8.5.3.7 of this final decision. That said, SFG did make a conclusion about the presence of bias for estimates with an R-squared of less than 10 per cent.<sup>640</sup> The AER considers that the finding of the measured beta being of less than one for the lowest decile as unsurprising, as SFG has selected a cluster of simulation results where only a small part of the variation in the return of the firm is explained by the variation in the return of the market. Where the R-squared is low it is likely that there will be a large number of estimates below one as it is likely there are a different set of factors faced by the business that are not faced by the market.

The AER has re-examined the SFG simulation analysis relating to R-squared statistics and reliability. The AER considers it is important to outline the assumptions used in the simulation, these are:

- the individual stock's true equity beta is equal to one
- the market has an expected monthly return of one per cent
- the expected monthly standard deviation of returns for the market range from 1 to 10 per cent with equal probability (assumes a uniform distribution)
- once the standard deviation is selected, the volatility of the market's returns are drawn from a normal distribution with a mean zero and the chosen standard deviation is then added to the expected return of one percent

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<sup>640</sup> SFG, *The reliability of empirical beta estimates*, Report prepared for ENA, APIA, and Grid Australia, 15 September 2008, p. 12.

- the expected monthly standard deviation of returns for the stock range from 1 to 10 per cent with equal probability (assumes a uniform distribution), and
- once the standard deviation is selected, the error terms are drawn from a normal distribution with a mean zero and the chosen standard deviation, before being added to the market return for the given month to derive the stock returns.

The AER also observes that the simulation analysis examines equity betas over 48 monthly observations. Table 8.3 replicates the results from SFG’s simulation analysis.

**Table 8.3 – Simulation results from SFG’s analysis**

Decile	Mean R-squared (%)	Mean beta estimate	Standard deviation of beta estimate	Proportion in which estimates are below one (%)	Proportion in which estimate is reported as significantly below one (%)	Proportion in which estimate is reported as significantly above one (%)
1	4	0.66	0.50	80	13	0
2	15	1.06	0.42	55	5	1
3	25	1.07	0.34	51	5	4
4	36	1.05	0.24	49	4	5
5	46	1.04	0.18	46	4	5
6	56	1.04	0.15	43	3	6
7	65	1.04	0.12	42	3	7
8	75	1.02	0.10	43	4	8
9	86	1.01	0.07	45	4	7
10	95	1.00	0.04	46	4	6
<b>Overall</b>	<b>50</b>	<b>1.00</b>	<b>0.29</b>	<b>50</b>	<b>5</b>	<b>5</b>

Source: SFG<sup>641</sup>

The AER observes that Henry has examined and replicated the SFG’s analysis and as a first step increased the number of observations used from 48 (i.e four years of monthly data) to 208 observations (i.e four years of weekly data). Table 8.4 replicates the results from Henry’s analysis.

<sup>641</sup> *ibid.*, p. 12.

**Table 8.4 – Simulation results from Henry’s analysis**

Decile	Mean R-squared (%)	Mean beta estimate	Standard deviation of beta estimate	Proportion in which estimates are below one (%)	Proportion in which estimate is reported as significantly below one (%)	Proportion in which estimate is reported as significantly above one (%)
1	5	0.92	0.31	65	8	1
2	15	1.03	0.19	51	5	4
3	26	1.01	0.13	50	5	5
4	36	1.01	0.10	50	5	5
5	46	1.01	0.08	49	5	5
6	55	1.01	0.07	46	4	6
7	64	1.01	0.05	46	4	6
8	75	1.01	0.04	47	4	6
9	85	1.00	0.03	47	4	6
10	95	1.00	0.02	48	5	5
<b>Overall</b>	<b>50</b>	<b>1.00</b>	<b>0.29</b>	<b>50</b>	<b>5</b>	<b>5</b>

Source: Henry<sup>642</sup>

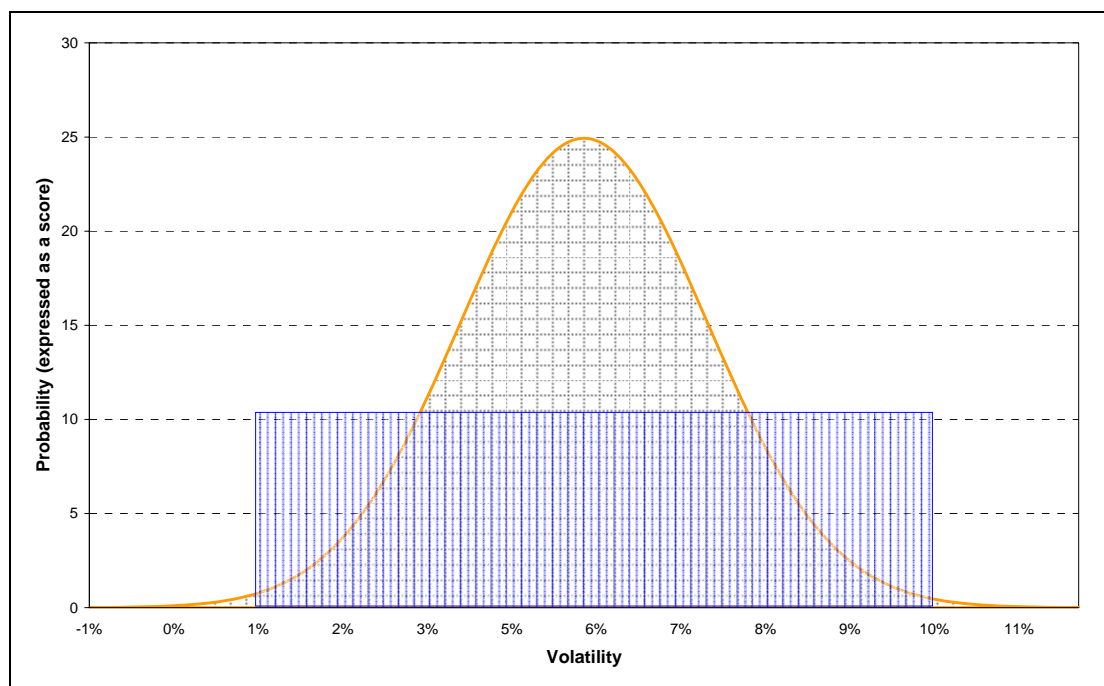
The AER notes that by increasing the number of the observations in the simulation analysis there is now only an eight per cent chance (compared to 13 per cent where 48 observations are used) that the equity beta estimate is below the true value of 1.0 in the simulation.

Another feature of SFG’s simulation analysis is the use of a distribution to select the expected standard deviations (volatility) of stock and market returns. Figure 8.1 is a graphical representation of the distribution being used in the simulation analysis.

<sup>642</sup> O. Henry, op. cit., 23 April 2009, p. 6.



**Figure 8.1 – Uniform and normal distributions**<sup>643</sup>



The AER also observes that a low level of volatility (i.e. one per cent) is equally as likely as a high level of volatility (i.e. ten per cent) under a uniform distribution. The AER considers that the uniform distribution is unlikely to be representative of volatility observed in an actual market. Figure 8.1 compares a uniform distribution to the commonly used normal distribution (bell shape).<sup>644</sup> The AER observes a uniform distribution is likely to result in high and low volatility outcomes that are likely to be over-represented when compared to volatility drawn from a normal distribution.

Further, the AER notes that Henry states:

Comparing the uniform distribution as a candidate distribution for  $\sigma^2$  with the normal distribution is very informative. The implications of the uniform distribution are very strong. The volatilities of  $r_{m,t}$  and  $\varepsilon_{i,t}$  are assumed to take a range of values in the range 1% to 10% with equal probability, P(U). Hence, average levels of volatility are just as likely to occur as very volatile or very calm returns. The probability of an average level of volatility being drawn from a normal distribution is much higher at P(N). Relative to the normal distribution, average levels of  $\sigma^2$  will be under-represented in the simulations based upon the uniform. Similarly, in comparison with the normal distribution, high and low levels of  $\sigma^2$  are likely to be over represented as a result of the assumption that volatility is uniformly distributed. The design of experiment over-represents data which exhibits extremely low or

<sup>643</sup> This diagram is merely an example of two different types of distributions, the probability is calculated by measuring the shaded areas underneath the curves (i.e. the probability density function). The uniform distribution may be higher or lower, and the normal distribution may be higher or lower, and/or thinner or wider.

<sup>644</sup> This diagram has been drawn for illustrative purposes. Drawing from a continuous uniform distribution will not substantially affect the analysis nor would comparing it to a normal distribution with a higher or lower probability (i.e. greater or lower than 50 per cent) at the central estimate.

high signal to noise ratios. Moreover, this experimental design may also under-represent draws with the average level of volatility for each factor.

In order to make any strong conclusions about a relationship between  $R^2$  and the estimate of  $\beta$  from the SFG study, the results of the experiment should be reasonably robust to deviations from the assumptions from the experiment. This robustness is not achieved as it is clear from table [8.4] that any relationship weakens as the sample size increases. Furthermore, it must be possible to justify the assumptions underlying the experiment. No explanation is given as to why  $\sigma^2$  should be discretely normally distributed, nor is the robustness of the results to deviations from this assumption examined.

...

However, without a justification for this choice of distribution and an examination of the impact of deviations from the assumptions underlying the experiment the conclusions drawn in the SFG study should be regarded as tenuous.<sup>645</sup>

Accordingly, the AER considers that the outcome in the SFG simulation analysis is likely to be an artefact of the selection of a uniform distribution and cannot be used to draw any inferences about equity beta regressions with a low R-squared. In addition, Henry has demonstrated that by merely increasing the number of observations of equity beta estimates with a low R-squared the proportion of estimates significantly below one decreases. The AER continues to disagree with the JIA about the interpretation of low R-squared statistics resulting in unreliable equity beta estimates.

The AER maintains that:

- the R-squared statistic, while a measure of the model's power to explain total risk, is not a direct measure of the precision or stability of the beta point estimate, and
- a low R-squared demonstrates that there is a high level of non-systematic (asset specific) risk.

The AER considers that the reliability of equity beta estimates is better assessed by sequential and recursive estimates, and Hansen's test. That said, the AER has considered the R-squared statistics of equity beta estimates, as reported by Henry in the AER's analysis (see section 8.5.4.3). The AER also considers that it is inappropriate to adjust standard errors and confidence intervals on the basis of an estimation having a low R-squared. The AER considers that there is already a direct relationship between the estimated standard errors of the equity beta estimate and the R-squared value as any variation in the stock return that is not explained by the variation in the market return (and therefore not included in the R-squared percentage) is likely to be picked up in the standard error of the estimation and subsequently the confidence interval. To make a further adjustment to the confidence intervals would be inappropriate as it would be extremely difficult to determine if any further adjustment is due to a low R-squared without resulting in an outcome that would potentially result in a 'double counting' of errors. That said, the AER considers:

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<sup>645</sup> O. Henry, op. cit., 23 April 2009, pp. 7-8.

- it would be inconsistent to place more weight on confidence intervals in the equity beta analysis than for other parameters (such as gamma and the MRP) without justification, and
- the point estimate is the most likely estimate of the ‘true’ equity beta (see section on confidence intervals).

### **AER’s conclusion**

In considering the interpretation of R-squared statistics, the AER:

- In its explanatory statement, did not explicitly or implicitly consider the simulation analysis as an alternative method of estimating the equity beta.
- Considers that the finding of the measured beta being less than one for the lowest decile is not unexpected, as SFG has selected a cluster of simulation results where the variation in the stock return that is not explained by the variation in the market return.
- Notes that by increasing the number of the observations in the SFG simulation analysis, there is now only an eight per cent chance (compared to 13 per cent where 48 observations are used) that the equity beta estimate is below the true value of 1.0 in the simulation.
- Considers that the uniform distribution used in the SFG simulation analysis has not been justified in terms of being representative of volatility observed in an actual market or by an actual business.
- Disagrees with the JIA about the interpretation of low R-squared statistics in equity beta estimations indicate that equity beta estimates are biased.
- Considers that to make a further adjustment to the confidence intervals would be inappropriate as it would be extremely difficult to determine if any further adjustment is due to a low R-squared without resulting in an outcome that would potentially result in a ‘double counting’ of errors.
- Continues to consider:
  - the R-squared statistic, while a measure of the model’s power to explain total risk, is not a direct measure of the precision or stability of the beta point estimate, and
  - a low R-squared demonstrates that there is a high level of non-systematic (asset specific) risk.

### ***Confidence intervals***

In general, the AER has focused on the point estimate of the equity beta in informing its view. However, the width of the confidence interval is an indicator of the precision of the point estimate. The precision of a point estimate is inversely related to its estimated variance or standard error. That is, estimates with lower variance are estimated more precisely and have narrower confidence intervals.

There are a number of issues when examining confidence intervals, including the presence of:

- outliers has the potential to affect both the point estimated and the associated confidence intervals, and
- autocorrelation (i.e. the errors in the regression in the present have a relationship or trend with errors in the past) and heteroskedasticity (i.e. variance in the errors over time is not constant).

### **Position in the explanatory statement**

Given the possibility of the presence of heteroskedasticity and autocorrelation in the errors of the equity beta estimation it is difficult to discern whether confidence intervals overstate or understate the upper bound of an estimate of the benchmark efficient equity beta. Further, the AER found no compelling reasons to favour the Newey-West adjustment approach adopted by the ACG in its analysis or the Whites approach to adjusting standard errors or making no adjustment to standard errors when examining confidence intervals. Further, the AER did not consider that having regard to the need for persuasive evidence translates into a specific statistical hypothesis that would require the selection of a particular set of standard errors to create confidence intervals for the purposes of testing the unknown true value of the equity beta.

That said, the AER noted even if it were to consider confidence intervals it would be appropriate to consider both the lower and upper bounds generated by the estimation as it is equally likely that a ‘true’ equity beta point estimate may be observed at the lower or upper bound. Given that upper and lower bounds are less likely to represent the ‘true’ point estimate the AER had regard to the point estimates rather than the range of possible estimates within confidence intervals.

### **Submissions in response to explanatory statement**

The JIA note the explanatory statement suggests limitations to the usefulness of confidence intervals. The JIA argue they must be relevant under the persuasive evidence test whenever the AER is basing its parameter estimates on statistics.<sup>646</sup>

The JIA also note that the ACG calculated 95 per cent confidence intervals for the results in order to assess the reliability and robustness of the results.<sup>647</sup>

The JIA contend that these estimates of confidence limits only account for the level of scatter of the data points and not other sources of statistical variation that impact on the representativeness of the central estimates. An understanding of the statistical properties of the estimates is crucial to informing any judgement about the confidence that can be placed in their accuracy, which are being made from the available data.<sup>648</sup>

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<sup>646</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 98.

<sup>647</sup> *ibid.*

<sup>648</sup> *ibid.*

The JIA note its consultant, SFG, provided financial and statistical analysis to assess the extent to which the equity beta estimates and confidence intervals undertaken using the standard techniques employed by ACG could be relied on, given the reliability problems with the data.<sup>649</sup>

The JIA observe that the AER has focused on point estimates of the equity beta and, while acknowledging that confidence intervals are measures of precision, it seems to largely ignore their application. The AER undertakes a technical discussion of standard errors, heteroskedasticity, auto correlation and their impact on confidence intervals, but does not draw conclusions about what the confidence intervals reveal about the reliability of point estimates. The JIA argue that considering both the very wide range of the confidence intervals and the expert advice of the ACG and SFG on the reliability of the confidence intervals, the approach by the AER calls into question the validity of the point estimates.<sup>650</sup>

The JIA note that the ACG provides a simple complete summary of the failures in the AER's approach to confidence intervals, highlighting both the need to use confidence intervals to make an assessment of persuasive evidence and the particular relevance of the upper confidence interval:

Thus, there is nothing inappropriate nor asymmetric about concentrating in the current case on the upper limit of the confidence intervals for the new beta estimates. When testing whether the evidence for change is 'persuasive' given the reliability of the evidence, only one end of the confidence interval would be relevant (with the relevant 'end' depending upon whether the new point estimates are above or below the previously adopted value).<sup>651</sup>

### **Issues and AER's considerations**

The AER requested that Associate Professor Henry examine the following statement made by the ACG, in its most recent report:

A confidence interval, in broad terms, describes the limit of our confidence about the true value given the evidence that has been considered – on the strength of the evidence examined, the true value could lie anywhere within the outer bounds of the confidence interval, but in contrast, we are confident that the true value cannot lie outside of those bounds.<sup>652</sup>

Henry considers that the above statement is incorrect as it misinterprets the usage of confidence intervals, noting that confidence intervals do not reveal the true value of the equity beta, his report notes:

The reason the above statement is incorrect lies in a misinterpretation of the concept of a confidence intervals. In the estimation of an interval we construct two functions  $f_1(r_{i,1}, r_{i,2}, \dots, r_{i,n})$  and  $f_2(r_{i,1}, r_{i,2}, \dots, r_{i,n})$  using the sample observations such that

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<sup>649</sup> *ibid.*, p. 99.

<sup>650</sup> *ibid.*, p. 113.

<sup>651</sup> *ibid.*

<sup>652</sup> ACG, *op. cit.*, January 2009(b), p. 15.

$\Pr(f_1 < \beta < f_2) =$  a given level of probability, say 95%

This results in a 95% confidence interval  $(f_1, f_2)$ . Since  $\beta$  is a parameter and is therefore an unknown constant (which we estimate as  $\hat{\beta}$ ), the confidence interval is a statement about  $f_1$  and  $f_2$  and not about  $\beta$ . What this implies is that if we use the functions  $f_1(r_{i,1}, r_{i,2}, \dots, r_{i,n})$  and  $f_2(r_{i,1}, r_{i,2}, \dots, r_{i,n})$  repeatedly with different samples then we may be confident that 95% of these confidence intervals will contain the true value,  $\beta$ .

...

In the case of any particular interval **we cannot say anything about the true value because (i) the confidence interval is a statement about  $f_1$  and  $f_2$  and not about  $\beta$  and (ii) the value of  $\beta$  is a parameter and is therefore unknown.** (emphasis added)<sup>653</sup>

Given the AER's previous views (that the point estimate is the most likely estimate of the 'true' equity beta), the JIA's position on other parameters and Henry's advice, the AER does not consider that having regard to the need for persuasive evidence translates into a specific statistical hypothesis that would require the selection of a particular set of standard errors to create confidence intervals for the purposes of testing the unknown true value of the equity beta. The AER continues to consider that the point estimate that is derived from empirical analysis is most likely to represent the 'true value' of the equity beta. The AER does not consider that in having regard to persuasive evidence that the AER must adopt the previously adopted value in circumstances where the previously adopted value is within the constructed confidence intervals. The AER's interpretation of persuasive evidence is discussed in section 3.4.7. That said, the AER has considered confidence intervals in its analysis of the empirically estimated equity betas.

The AER considers that no new information was contained in submissions on the explanatory statement that has given the AER cause to depart from its position in the explanatory statement that the point estimate is the most likely estimate of the 'true' equity beta. Further, a range of point estimates derived from different samples and sampling periods is more likely to provide a reasonable range for the 'true' equity beta. That said, the AER agrees with the JIA and the ACG that the relevant confidence interval would be the bound which may include the previously adopted value.

The AER considers that confidence intervals should only be used as a guide to determine how much weight should be placed on individual portfolio equity beta point estimates, where confidence intervals can be estimated (i.e. not on individual average equity beta estimates, as an average on the standard errors is likely to be inappropriate).

Although the JIA assert that the confidence intervals must be widened due to the potential problems of heteroskedasticity, autocorrelation and low R-squared statistics, it has failed to justify the basis for this assertion or quantify the adjustment required. The AER noted that the ACG did not demonstrate that there was any presence of

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<sup>653</sup> O. Henry, op. cit., 23 April 2009, pp. 12-14.

autocorrelation in the errors and therefore did not consider that the Newey-West adjustment (which adjusted for heteroskedasticity of an unknown form and autocorrelation) is appropriate. The AER considers that no new information was contained in submissions on the explanatory statement that has given the AER cause to depart from its position in the explanatory statement on the adjustment of standard errors. The AER considers that the JIA in response to the explanatory statement has not demonstrated that the Newey-West adjustment to the standard errors is a clearly superior approach to either no adjustment or the Whites adjustment.

The AER considers that it is inappropriate to adjust confidence intervals on the basis of low R-squared statistics due to the issue of ‘double counting’ of errors. This is discussed in this section on R-squared statistics. As for widening confidence intervals due to the presence of heteroskedasticity, Associate Professor Henry has demonstrated that White’s adjustment of the standard errors was found to be negligible.<sup>654</sup>

The AER continues to consider it is unclear whether confidence intervals should be wider or narrower on the basis of qualitative factors (such as macroeconomic stability) and quantitative factors (such as heteroskedasticity). Therefore, the AER considers it is more appropriate to examine unadjusted confidence intervals.

### **AER’s conclusion**

When examining the confidence intervals of equity beta estimates, the AER:

- Continues to consider that the point estimate is the most likely estimate of the ‘true’ equity beta. The AER considers that a range of point estimates derived from different samples and sampling periods is more likely to provide a reasonable range for the ‘true’ equity beta. That said, the AER has had regard to the relevant confidence intervals.
- Considers that confidence intervals should only be used as a guide to determine how much weight should be placed on individual portfolio equity beta point estimates, where confidence intervals can be estimated (i.e. not on individual average equity beta estimates, as an average on the standard errors is likely to be inappropriate).
- Considers that it would be inconsistent to selectively apply confidence intervals to equity beta estimates and not other parameters as part of the persuasive evidence test.
- Continues to consider that the point estimate that is derived from empirical analysis is most likely to represent the ‘true value’ of the equity beta. That said, the AER has considered confidence intervals in its analysis of the empirically estimated equity betas.

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<sup>654</sup> O. Henry, op. cit., 28 November 2008, p. 6.

- Considers that the JIA has not demonstrated that the Newey-West adjustment to the standard errors is a clearly superior approach to either no adjustment or the Whites adjustment.
- Considers that it is inappropriate to adjust confidence intervals on the basis of low R-squared statistics due to the issue of ‘double counting’ of errors.

***Examining the stability of equity beta estimates over time***

The AER and interested parties have examined the stability of equity beta estimates over time as a consideration when determining the amount of weight that should be given to estimated equity betas. In general, three approaches that have been used include recursive estimates which use a fixed window (‘fixed window approach’), recursive estimates which use an expanding window (‘expanding window approach’), and the Hansen test for parameter stability.

The ‘fixed window approach’ involves estimating equity betas over a specified time window (e.g. 60 consecutive observations) and moving the fixed window forward by one month/week/day at a time. This effectively removes the first observation from the window and adds an observation after the last observation of the previous window. The equity beta estimates and confidence interval results are then plotted on a graph to examine whether the equity beta estimates have remained stable over time.

The ‘expanding window approach’ begins with a set window and expands the size of the window by one observation at a time without removing any observations from the window. (e.g. the first window will contain 60 observations, the second window will contain 61 observations). As was the case with a fixed window, this approach involves plotting the estimation results on a graph to examine whether the equity beta estimates have remained stable over time.

Henry noted in his report that these approaches use windows to examine the stability of equity betas over time they may not be sufficient in testing parameter stability as they do not employ all available information.<sup>655</sup> Another approach that can be used to examine parameter stability is the Hansen test for structural stability which conducts statistical tests on the stability of the variance of errors, the constant in the equation, and the estimated equity beta over the sampling period.

**Position in the explanatory statement**

The AER considered in its explanatory statement that methods that examine graphical presentations of recursive estimates may be open to different interpretations.

Therefore, the AER also considered that the Hansen test is equally appropriate to the graphical presentations (recursive approaches) for the purpose of examining the stability of equity beta estimates over time.

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<sup>655</sup> O. Henry, op. cit., November 2008, p. 20.



### **Submissions in response to explanatory statement**

The JIA contend that the AER considers that the Hansen test is more useful than graphical approaches but makes no definitive conclusion about stability.<sup>656</sup>

### **Issues and AER's considerations**

The AER did not receive any substantive submissions on whether the use of the three methods were appropriate or inappropriate. Submissions relating to the interpretation of the Hansen test are addressed in section 8.5.4. Nonetheless, it appears that the JIA has misinterpreted the AER's position on tests for stability. The AER's position in its explanatory statement was that all three approaches were equally informative.

The AER observes that the ACG noted in its response to the explanatory statement that the results from the Hansen's test and visual examination (i.e. graphical presentations) may be due to the adoption of a sampling period which had a historically low level of volatility.<sup>657</sup> The AER agrees with the ACG that the results from these tests may be a result of the period that has been selected. However, the AER notes that the weight given to different estimation periods is a matter of judgement. This is discussed in section 8.5.3.4. That said the AER considers that it is inappropriate to make inferences about the reliability of historical equity beta estimates on the basis that market conditions may be different in the future. It has also not been demonstrated whether examining equity beta estimates from a period where macroeconomic conditions are more volatile than the historical average will provide more reliable equity beta estimates than a period where the volatility is below the historical average. It could be equally argued that macroeconomic conditions are unlikely to maintain the high level of volatility into the future and therefore any data examining a period high volatility should also be excluded. The AER considers that to exclude data on the basis of historical highs or lows (above and below historical averages) seems inappropriate. Further, the AER has not received empirical evidence how historically high macroeconomic stability would affect the equity beta estimates.

### **AER's conclusion**

When examining the stability of equity beta estimates over time, the AER:

- maintains that the 'fixed window approach', 'expanding window approach' and Hansen test are equally informative approaches for examining the stability of equity beta estimates and that all three approaches should be considered.
- Considers that the weight given to different estimation periods is a matter of judgement. This is discussed in section 8.5.3.4.
- It is also has not been demonstrated whether examining equity beta estimates from a period where macroeconomic conditions are more volatile than the historical average will provide more reliable equity beta estimates than a period where the volatility is below the historical average.

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<sup>656</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 105.

<sup>657</sup> ACG, op. cit., January 2009(b), p. 17.

### 8.5.3.7 Blume and Vasicek adjustments

Given the general imprecision of beta estimates for individual firms, some of the commercial beta estimation services apply either of two adjustments. These adjustments are:

- the Blume adjustment—which as typically applied adjusts ‘raw’ beta estimates towards a beta of 1.0 (being the average of the market) by applying a weight of 0.67 to the raw beta estimate and a weight of 0.33 to a beta of 1.0, and
- the Vasicek adjustment—which adjusts ‘raw’ beta estimates towards the beta of a prior distribution or ‘prior belief’ with the weights applied based on the relative precision of the two estimates. The greater is the relative imprecision of the raw beta estimate the more weight that is placed on the prior distribution. Typically the average or portfolio beta estimate of the industry to which the individual business belongs is used as the prior distribution.

Where the raw beta estimate is above or below one, applying the Blume adjustment will always ‘push’ the beta estimate closer to one. Similarly, where the raw beta estimate is above or below the ‘prior belief’, applying the Vasicek adjustment will always ‘push’ the beta estimate closer to that of the ‘prior belief’.

#### *Summary of position in explanatory statement*

The AER considered that neither the Blume adjustment nor Vasicek adjustment (where the ‘prior belief’ is assumed to be one) are appropriate to apply to the raw beta estimates of energy stocks in a regulatory setting.

In contrast, the JIA supported the use of both the Blume and Vasicek adjustments. The JIA commissioned two reports on beta estimation in response to the issues paper—one from the ACG and one from SFG (i.e Professor Gray).<sup>658</sup> Both reports commented on the Blume and Vasicek adjustments.

#### *Blume adjustment*

The AER noted that some empirical studies (including that by Blume) have found a tendency for equity beta estimates to regress towards one over time.<sup>659</sup> The AER further noted that two rationales have been presented to explain this tendency, and consequently either or both of these two rationales have been referenced in support of applying the Blume adjustment.

The first rationale is that the management of a business with projects of extreme risk (either high or low) may seek to diversify the operations of the business, such as expanding into industries of less extreme risk. Or similarly, that the management of a business with extreme levels of gearing (either high or low) may seek less extreme levels of gearing over time. That is, through conscious management initiatives, a business of either extreme high or low risk may become less extreme over time and converge towards the average risk of the market. In beta terms, this rationale is that the true beta of a business which is either significantly above or below one may

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<sup>658</sup> ACG, op. cit., 17 September 2008(b), p.45; SFG, op. cit., 15 September 2008.

<sup>659</sup> M. Blume, ‘On the assessment of risk’, *The Journal of Finance*, Vol.26, No.1, 1971.

converge towards one over time due to conscious management initiatives to change the risk profile of the business.

The second rationale notes that the true beta of a business is unobservable, and so when this beta is estimated, it will be estimated with error (either positive or negative). Accordingly, the observed tendency for beta estimates to converge towards one may simply represent the ‘unwinding’ of this estimation error. The AER noted that Blume described this second rationale as the ‘order bias’, and outlined the frequently given intuitive explanation of this bias through an example, which follows.

Assume all businesses in the market are partitioned into portfolios with similar beta estimates, with each portfolio containing 100 businesses. Next consider the possibilities as to how a business might happen to have one of the lowest 100 beta estimates. There are two possible explanations (either, or a combination of):

- the true beta of the business is in the lowest 100, and the beta is estimated with a relatively small estimation error. If this is the case, the tendency for beta estimates to mean revert over time may reflect changes in the true beta of the business—this is the first rationale, or
- the true beta of the business is not in the lowest 100, but the estimated beta might still be in the lowest 100 estimates if it were estimated with a sufficiently large negative error (known as ‘order bias’). If this is the case, the tendency for beta estimates to mean revert over time may reflect the unwinding of this estimation error—this is the second rationale.<sup>660</sup>

The AER noted that the benchmark efficient NSP is generally assumed to be ‘pure play’, so assumed to have no opportunities to diversify activities across industries, and also assumed to have a fixed level of gearing. Accordingly, the AER considered that if the tendency of beta estimates to mean revert is explained by the first rationale, then application of the Blume adjustment in a regulatory setting—that is, in estimating the equity beta of a benchmark efficient network service provider—is not appropriate. There appeared to be general acceptance of this position from stakeholders such as the MEU and experts such as SFG.<sup>661</sup>

However, SFG argued that this is not the only reason for applying the Blume adjustment, noting that this rationale:

... does not address the bias in beta estimates which results purely from the statistical properties of beta estimation. ... OLS beta *estimates* exhibit mean-reversion as a result of statistical bias, even if the firm makes no change in asset base or leverage whatsoever and the *true* (but unobservable) beta remains constant.<sup>662</sup>

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<sup>660</sup> M. Blume, ‘Betas and their regression tendencies’, *The Journal of Finance*, Vol.30, No.3, 1975, pp.787-788.

<sup>661</sup> MEU, *Submission in response*, op. cit., September 2008, pp.52-53; SFG, op. cit., 15 September 2008, p.24.

<sup>662</sup> *ibid.*

The specific report referenced by the JIA to support applying the Blume adjustment was Gray, Hall, Bowman, Brailsford, Faff and Officer.<sup>663</sup> Gray et al accepted that the first rationale—movement in true betas due to management initiatives—is one explanation proposed why estimated betas exhibit a tendency for mean reversion over time. However they considered the second rationale—unwinding of estimation error—was an alternative and ‘perhaps more intuitive’ explanation. The authors did not explicitly state that they endorsed the application of the Blume adjustment in a regulatory setting, but rather stated:

Given the fact that it is widely accepted that betas contain estimation error, and given that the Blume adjustment can be viewed as a way to reduce such errors, and since it is used by a number of leading data service providers, we include this estimation technique in our empirical estimations.<sup>664</sup>

However, the AER noted that the authors did not address the issue that application of the Blume adjustment may adjust the raw beta estimate to reflect both the first rationale (which was accepted is not appropriate in a regulatory setting) and for the second rationale. If the tendency for beta estimates to mean revert over time was predominantly due to the unwinding of estimation error, the AER noted that then this may not be so problematic. However Gray et al did not provide any evidence to substantiate that this is so, simply stating that this second rationale is ‘perhaps more intuitive’. However, the AER noted in Blume’s original research—studying the stock price movements on the NYSE over 1933-68—Blume considered that the tendency for beta estimates to mean revert towards one was due to ‘real non-stationarities’ in the true betas and that the ‘order bias’ explanation was ‘not of overwhelming importance’.<sup>665</sup> Further, the AER noted that the ACG also stated that studies that found a tendency for beta estimates to mean revert over time attributed this to conscious management initiatives and not to the unwinding of estimation error.<sup>666</sup> The ACG notes that two such studies are Brailsford, Faff and Oliver and Sheutrim.<sup>667</sup>

The AER noted that Gray et al also performed tests of the ability of betas, estimated over estimation periods of varying length, and with and without the Blume adjustment, to predict the beta estimate for the following quarter. The authors found that the Blume adjusted beta outperformed the unadjusted beta. However, the AER noted that the ACG had previously stated that the tests performed by Gray et al were ‘not particularly convincing’ for a number of reasons.<sup>668</sup>

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<sup>663</sup> S. Gray, J. Hall, J. Bowman, T. Brailsford, R. Faff and B. Officer, op. cit., May 2005.

<sup>664</sup> *ibid.*, p.11.

<sup>665</sup> *ibid.*, p.794.

<sup>666</sup> ACG, *Empirical evidence on proxy beta values for regulated gas transmission activities – Final report*, Report to the ACCC, July 2002, p.32.

<sup>667</sup> T. Brailsford, R. Faff, and B. Oliver, ‘Research design issues in the estimation of beta’, McGraw-Hill series in *Advanced finance volume 1*, Sydney, McGraw-Hill, p.28; Sheutrim, G. (1998), *Systematic risk characteristics of corporate equity – Research discussion paper 9802*, Reserve Bank of Australia, Sydney, 2000, p.8.

<sup>668</sup> These reasons included that ‘While the Blume adjustment was found to improve the forecasting of future equity returns to a statistically significant amount, it only did so for 52.7 per cent of the time – which is barely more than a random result and is not economically significant’, ACG, op. cit., June 2007, p.33.

Further, the AER noted that Gray et al only considered the Blume adjustment and did not compare this with the Vasicek adjustment. By contrast, in the SFG advice provided in response to the issues paper, SFG (i.e. Professor Gray) considered both the Blume and Vasicek adjustments and appeared to advocate applying the Vasicek adjustment rather than the Blume adjustment.<sup>669</sup>

Accordingly, the AER did not consider that Gray et al.—which was the report referenced by the JIA to support the Blume adjustment—provided compelling reasons to apply the Blume adjustment in a regulatory setting.

The AER also noted that the JIA acknowledged that the ACG (one of their advisers on beta estimation) advised against applying the Blume adjustment, however, the JIA stated that this was because the ACG ‘associates Blume purely with mean reversion’.<sup>670</sup> Whereas the JIA considered that this was not the only reason for applying the adjustment, though conceded this limited the role of the Blume adjustment.<sup>671</sup>

The AER considered that the JIA appeared to have misunderstood the reasons generally given for applying the Blume adjustment and ACG’s reasons for not applying it. As discussed above, applying the Blume adjustment may adjust for both expected future changes in the true beta due to management initiatives, and to correct for estimation error. Both relate to mean reversion and are rather different explanations for the observed mean reversion of beta estimates over time. It appeared that the JIA were referring to the view that the ACG did not support the Blume adjustment because they associate this mean reversion purely with management initiatives and not with the unwinding of estimation error. However, by reference to a number of previous ACG reports, the AER demonstrated that the ACG has had continually had regard to this second potential rationale before advising against applying the Blume adjustment in a regulatory setting. For example, in one previous report, the ACG stated that if the objective of the Blume adjustment is to reduce estimation error:

- it is an imprecise adjustment for achieving this, with the 0.67:0.33 weights ‘derived from another market in another time’
- it cannot be determined how much (if any) of the observed regression tendency in betas is due to a change in the true beta over time and how much (if any) is due to the effects of errors in estimates<sup>672</sup>, and

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<sup>669</sup> SFG, *op. cit.*, 15 September 2008, pp.22-26.

<sup>670</sup> JIA, *Submission in response*, *op. cit.* September 2008, p.129.

<sup>671</sup> JIA, *Submission in response*, *op. cit.* September 2008, p.129. The JIA associates the Blume adjustment with applying weights of 70:30 between the raw beta estimate and one. The AER notes the Blume adjustment as typically applied applies weights of 67:33 between the raw beta estimate and one.

<sup>672</sup> While the AER agrees with ACG on the first and third dot points, it does not agree with the second dot point which implies that the degree to which the tendency for beta estimates to mean revert to be explained by changes in the true betas and the unwinding of estimation error is completely unknown. As noted above, Blume (1975)’s empirical studies attributed the tendency to the movements in true betas finding that the order bias rationale was not of overwhelming importance.

- it applies the same predetermined weights irrespective of the precision of the particular beta estimate.<sup>673</sup>

In another report, ACG stated that it did not ignore the issue of estimation error, but rather addressed this through other measures such as calculating industry portfolio betas (mean, median) to reduce the estimation error in individual beta estimates<sup>674</sup>

The AER considered it was clear that the ACG had had regard to the unwinding of estimation error rationale before advising against applying the Blume adjustment in a regulatory setting. The AER agreed with the views of ACG as to why the Blume adjustment should not be applied.<sup>675</sup>

Additionally, the AER noted that Lally had previously explained how applying the Blume adjustment can cause, rather than remedy, bias in beta estimates. For example, applying the Blume adjustment to an industry where the beta is expected to be low is likely to overestimate the beta, and vice versa. Lally gave the following example:

A dramatic example of this is in the U.S. electric utilities. A typical such firm has an estimated beta (unadjusted) of around 0.4 (Value Line, 1993). By virtue of being typical, the Vasicek estimate, with prior corresponding to this industry, will also be 0.4. By contrast, Blume adjusts the 0.4 to 0.6 [i.e.  $0.33 + 0.67(0.4)$ ]. The result is a dramatic overestimate by Blume, because a singularly relevant fact is ignored, i.e., membership of an industry whose average estimated, and therefore presumably also true, beta is well below one. Given that these firms have output prices that are set so as to recover costs, including the cost of equity, and then have substantial equity investment, then the implications of using Blume betas (i.e., not partitioning into industries) for measuring costs of equity are particularly severe.<sup>676</sup>

The ACG considered that given the majority of beta estimates for Australian energy stocks are below one, and this pattern is repeated in the US, applying the Blume adjustment may well result in such a bias. The AER noted that whilst beta estimates of Australian energy stocks had risen since the ACG gave this advice, the majority remain below one, and this pattern is still present in the US. Accordingly, the AER

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In previous advice, ACG (2002) also stated that studies that found a tendency for beta estimates to mean revert attributed this to the conscious management initiatives and not to the unwinding of estimation error. ACG (2002) notes that two such studies are Brailsford, Faff and Oliver (2000) and Sheutrim (1998).

<sup>673</sup> ACG, op. cit., 17 September 2008(b), p.36.

<sup>674</sup> The other measures taken by the ACG to address the issue of estimation error were: reporting 95 per cent confidence intervals around the point estimates of both the individual and portfolio betas; applying a number of different beta estimation techniques (OLS, re-weighted OLS, least absolute deviation (LAV)), and other techniques to deal with outliers; estimating betas across extended time periods; providing additional information about the nature of the operations of the businesses in the sample; and, excluding data from the 'tech bubble'. ACG, op. cit., February 2008, p.4.

<sup>675</sup> As stated in section 8.5.3.6 of the explanatory statement, the AER considered little regard should be given to the confidence intervals of beta estimates and greater regard should be had to the point estimates. However the AER agreed with the remaining approaches the ACG had taken to address the issue of imprecision in beta estimates.

<sup>676</sup> M. Lally, 'An examination of Blume and Vasicek betas', *The Financial Review*, Vol.33, 1998, p.192.

considered applying the Blume adjustment may lead to an upwards bias in the beta estimates of Australian energy stocks.

In conclusion, the AER considered that in a regulatory setting the Blume adjustment is not an appropriate method to address the general imprecision of beta estimates and may lead to an upwards bias in beta estimates when applied to Australian energy stocks. Additionally, as a benchmark efficient NSP is generally assumed to be ‘pure play’, so assumed to have no opportunities to diversify activities across industries, and with a fixed level of gearing, application of the Blume adjustment for this reason was not justified in a regulatory setting either. That is, neither the first or second rationale (that are generally used to support the Blume adjustment) justified applying the Blume adjustment in a regulatory context.

#### *Vasicek adjustment*

In their submission on the issues paper, the JIA argued the Vasicek adjustment should also be applied because the concept of a prior assumption was useful. They referenced advice from the ACG—commissioned by the JIA in response to the issues paper—to support this position.

The ACG considered that the Vasicek adjustment has ‘a number of desirable aspects’ compared to the Blume adjustment, including that the adjustment is only motivated by the relative precision of the ‘prior belief’ and not to account for movement in true betas. The ACG noted that the difficult question for the Vasicek adjustment is the assumed prior belief and the assumed precision of that prior belief. The ACG considered that the only practicable prior belief is one based on the average beta for the market, following the method applied by the London Business School.<sup>677</sup> The ACG noted:

While it may be argued that a prior of an equity beta of 1 will bias upwards the beta estimate, we do not consider there to be strong grounds for this view.<sup>678</sup>

However, the AER noted that this contrasted with previous advice by the ACG, where they had previously stated:

In contrast, the London Business School service uses all listed companies as the peer group, which may introduce bias in the beta estimate.<sup>679</sup>

In this previous advice, the ACG further stated:

...the use of a prior distribution that includes all firms may introduce bias into the proxy beta that is derived. Certainly, taking account of information from all firms is somewhat at odds with carefully selecting the group of comparable entities that is used to derive the proxy beta.<sup>680</sup>

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<sup>677</sup> Similarly, the JIA argued ‘The problem in the current review is that application of a prior assumption is problematic unless it is accepted that the appropriate prior value is 1.0.’ JIA, *Submission in response*, op. cit. September 2008, p.128.

<sup>678</sup> ACG, op. cit., 17 September 2008(b), p.38.

<sup>679</sup> ACG, op. cit., July 2002, p.31.

<sup>680</sup> *ibid.*, p.32.

The AER noted that the ACG stated that in its previous advice it assumed that the prior distribution would be based on the average of a set of comparable entities, and concluded this would add little if the same set were used when estimating the beta for regulated activities. However since then:

...the reliability and stability of the beta estimates in Australia has remained depressingly poor, notwithstanding our predictions that the situation would improve.<sup>681</sup>

However the AER stated it was unclear how this statement justified a departure from the ACG's previous advice that assuming a prior belief of one may introduce bias in the beta estimates. The AER supported the ACG's previous advice, that the Vasicek adjustment assuming a prior distribution of one may introduce a bias. The AER considered that a better way to address the issue of imprecision in beta estimates was to use the methods outlined by the ACG (in the context of rejecting the Blume adjustment) which included forming portfolio betas that cancel out some of the estimation error in individual beta estimates and to apply different estimation techniques to deal with outliers.<sup>682</sup>

The AER noted that it is generally considered that applying the Blume adjustment is motivated by adjusting for expected changes in the true betas (which is accepted is not valid in a regulatory setting) and reducing estimation error, while the Vasicek adjustment is only motivated by reducing estimation error. The AER considered that this description of the Vasicek adjustment is correct where it is applied in the typical manner, being to adjust individual beta estimates towards an industry average with the weights determined based on the relative precision of the two estimates. However, the AER considered that applying the Vasicek adjustment (with assumed prior distribution of one) makes this adjustment very similar to the Blume adjustment, with the only difference between the weights applied. As such, the same issue of bias as for the Blume adjustment is introduced.

The ACG acknowledged that a further problem was determining the precision of the prior belief. The ACG recommended three different options based on the variance of the whole market, the variance of the 100 largest businesses, and the variance of the 100 most precise businesses.

The AER noted that applying the Vasicek adjustment in the manner recommended by the ACG—that is, applying a 'prior distribution' of one and the relative weights determined in the three approaches described above—had little impact on the point estimates of the estimated betas, leading to an increase of 0.01-0.04, depending on how the Vasicek adjustment is applied and whether applied to the average or median portfolio. The impact on the 95 per cent confidence intervals was also very minor, ranging from a minor widening of 0.01 to a minor narrowing of 0.03. In other words, putting aside the conceptual concerns the AER had in applying the Vasicek adjustment (with assumed prior belief of one) in the regulatory setting, the practical

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<sup>681</sup> ACG, op. cit., 17 September 2008(b), p.38.

<sup>682</sup> The exception to this was the ACG's recommendation to have regard to the confidence intervals of the beta estimates. As explained in the explanatory statement, the AER considered greater weight should be placed on the point estimates.



outcome was that applying the Vasicek adjustment in the manner recommended by ACG made little to no difference on the estimated betas.

Accordingly the AER did not consider that the ACG had presented compelling reasons to apply the Vasicek adjustment in the current context.

In the other beta estimation report commissioned by the JIA, SFG also recommended applying the Vasicek adjustment with an assumed prior distribution of one to correct for estimation error. SFG argued that:

I demonstrate that beta estimates derived from an OLS regression of stock returns against market returns are systematically biased in that low estimates have a high probability of understating the true risk of the stock, and that high estimates are just as likely to overstate the true risk of the stock.

Importantly, I show that this statistical bias exists even though “noise” or “random error” in the data is perfectly symmetric – being equally likely to increase or decrease stock prices.<sup>683</sup>

SFG’s demonstration was by means of a simulation where one million simulations were run. It was assumed that each observation had a *true* beta drawn from a normal distribution with mean of one and standard deviation of 0.5 and a beta *estimate* drawn from a normal distribution with mean equal to its true beta estimate and standard deviation equal of 0.8. SFG then presented the results of this simulation in an attempt to demonstrate that beta estimates less than one were more likely to understate, than overstate, the true beta estimate, and vice versa. Applying the Vasicek adjustment to the simulated beta estimates resulted in each adjusted beta estimate having an equal probability of understating or overstating the true beta.

However, the AER considered that both results were an artefact of the simulation. In the simulation, a beta estimate below one was only more likely to underestimate the true beta because it was known that the estimate is drawn from a distribution with a mean of one. If, for example, the distribution of true betas was known to have a mean of 0.7, and the remainder of SFG’s assumptions were retained, the result would be markedly different. In that alternative simulation, all beta estimates between 0.7 and 1.0 (or greater) would be more likely to overestimate the true beta than underestimate it. The higher the beta estimate above 0.7, the more likely the beta estimate would be to overestimate the true beta.

The AER considered that assuming the mean of the distribution was one may be a reasonable assumption where the beta is randomly selected from the market at large, but that was not the case here in relation to the AER’s estimation of the equity beta of a benchmark efficient NSP. The population was not the entire market but a small set of comparator businesses that had been carefully selected to be comparable to the benchmark efficient NSP. While the AER noted that the mean of the true betas from this population cannot be observed, strong empirical and conceptual evidence, as outlined in the explanatory statement, suggested that the mean of the true betas could be expected to be less than 1.0. Accordingly it was incorrect to infer that a beta estimate from any of the carefully selected comparator businesses less than one was

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<sup>683</sup> SFG, op. cit., 15 September 2008, p.20.

more likely to understate than overstate the true beta (based on this information alone).

Further, the AER noted that in determining the appropriate ‘prior belief’ to be adopted in applying the Vasicek adjustment, SFG considered three options:

- *a prior distribution based on all betas in the market*

SFG argued that a prior distribution based on all betas in the market, that is, one, was the ‘most obvious’ option and would naturally be appropriate for a ‘randomly-selected stock’. However, as noted, the AER stated that in this context the comparator businesses have been carefully selected and not simply selected at random from the market at large. The AER also reiterated that Lally had explained how industry of the comparator business is an important determinant of the true beta of a stock, and ignoring this may bias the beta estimate. Accordingly, the AER did not consider a prior distribution of one based on the market average was appropriate in a regulatory setting.

- *a prior distribution based on regulatory precedent, or*

SFG also argued in favour of a prior distribution of one based on regulatory precedent. It stated that it seemed natural to move from this value only to the extent that was warranted by the available data. The AER noted that one of the NER requirements is that, where a parameter cannot be determined with certainty, the AER must have regard to the need for persuasive evidence before departing from the previously adopted value. However in considering whether or not there is persuasive evidence to depart from 1.0 (or 0.9), it appeared to the AER to make little sense to weight the beta estimate partly on market data and partly on the previously adopted value(s). Such an approach only seemed appropriate if the final equity beta adopted was mechanistically based on these adjusted betas. However the AER noted that neither it nor the JIA supported a mechanistic approach. Accordingly, the AER did not consider a prior distribution of one based on regulatory precedent was appropriate.

- *a prior distribution based on the average beta of comparable stocks*

SFG accepted that a prior distribution based on the average of comparable businesses ‘makes little sense in the present context’ as a reliable industry average is what is being sought in the first place. If this was already known, then this estimate could simply be used. Additionally, it noted that a prior distribution based on the same set of comparable businesses would be ‘entirely circular’ implying that the portfolio betas derived from these adjusted betas would be close to or exactly the same as portfolio betas derived from unadjusted betas. The AER noted that SFG appeared to conclude from this that a prior distribution of one, therefore, must be used but did not consider the possibility that this might suggest that the Vasicek adjustment should not be applied at all.

The AER also noted that in parts of the report, SFG appeared to imply that the Vasicek adjustment assumes that the prior distribution and variance of the prior

distribution are that of the market.<sup>684</sup> In contrast, the AER noted that Vasicek recommended that the parameters of the distribution ‘are chosen to reflect *all* the information on beta available prior to sampling.’<sup>685</sup>

*AER’s conclusion*

The AER concluded that neither the Blume adjustment nor Vasicek adjustment (where the ‘prior belief’ is assumed to be one) were appropriate to apply to the raw beta estimates of energy stocks in a regulatory setting.

The AER noted that if the true equity beta of a benchmark efficient NSP is below one then application of either adjustment is likely to bias beta estimates upwards. While the true beta of any stock is unobservable, the AER considered that the persistence of beta estimates for energy stocks to be below one strongly suggested that the true beta for these businesses is below one.

Rejecting these adjustments, which are intended, in part, to improve the precision of beta estimates, did not mean that the AER had not had regard to the issue of precision. Rather, the AER considered that the issue of precision could be better addressed through other methods which were unlikely to introduce a bias, such as:

- calculating industry portfolio betas to reduce the estimation error in individual beta estimates
- applying a number of different beta estimation techniques to deal with outliers
- estimating betas across extended time periods
- excluding data from the ‘tech bubble’, and
- using foreign betas of comparable businesses as a ‘cross-check’.

The AER noted that an important aspect of its approach to determining a equity beta for a benchmark efficient NSP was that it did not adopt the empirical beta estimates ‘mechanistically’. Rather, while the central estimates of the empirical estimates would suggest a beta in the range of 0.44 to 0.68, taking into account the likely precision of these estimates (along with other relevant consideration) the AER adopted an equity beta of 0.8.

Additionally, if the objective of the Blume adjustment was to reduce estimation error, the AER noted that it seemed at odds to apply the weights typically adopted which have no regard to the precision of the raw beta estimates to which it is being applied. While the Vasicek adjustment does have regard to the relative precision, applied in the manner recommended by ACG had little effect on the beta estimates increasing them in the range of 0.01-0.04.

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<sup>684</sup> For example, in setting out the formula for the Vasicek adjustment the prior distribution is simply stated as ‘1’, without making it clear that this was the choice of the author and was not part of the Vasicek adjustment as developed by Vasicek.

<sup>685</sup> A. Vasicek, ‘A note on using cross-sectional information in Bayesian estimation of security betas’, *The Journal of Finance*, Vol. 28, No. 5, 1973, p.1238.

### ***Summary of submissions in response to explanatory statement***

The JIA does not respond to any of the arguments presented by the AER against using either the Blume or Vasicek adjustments in a regulatory setting. Rather, in relation to confidence intervals, the JIA simply states:

In the absence of utilising any recognised techniques for adjusting equity beta estimates (such as the Blume and Vasicek adjustments), SFG recommends that the problems should be dealt with by:

- widening confidence intervals
- shifting the equity beta estimates upwards, and
- affording little weight to estimates under certain conditions.<sup>686</sup>

### ***Issues and AER's considerations***

The issue of confidence intervals is discussed in section 8.5.3.6.

As the JIA have not responded to the AER's arguments against using either the Blume or Vasicek adjustments, it is not clear whether or not the JIA have accepted the AER's reasons for not applying either adjustment. For example, in their initial submission, the JIA referenced a report by Gray et al in support of using the Blume adjustment. The AER was critical of the arguments put forward by Grey et al in this report, and the JIA has not responded to these criticisms. Similarly, the JIA referenced a report from the ACG (which it commissioned) in support of applying the Vasicek adjustment. The AER was also critical of the arguments put forward by the ACG in support of this adjustment, noting among other matters, inconsistencies between the ACG's advice in that report and advice it had given in the past. The JIA has not responded to these criticisms, nor has it request the ACG to respond to these criticisms.

SFG does continue to discuss the issue of bias in beta estimates in its current report (commissioned by the JIA) in response to the AER's explanatory statement, though it is unclear whether or not SFG recommend that either the Blume or Vasicek adjustment actually be applied.

Rather the focus of SFG's current report appears to be an argument that all beta estimates below one are negatively biased, and so little to no weight can be placed on any beta estimates. In its current report, SFG argues that:

Conceptually, it should be clear that *every* beta estimate below 1.0 is negatively biased (i.e. more likely to underestimate the true value than overestimate it) even if noise is perfectly symmetric—the only question is the extent of the bias.

...

However, the Explanatory Statement does not recognise the existence of bias and does nothing to quantify or correct for that bias in the estimates of equity beta—even though the existence of bias is well-recognised in the relevant

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<sup>686</sup> JIA, op. cit., 2 February 2009, p.100.

literature and bias correction methods are commonplace among commercial data service providers.<sup>687</sup>

Further, SFG argues that the AER has apparently misunderstood the purpose of the adjustments that are used by commercial data service providers. Accordingly to SFG these approaches are designed to correct for the bias in equity beta estimates that SFG argues it has established both conceptually and through simulation. It considers that the AER has rejected the Blume and Vasicek adjustments on the basis that they are designed to improve precision and that the AER has other methods to do that. However, SFG state that bias and precision are two quite different concepts. In particular, precision is a symmetric concept whereas bias is a directional concept.

The AER did not (and does not)—and SFG implies—deny the possibility that the general observance of equity betas to revert towards the market average over time could be driven by bias, specifically ‘order bias’. In fact, the AER discussed this issue at length in its explanatory statement. This appears to be the concept SFG refer to when it discusses the issue of bias in the beta estimates.

Nor did the AER deny that the common data service providers generally allow for the application of either the Blume or Vasicek adjustments to estimates of betas (either as the default option or as an alternate option). However, the AER noted (as appeared to be the consensus view) that there were two reasons the Blume adjustment was applied. Either:

- to adjust for the expected changes in the true beta of a business towards the market average due to conscious management initiatives—the first rationale, or
- to adjust for the expected unwinding of estimation error (i.e. order bias)—the second rationale.

The AER also noted that applying the Vasicek adjustment (with prior distribution of 1.0) effectively made this adjustment very similar to the Blume adjustment, with the only difference being the relative weights adopted. Accordingly, the above two rationales would be possible reasons why the Vasicek adjustment could be applied.

There appeared to be agreement among stakeholders (including by SFG) that an adjustment for the first rationale was not appropriate in a regulatory setting. This is because it is assumed that the business activities and gearing of a benchmark efficient NSP do not change, and so could be altered by conscious management initiatives. Specifically, a benchmark efficient NSP is assumed to only provide regulated electricity network services, and so the degree of systematic risk of its business activities is assumed not to change over time. Similarly, as the gearing ratio for a benchmark efficient NSP is ‘locked-in’ as a value, the systematic nature of its exposure to financial risk is assumed to remain constant over time. Accordingly, to the extent that the first rationale is the dominant explanation for the mean reversion of beta estimates, the fact that the Blume and Vasicek adjustments are available through the common data service providers should not be of concern to the AER.

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<sup>687</sup> SFG, *The reliability of empirical beta estimates: Response to AER proposed revision of WACC parameters—Report prepared for ENA, APIA and Grid Australia*, 1 February 2009, pp.30-31.

On the second rationale, SFG claims that ‘the existence of bias is well-recognised in the relevant literature’. However, in the explanatory statement the AER noted that studies that attempted to breakdown the mean regression of beta estimates into the first and second rationales found that the dominant effect was a change in the true betas of these businesses due to conscious management initiatives. For example, Blume found that the unwinding of estimation error explanation was ‘not of overwhelming importance’.<sup>688</sup> SFG neither contests the findings of the reports referenced by the AER, nor does it reference any reports with findings to the contrary. Accordingly, the AER considers that SFG has not demonstrated the case that the ‘literature’ establishes a significant order bias in the beta estimates such that the AER should be concerned.

Further, the AER agrees with SFG that the concepts of precision and bias are different concepts. The first being symmetric and the second being directional. However, the AER notes that the two concepts are related in this matter. For example, every beta estimate will be determined with either positive or negative estimation error (this relates to precision). However a low beta estimate may have come about because it was estimated with significant negative estimation error. And if this was the case, it would be expected that this estimation error would unwind over time (this relates to bias, what Blume calls ‘order bias’). Further, concepts are related in this context as by pooling individual beta estimates into simple averages and portfolios betas, it is likely that estimation error will be reduced (i.e. the portfolio estimates will be more precise than the individual beta estimates) and consequently the potential for order bias will also be reduced.

In relation to the results from SFG’s simulation, the AER maintains its position that the magnitude of these results (which attempt to show that beta estimates below one will be materially and negatively bias) appear to be an artefact of the simulation. While SFG’s results are a simulation, in contrast the AER repeats that the studies of market evidence that considered the causes of the mean reversion of beta estimates have attributed this mainly to conscious management initiatives and not to the unwinding of estimation error.

Lastly, SFG criticises the manner in which Henry implements the Vasicek adjustment in his beta estimation report. Henry used a prior distribution based on the portfolio average, which as SFG argues, is circular and makes little effect given it is essentially an industry portfolio that the regulator is attempting to estimate. Further, SFG imply that the AER agreed with this approach to implementing the Vasicek adjustment.

To be clear, the AER does not support applying the Vasicek adjustment using a portfolio beta estimate as the prior distribution as this approach has little effect in a regulatory setting, as noted by SFG. This position should have been clear from the AER’s statements in the explanatory statement (as summarised above) along with the fact that the AER did not reference the Blume or Vasicek adjusted beta estimates in the results and interpretation section of the beta chapter in the explanatory statement.

Further, SFG appear to imply that Associate Professor Henry supports the estimation of beta using the Vasicek adjustment applied in this manner. However, Henry does

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<sup>688</sup> *ibid.*, p.794.

not support this approach. In fact, SFG overlooks the main conclusion of Henry on this issue which is that neither recursive individual nor recursive portfolio beta estimates over time demonstrate that these beta estimates (i.e. the beta estimates of energy stocks) are trending towards one. Henry concludes:

The Vasicek adjustment has the advantage that the weights are estimated for each cross section of  $\beta$  estimates, unlike the Blume adjustment where the weights estimated by Blume are typically employed despite their lack of relevance to any cross section of  $\beta$  estimates other than those estimated by Blume (1975). However, in the current context, there is little evidence of regression towards unity in  $\beta$ . As a consequence there is scant justification for employing either correction, which simply inflate the estimate of  $\beta$  without justification.<sup>689</sup>

SFG state that it maintains its view that where the Vasicek adjustment is applied, the prior distribution should be assumed to be one, consistent with the market average and regulatory precedent. However, SFG do not address the arguments put forward by the AER in the explanatory statement that applying the Vasicek adjustment (with assumed prior distribution of 1.0) may actually be a source of bias rather than a remedy for bias.

Further, SFG do not recommend what relative weights should be adopted in applying the Vasicek adjustment. Assuming SFG agreed with the weights proposed by the ACG, the AER noted in its explanatory statement that this approach had little impact on the point estimates of the estimated betas, leading to an increase of only 0.01-0.04, depending on how the Vasicek adjustment is applied and whether applied to the average or median portfolio. The impact on confidence intervals was similarly minor (and not one directional either). In other words, putting aside the concerns the AER had (and continues to have) in applying the Vasicek adjustment (with assumed prior belief of one) in the regulatory setting, the practical outcome was (and continues to be) that applying the Vasicek adjustment with the prior distribution of 1.0 (as recommended by SFG) and relative weights as recommended by the ACG (in the absence of any relative weights recommended by SFG) would make little to no difference on the estimates of beta.

#### ***AER's conclusion***

The AER maintains its position that the use of either the Blume adjustment or Vasicek adjustment (with a prior distribution of 1.0) is not appropriate in a regulatory context.

The AER considers that SFG's argument that beta estimates below one are estimated with a significant negative bias has not been established. Further, the AER maintains its position that application of either the Blume adjustment or Vasicek adjustment (with a prior distribution of 1.0) may potentially be a source of bias rather than a remedy for bias. Additionally, While applying the Vasicek adjustment (with a prior distribution equal to the portfolio estimate) would not be a source of bias, neither would it make much impact on the resultant portfolio estimates (due to the circularity) and therefore appears of little benefit.

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<sup>689</sup> O. Henry, op. cit., November 2008, p. 13.

Additionally, the AER maintains its position that by rejecting these adjustments, which are intended, in part, to improve the precision of beta estimates, does not mean that the AER had not had regard to the issue of precision. Rather, the AER considers the issue of precision can be better addressed through other methods which were unlikely to introduce a bias, such as:

- calculating industry portfolio betas to reduce the estimation error in individual beta estimates
- consideration of confidence intervals
- applying a number of different beta estimation techniques to deal with outliers
- estimating betas across extended time periods
- excluding data from the ‘tech bubble’, and
- using foreign betas of comparable businesses as a ‘cross-check’.

Further, the AER again notes that an important aspect of its approach to determining a equity beta for a benchmark efficient NSP is that it has not adopted the empirical beta estimates ‘mechanistically’. Rather, while the central estimates of the empirical estimates would suggest a beta in the range of 0.44 to 0.68, taking into account the likely precision of these estimates (along with other relevant considerations) the AER has adopted an equity beta of 0.8.

#### **8.5.3.8 Use of portfolio and individual averages**

When examining equity beta estimates there a number of different approaches that can be taken to obtain equity beta estimates that are reflective of a benchmark efficient NSP, these are:

- comparing the re-levered equity beta estimates of individual stocks
- obtaining individual re-levered equity beta estimates of the businesses that are representative of a benchmark efficient NSP and calculating an estimate of the equity beta using a median
- obtaining individual re-levered equity beta estimates of the businesses that are representative of a benchmark efficient NSP and calculating an estimate of the equity beta using a simple average
- calculating median and average returns for a portfolio of stocks – using an equal-weighted portfolio (which assumes the investor will have share holdings of equal value in each business) or value-weighted portfolio (which assumes the investor will have an equal number shares per business that have different prices and therefore different values) – and then estimating a portfolio equity beta.



### **Position in the explanatory statement**

The AER considered that to be consistent with approaches to other industry specific parameters it is important to consider different estimation techniques in order to ensure that the data provides reliable estimates of equity betas.

The AER agreed with the JIA and the ACG that estimates of equity betas for individual businesses, if examined separately, are unlikely to provide the AER with sufficient guidance on the equity beta of a benchmark efficient NSP.

The AER considered it appropriate, as noted in the ACG report<sup>690</sup>, to either pool equity beta estimates or generate a series which contains a portfolio of stocks. Consistent with the ACG report<sup>691</sup> the AER examined a simple average of equity betas.

The AER disagreed with the MEU and the JIA, which consider that only equal weights (and not a value-weighted average) should be used when examining portfolio equity betas. The AER compared the equity beta estimates of portfolios that use equal weights or value-weights to inform its views on the equity beta of a benchmark efficient NSP.

The AER considered that the ACG had not demonstrated its basis for using median portfolio returns but nonetheless examined the estimates provided by median returns in addition to simple average returns.

### **Submissions in response to explanatory statement**

The JIA's consultant, the ACG disagrees with the use of value-weighted portfolios.<sup>692</sup>

The JIA's consultant, the ACG argues that applying a value-weighting to the returns from the firms within the portfolio will lead to a greater weight being applied to the returns of the larger firms. Unless the beta estimates for the larger firms are considered more accurate, then there is no reason that such a weighting would improve the accuracy of the resulting beta estimate.<sup>693</sup>

### **Issues and AER's considerations**

When estimating equity betas using portfolio returns, the AER observes there are two issues that need to be addressed and these are:

- the construction of returns (using median or average returns), and
- the use of equal or value weights on the stocks in the portfolio.

The AER considers that no new information was contained in submissions on the explanatory statement that has given the AER cause to depart from its position in the explanatory statement on the use of median or average portfolio returns.

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<sup>690</sup> ACG, op. cit., 17 September 2008, pp. 34-35.

<sup>691</sup> *ibid.*, p. 35.

<sup>692</sup> ACG, op. cit., January 2009(b), p. 8.

<sup>693</sup> *ibid.*

Although the AER did not receive criticisms about the use of value weights as part of the main submission from the JIA, its consultant, the ACG questioned the use of value-weighted portfolios.<sup>694</sup> The AER accepts that applying a value-weight will give a greater weight to the larger firms in the portfolio and has therefore not solely relied on any one estimate. However, this criticism is equally valid to the construction of the ACG's Australian portfolios, where firms drop in and out depending on whether they are listed and therefore more weight is provided to a business the longer the period it is represented in the portfolio relative to other businesses in the portfolio.

Associate Professor Henry has raised concerns over the usefulness of equity beta estimates provided by such a portfolio, Henry notes:

Two sets of 'portfolios' are constructed, average 'portfolios' and median 'portfolios'. Average 'portfolios' use the equally weighted average returns to the  $n_t$  firms that are held in the 'portfolio' in period  $t$ . Median 'portfolios' use the median of the  $n_t$  firms that are held in the 'portfolio' in period  $t$ . The periods are defined as follows:

Period	Firms	Weight $1/n_t$
1 Jan 2002 – 12 Aug 2004	ENV APA GAS AAN AGL	1/5
13 Aug 2004 – 16 Dec 2004	ENV APA GAS AAN AGL DUE	1/6
17 Dec 2004 – 15 Dec 2005	ENV APA GAS AAN AGL DUE HDF	1/7
16 Dec 2005 – 30 Oct 2006	ENV APA GAS AAN AGL DUE HDF SPA	1/8
31 Oct 2006 – 16 Nov 2006	ENV APA GAS AAN DUE HDF SPA	1/7
17 Nov 2006 – 2 Mar 2007	ENV APA AAN DUE HDF SPA	1/6
3 Mar 2007 – 16 Aug 2007	ENV APA AAN DUE HDF SPA SKI	1/7
17 Aug 2007 – 1 Sep 2008	ENV APA DUE HDF SPA SKI	1/6

Source: Henry<sup>695</sup>

It is very important to recall that  $[E(R_p) = aE(R_x) + (1-a)E(R_y)]$  is written assuming that the weight  $a=1/n_t$  is constant, which is clearly not the case for the results presented below. As a consequence there is very likely to be substantial measurement error in the returns data as the return to the portfolio may vary because the asset values in the portfolio vary, or the weights in the portfolio vary, or both. Moreover, it is very likely that  $[Var(R_p) = a^2Var(R_x) + (1-a)^2Var(R_y) + 2a(1-a)Cov(R_x, R_y)]$  will provide a very poor guide as to the variance of this second set of 'portfolios' as terms such as  $Var(1/n_t)$  and  $Cov(r_{it}, 1/n_t)$  will be omitted from the measurement of variance of return. The resulting estimates and any associated inference difficult to interpret. In particular, it is not clear whether  $Cov(r_{mb}, r_{pt})$  will be affected by this measurement error, and what the impact of the measurement error could be. Any issues with bias in the  $\beta$  estimates obtained using this data are as a

<sup>694</sup> ACG, op. cit., January 2009(b), p. 8.

<sup>695</sup> O. Henry, op. cit., 23 April 2009, p. 25.

result of the particular approach used to construct the 'portfolio' returns and not due to problems with the OLS or LAD estimator.<sup>696</sup>

The AER observes that the presence of non-constant weights of businesses in the portfolio that will not affect the efficiency of the OLS or LAD estimators. However, the estimated equity beta now measures the relationship between:

- the volatility in market returns, and
- the volatility in the portfolio returns (which measures the volatility in individual stock returns and the changing weights assigned to individual stocks that form the portfolio).

Accordingly, it is unclear to the AER whether the time-varying portfolio would be superior to a value-weighted portfolio in terms of improving the accuracy of the estimate. In examining portfolio equity beta estimates the AER has considered:

- the number of comparator businesses in the sample
- the frequency of observations used to estimate the equity beta
- the length of the estimation period, and
- the presence of measurement error.

The AER now considers that a greater amount of weight to an average of individual estimates may be appropriate given that Henry and the JIA's consultants have concerns regarding time varying and value weighted portfolio estimates, respectively.

The ACG has suggested an alternative approach to examining individual averages. This approach involves taking averages of individual equity beta estimates based upon the time a business has traded in the market. While it is not transparent to the AER which businesses are included in the four year simple average and notes that this approach reduces the sample size, the AER has considered these estimates in informing its view on equity beta estimates.

### **AER's conclusion**

The AER did not receive submissions from interested parties on its approach to individual averages and portfolio equity beta estimates. However, in response to the JIA's consultant report, the AER:

- Will continue to examine portfolio estimates that use simple average and median returns.
- Considers it is unclear whether the time-varying portfolio would be superior to a value-weighted portfolio in terms of improving the accuracy of the estimate.

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<sup>696</sup> *ibid.*, p. 25-26.

- Now considers that a greater amount of weight to an average of individual estimates may be appropriate given that the issues raised by the AER and the JIA's consultants over the impact of weights used in the different portfolio estimates.
- Will consider the ACG's new averaging approach as part of the range of equity beta estimates. However, it is not transparent to the AER which businesses are included in the three and five year simple average and the actual weights being applied to the individual businesses and therefore some caution must be given to these results.

#### **8.5.4 Empirical estimates – results and interpretation**

The AER has examined the results reported by the ACG (submitted on behalf of the JIA) and Associate Professor Henry (commissioned on the behalf of the AER). This section is a summary of the results provided by the ACG and Henry. The AER notes that the conclusions of Associate Professor Henry and the ACG differ (in response to the issues paper and subsequent to the explanatory statement). The AER observes that the JIA requested that the ACG form a view on whether there was 'persuasive evidence' to depart from the previously adopted value while Henry provides his opinion on the range of point estimates based upon the analysis.

##### **8.5.4.1 Analysis in the explanatory statement**

In analysing equity beta estimates for Australian comparator businesses in its explanatory statement the AER concluded:

- the ACG and Henry found that there was little presence of (if any at all) thin trading and, as a result, was unlikely to affect the overall equity beta estimates<sup>697</sup>
- the highest average of individual equity beta estimates (ACG – 0.61) was well below the previously adopted equity betas of either 0.9 or 1.0
- when examining the AER's preferred estimation period post 'technology bubble', the AER's equity beta point estimate in conjunction with the ACG's estimates for the JIA, provided a range of estimates from 0.44 to 0.68, and
- although the AER had not conducted a Hansen test on the AER's portfolio equity beta estimates, it appeared likely that given Henry's results for each of his portfolios, that the results for the AER's portfolio are likely to be stable.

In analysing equity beta estimates for foreign comparator businesses in the explanatory statement the AER concluded:

- there were a sufficient number of businesses in the United States to examine equity beta estimates which include data prior to the 'technology bubble'

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<sup>697</sup> The ACG noted the point estimate did not change much, see ACG, op. cit., 17 September 2008(b), p. 55; and O. Henry, op. cit., November 2008, p. 16.

- there were a sufficient number of electricity networks (electricity, and hybrid gas and electricity), with longer trading histories, to determine an informative estimate of the equity beta of a benchmark efficient electricity network service provider in the United States, without the inclusion of ‘pure play’ gas businesses in the sample
- the re-levered individual equity beta averages for the same United States businesses in the ACG report using a five-year period was 0.95 for OLS, and in the AER’s results was 0.87 for OLS (using monthly observations and a period beginning post ‘technology bubble’ to September 2008)
- the re-levered equity beta average for the same United States businesses in the ACG report was 0.82 for LAD, and in the AER’s results was 0.75 for LAD (using monthly observations)
- that the ACG’s highest portfolio equity beta estimate using the longest term (pre and post ‘technology bubble’ data) was 0.68, and
- the portfolio estimate of 0.68 confirmed that the highest point estimate of the Australian portfolios of 0.68 (which uses the AER’s preferred estimation period for Australian beta estimates) was reasonable.

The AER concluded that on the basis of the empirical analysis that an equity beta of less than 0.7 for a benchmark efficient NSP could be considered reasonable.

#### **8.5.4.2 Submissions in response to explanatory statement**

The JIA contend that the detailed statistical calculations are problematic due to:

- statistical problems arising from minimal market volatility, and mergers and acquisitions,
- a small and only broadly representative sample of proxy companies for the benchmark efficient NSP
- while the past may be a reasonable indicator of the future, such information should not be applied without considering whether past values are influenced by a range of factors which may not be relevant to equity beta values going forward
- conflicting results between some historic equity beta calculations and observed market results (which may be explained by flaws in the Sharpe CAPM)
- conflicting results between some historic equity beta calculations and what may be observed as equity beta expectations based on the dividend growth model (DGM), and
- subjective judgements are problematic due to the current financial environment, which is impacting on both observed returns and expectations of future returns,

particularly where short-term indicators are moving out of line with longer term measures.<sup>698</sup>

The JIA argue that the market context within which this analysis is being undertaken suggests that particular caution must be taken in interpreting the results of any analysis, and that compelling evidence must be provided to justify a departure from the established parameter value of 1.0.<sup>699</sup>

The JIA note that data problems are generally recognised by market valuers, for example Grant Samuel state:

...there are very significant measurement issues with betas which mean that only limited reliance can be placed on such statistics. Even measurement of historical betas is subject to considerable variation.<sup>700</sup>

The JIA believe that the AER, while considering statistical errors and problems with data, did not adequately take them into account.<sup>701</sup>

The JIA note that the ACG takes issue with Henry's conclusion that the equity beta estimates are stable, and the JIA point out that the Hansen Tests indicate instability with four out of the nine firm's estimates. The JIA argue that the imprecision of the estimates means that the test's ability to detect instability, which may in fact be present, is limited and therefore the AER's conclusion is quite unconvincing.<sup>702</sup>

The JIA note that according to the ACG:

The AER has understated the range for the central estimate of beta. The AER's own results and a proper interpretation of the JIA's empirical work justify a range for the central estimate of the equity beta between 0.6 and 0.9 (rounded).<sup>703</sup>

Envestra argues that in the commercial application of the CAPM, practitioners make allowances for uncertainty and the statistical imprecision of the equity beta estimates made available by Bloomberg, AGSM, etc.<sup>704</sup>

Envestra contends that given the statistical measures used to assess the accuracy of the equity beta data indicate there is a wide range of valid equity beta estimates, it seems intuitive that the AER choose an equity beta value higher than which prevailed in the past.<sup>705</sup>

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<sup>698</sup> JIA, *Submission in response*, op. cit., 2 February 2009, pp. 95-96.

<sup>699</sup> *ibid.*, p. 107.

<sup>700</sup> *ibid.*, p. 109.

<sup>701</sup> *ibid.*

<sup>702</sup> *ibid.*, p. 116.

<sup>703</sup> *ibid.*

<sup>704</sup> Envestra, *Submission in response*, op.cit., 28 January 2009, p. 7.

<sup>705</sup> *ibid.*, p. 8.

Envestra concludes that no account seems to have been taken of the paucity of available data in the AER's use of data analysis in determining what is stated to be a 'conservative' assessment of an equity beta of 0.8.<sup>706</sup>

The FIG notes that Grant Samuel uses a MRP of 6 per cent and equity beta ranges of:

- 0.8 to 1.0 for Origin Energy's fuel, and energy conversion and marketing businesses, and
- 0.8 to 0.9 for its 2006 valuation of AGL's infrastructure assets.<sup>707</sup>

The FIG argues that in the explanatory statement that the AER relied on data over the period from January 2002 to September 2008 and this period does not capture the worsening market conditions in the last three months of 2008 which is an important consideration given the equity beta measures business and financial risks.<sup>708</sup>

NSW Treasury observes a strong correlation between the ASX 200 Utilities Index versus the ASX All Ordinaries over the past five years. NSW Treasury acknowledges that the ASX 200 Utilities Index may not be directly comparable to NSW electricity networks as it includes businesses with elements of unregulated activities. However, it argues the strong correlation demonstrates that 'low risk' utilities are not immune to market volatility and broadly supports that businesses trend towards an equity beta of 1.0.<sup>709</sup>

NSW Treasury has concerns that:

- there are only a limited number of energy utility businesses traded on the Australian Stock Exchange
- these businesses have a relatively short listing period, and
- these businesses are not always directly comparable to regulated electricity networks.<sup>710</sup>

NSW Treasury contends considerable uncertainty remains in terms of the usefulness of market data in determining robust equity beta estimates. It observes the explanatory statement outlines the ACG's conclusions that 'the reliability and stability of the beta estimates in Australia has remained depressingly poor' and that 'equity beta estimates are unstable and rising'. In contrast the AER concludes, 'there is little evidence of parameter instability in the point estimate of the equity beta', although warns that 'extreme caution should be used when considering confidence intervals.'<sup>711</sup>

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<sup>706</sup> *ibid.*

<sup>707</sup> FIG, *Submission in response*, op. cit., 29 January 2009, p. 29.

<sup>708</sup> *ibid.*, p. 33.

<sup>709</sup> NSW Treasury, *Submission in response*, op. cit., 28 January 2009, p. 6.

<sup>710</sup> *ibid.*, p. 7.

<sup>711</sup> *ibid.*

NSW Treasury submits the explanatory statement further outlines a range of often-conflicting views on a large range of conceptual and methodological issues (i.e. R-squared, different market gearing between countries, unrepresentative events, estimation period and frequency of observations, etc.).<sup>712</sup>

NSW Treasury concludes the persuasive argument for change has not been satisfied given the uncertainty relating to the statistical reliability of market evidence and often conflicting academic views on a wide range of conceptual and methodological issues.<sup>713</sup>

RARE Infrastructure notes all of its internal equity beta estimates used in modelling and valuing listed Australian securities are above the 0.8 equity beta in the explanatory statement. In one case it estimates the equity beta at 1.19. RARE Infrastructure also believes the proposed reduction in the equity beta is inconsistent with the mean of 0.91 and the median of 0.90 for final determinations over the last four years.<sup>714</sup>

#### **8.5.4.3 Issues and AER's considerations**

The AER notes that NSW Treasury and Envestra submit there is a sufficient level of uncertainty not to depart from the previously adopted value due to conflicting views between academics/consultants and given there are differences in historical equity beta estimates. The AER considers that it is inappropriate to dismiss all of the empirical evidence provided to it by interested parties as part of this review merely on the basis of conflicting views. The AER notes that it is common to have conflicting views on a number of issues and the AER considers that its role is to determine whether there is persuasive evidence to depart from the previously adopted value by weighing up the evidence.

The AER considers that a number of the concerns raised by the JIA about the analysis have been addressed across the relevant sections in the chapter. The following lists where the identified issues have been addressed:

- statistical problems (sections 8.5.3.3 on the treatment of outlier observations and 8.5.3.4 on the length of the estimation period)
- sampling issues (section 8.5.2 responds to the selection of comparator businesses and section 8.5.3 outlines the different methodological choices and approaches taken to address these issues)
- whether past values are influenced by a range of factors which may not be relevant to equity beta values going forward (sections 8.5.3.3 on the treatment of unrepresentative events and 8.5.3.4 on the length of the estimation period)
- flaws in the Sharpe CAPM (section 8.5.5 on other conceptual issues), and

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<sup>712</sup> *ibid.*, pp. 7-8.

<sup>713</sup> *ibid.*, p. 8.

<sup>714</sup> RARE infrastructure, *Submission in response*, op. cit., 27 January 2009, p. 2.



- the DGM and expectations of future returns (section 8.5.5 on other empirical issues and section 2.5 on the cost of equity).

In examining equity beta estimates, the AER has taken the approach of:

- examining the validity of the conceptual arguments being raised
- examining numerous equity beta estimations from different time periods using different techniques
- weighing up the strengths and deficiencies of each equity beta estimate when determining the amount of weight that should be placed upon the information provided by consultants and interested parties, and
- where limitations have been identified or acknowledged, taking into account these limitations.

The AER notes that the JIA's consultant, the ACG, in its most recent reports, is silent on the issue about the quantity of the data while the JIA's other consultant, SFG, considers that the data set used by Henry is scant and incomplete.<sup>715</sup> However, the AER observes that the ACG make no such claim in its report and in its initial report in notes that:

The estimation of beta for the Australian regulated energy sector **has been hampered by a paucity of data** over a longer period, but the material rise in the estimates of beta (up to 0.40 higher) observed for the Australian portfolio data since our last report in 2007 due to **a substitution of 16 months of more recent data** gives even greater cause for concern about the reliability of the estimates than had previously existed.<sup>716</sup>(emphasis added)

The AER notes that the ACG appear to believe that the additional 16 months of data since its previous report may have reduced the paucity of data.<sup>717</sup> Further, in its most recent report, the ACG considered that businesses with greater trading histories were more reliable<sup>718</sup>, hence, effectively reduced the number of sample businesses and consequently the data set used. Further, the AER disagrees with SFG and Envestra about there being a paucity of data as can be demonstrated by the multiple measurements of the equity beta provided by consultants covering different time periods and businesses. However, the AER has acknowledged limitations with the data or estimation techniques (where relevant) in both the analysis and methodological sections of this chapter.

The FIG argues in its submission that the financial and business risks increased over the last three months of 2008 which the equity beta measures.<sup>719</sup> However, for the

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<sup>715</sup> SFG, op. cit., 1 February 2009(a), p. 27.

<sup>716</sup> ACG, op. cit., 17 September 2008(b), p.11.

<sup>717</sup> The AER has considered and responded to the ACG's concerns about the reliability of the estimates in the explanatory statement and in this final decision (see sections 8.5.3.6 and analysis of the stability of estimates).

<sup>718</sup> ACG, op. cit., January 2009(b), p. 23.

<sup>719</sup> FIG, *Submission in response*, op. cit., 29 January 2009, p. 33.

equity beta to change it would require that the relative volatility of the sample of businesses to increase relative to the market have increased in this period. If both the volatility of the market and the volatility of the sample businesses increased by the same rate during the last three months, then it is unlikely the measured equity beta will change. That said, the AER has included the updated estimates provided by the ACG which include data to November 2008 when considering the empirical range of estimates. Further, the AER:

- disagrees with the FIG, as the AER's empirical range in the explanatory statement and this final decision are also informed by measured equity betas spanning from 1990 to 2008 (excluding the 'technology bubble') using Australian and foreign businesses, and
- in the explanatory statement, the AER selected a value above the range of equity beta estimates.

NSW Treasury and the JIA raise concerns that the AER relied upon empirical evidence to set the equity beta of a benchmark efficient NSP given the limitations identified in the explanatory statement.<sup>720</sup> In its explanatory statement the AER chose an equity beta which the AER considered was above the range of reasonable empirical estimates. To imply that the AER solely relied upon the empirical estimates in forming its view on the equity beta of a benchmark efficient NSP is a misrepresentation of the AER's position in the explanatory statement. The AER also notes that the issues raised by the NSW Treasury have been identified and then accounted for explicitly or implicitly in the AER's conclusions.

### **Australian equity beta estimates**

Both Henry and the ACG estimated equity betas for the same set of businesses. The AER notes that Henry examined portfolios using weekly and monthly observations while the ACG used monthly observations. Further, both the ACG and Henry find that the presence (if any at all) of thin trading is unlikely to affect the overall equity beta estimates.<sup>721</sup> Given the issues raised by the JIA and the ACG in response to the explanatory statement about Henry's portfolios, and Henry's views about time-varying weighted portfolios, the AER has also considered the average of individual equity betas for this final decision.

### ***Individual equity beta estimates***

The following tables report the ACG's and Associate Professor Henry's re-levered (using the simple leveraging formula which does not account for tax or imputation) equity beta estimates for the individual comparator businesses (average by sample period/sampling frequency/regression technique). The AER observes that the ACG

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<sup>720</sup> NSW Treasury, *Submission in response*, op. cit., 28 January 2009, p. 7; and JIA, *Submission in response*, op. cit., 2 February 2009, pp. 109.

<sup>721</sup> The ACG noted the point estimate did not change much, see ACG, op. cit., 17 September 2008(b), p. 55; O. Henry, op. cit., November 2008, p. 16; and O. Henry, op. cit., 23 April 2009, pp. 18-19 and 29-32.

only updated the pre and post ‘technology bubble estimates. Tables 8.5 and 8.6 report Henry’s and the ACG’s results, respectively.<sup>722</sup>

**Table 8.5: Average re-levered equity beta estimates – Henry’s results<sup>(a)</sup>**

	2002-2008 - monthly	2002-2008 - weekly	2003-2008 - monthly	2003-2008 - weekly
OLS	0.57	0.59	0.65	0.71
LAD	0.45	0.45	0.64	0.59

Source: Henry<sup>723</sup>

Notes:

(a) Averages calculated by the AER.

**Table 8.6: Average re-levered equity beta estimates – ACG’s results**

	1990-1998 and 2002-2008) <sup>(a)</sup>	2003-2008 <sup>(a)</sup>	1990-1998 and 2002-2008) – Updated (All)	1990-1998 and 2002-2008) – Updated (4+) <sup>(b)</sup>	1990-1998 and 2002-2008) – Updated (5+) <sup>(c)</sup>
OLS	0.55	0.61	0.54	0.60	0.63
Re-OLS	0.53	0.49	0.50	0.57	0.61
LAD	0.52	0.55	0.58	0.65	0.69

Source: ACG<sup>724</sup>

Notes:

(a) Averages calculated by the AER.

(b) Averages calculated for firms with a trading history greater than four years.

(c) Averages calculated for firms with a trading history greater than five years.

The AER observes that the average of the point estimates of the equity betas for Henry’s report range from 0.45 (LAD – 2002 to 2008 – weekly or monthly observations) to 0.71 (OLS – 2003 to 2008 – weekly observations). In contrast the averages estimated by the ACG’s range from 0.49 to 0.69.<sup>725</sup>

While the AER does not consider that a low R-squared is informative of the reliability of equity beta estimates as proposed by the JIA (and the SFG), the AER requested that Henry report R-squared statistics for individual equity beta estimates.<sup>726</sup>

In his discussion on the R-squared statistics, Henry notes:

<sup>722</sup> Refer to Appendix C for the ACG’s individual estimates.

<sup>723</sup> O. Henry, op. cit., 23 April 2008, pp. 10-11 and 14-15. The AER provided gearing ratios that account for loan notes and double leveraging and therefore the re-levered equity betas in Henry’s latest report have changed.

<sup>724</sup> ACG, op. cit., 17 September 2008(b), pp. 42-44; and ACG, op. cit., January 2009(b), p. 22.

<sup>725</sup> Refer to Appendix C for the individual estimates.

<sup>726</sup> Refer to O. Henry, op. cit., 23 April 2009, p. 15 for R-squared statistics.

Leaving aside any discussion of the assumptions underlying the SFG report, it is well known that a high  $R^2$  value is neither a necessary nor a sufficient condition for statistically reliable estimates. Regressions with high  $R^2$  values may exhibit non-spherical residuals, or in the extreme may simply be “spurious” regressions. Moreover, regressions used to explain asset returns typically exhibit relatively low coefficients of determination.<sup>727</sup>

In relation to the R-squared statistics for the monthly data, Henry observes:

SFG recommend that the  $R^2$  value for each regression is reported. This is done in Table 4.5. Even allowing for the caveats discussed in Section 3 above regarding the robustness and generality of the SFG simulation results, it is clear that relatively few of the regressions are associated with low  $R^2$  values. Accounting for sample overlap, 5 out of 14 monthly cases exhibit an  $R^2 < 10\%$ , AGK and GAS in both sample periods and AAN in the January 2002 – September 2008 sample period. In only two of these cases was the sample size less than 48 observations, that of AGK and GAS in the post 2003:09 sample.

In relation to the R-squared statistics for the weekly data, Henry observes:

SFG conclude that there is evidence of bias in regressions with  $R^2 < 10\%$  in samples of 48 observations. In 8 out of 14 cases the OLS  $R^2$  was less than 10% for data sampled at the weekly frequency. However, in all cases the sample size is well in excess of the 48 observations considered by SFG, with the smallest sample containing 78 observations and the largest containing 348 observations. The results in table 3.2 demonstrate that the apparent bias is reduced by an increase in the sample size. Given the larger sample sizes and then fact that only 3 of 13 cases exhibit  $R^2 < 5\%$  there are unlikely to be concerns regarding the potential for a downward bias in unless one accepts the generality and robustness of the SFG simulation results completely.<sup>728</sup>

The AER observes that the majority of the individual estimates using monthly observations have an R-squared greater than 10 per cent. The AER also observes that the estimates which use weekly observations have lower R-squared statistics. That said, the AER has considered monthly estimates as well as weekly estimates in forming its views about the range of empirical equity beta estimates.

The AER considers that the difference between Henry’s and the ACG’s averages can be reconciled by the differences in:

- estimation periods (i.e. period commencing after the ‘technology bubble’ to September 2008 versus five years (commencing May 2003) after the ‘technology bubble’ to May 2008)<sup>729</sup>
- leveraging approaches (the use of ‘net debt concept’<sup>730</sup> by the ACG in calculating gearing ratios), and

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<sup>727</sup> O. Henry, op. cit., 23 April 2009, p. 16.

<sup>728</sup> *ibid.*

<sup>729</sup> The AER notes that the ACG did not update its estimates that examined the most recent 5 years.

<sup>730</sup> The ‘net debt concept’ assumes all cash is used to retire debt and uses net debt on both the numerator and denominator to calculate gearing. Equity is not increased to account for the adjustment made to debt.

- the sampling frequencies applied (Henry calculates estimates based on both weekly and monthly observations, whereas, the ACG only calculates estimates based on monthly observations).

The AER observes that the highest average point estimate (OLS weekly observations for the last five years to September 2008 of 0.71) is well below the previously adopted equity betas of either 0.9 or 1.0.

#### *Portfolio equity beta estimates*

The AER notes that the ACG estimates different portfolio equity betas. Table 8.7 summarises the ACG's portfolio estimates.

**Table 8.7: Re-levered time-varying portfolio equity beta estimates – ACG's results**<sup>731</sup>

	Average (1990-1998 and 2002- 2008) <sup>(a)</sup>	Median(1990- 1998 and 2002-2008) <sup>(a)</sup>	Average (2003 – 2008) <sup>(a)</sup>	Median (2003 – 2008) <sup>(a)</sup>	Average (1990-1998 and 2002- 2008) – Updated <sup>(b)</sup>	Median(1990- 1998 and 2002-2008) – Updated <sup>(b)</sup>
<b>OLS</b>	<b>0.72</b>	<b>0.72</b>	<b>0.65</b>	<b>0.65</b>	<b>0.75</b>	<b>0.73</b>
OLS <sub>U</sub>	1.02	1.03	0.85	0.94	N/A	N/A
OLS <sub>L</sub>	0.43	0.42	0.46	0.36	N/A	N/A
<b>Re-OLS</b>	<b>0.65</b>	<b>0.65</b>	<b>0.65</b>	<b>0.64</b>	<b>0.71</b>	<b>0.69</b>
Re-OLS <sub>U</sub>	0.90	0.92	0.85	0.93	N/A	N/A
Re-OLS <sub>L</sub>	0.40	0.39	0.45	0.36	N/A	N/A
<b>LAD</b>	<b>0.80</b>	<b>0.87</b>	<b>0.64</b>	<b>0.68</b>	<b>0.82</b>	<b>0.91</b>
LAD <sub>U</sub>	1.10	1.18	0.88	1.04	N/A	N/A
LAD <sub>L</sub>	0.50	0.56	0.40	0.32	N/A	N/A

Source: ACG<sup>732</sup>

Notes:

(a) Estimation period ends in May 2008.

(b) Estimation period ends in November 2008.

The AER observes:

<sup>731</sup> A time varying portfolio is where the weights in the portfolios vary over time due to businesses being introduced into the portfolio as they become listed on the market and being removed when they are no longer listed, as a result the number of stocks changes and this in turn changes the portfolio weights (see section 8.5.3.8).

<sup>732</sup> ACG, op. cit., 17 September 2008(b), pp. 43-44; and ACG, op. cit., January 2009(b), p. 22.

- equity beta estimates ranging from 0.65 (re-weighted OLS – no updates) to 0.82 (LAD – updated) over the period June 1990 to May or November 2008 (excluding the ‘technology bubble’) and 0.64 (LAD) to 0.65 (OLS or re-weighted OLS) using the last five years ending May 2008) using average returns, and
- equity beta estimates ranging from 0.65 (re-weighted OLS – no updates) to 0.91 (LAD – updated results) over the period June 1990 to May or November 2008 (excluding the ‘technology bubble’) and 0.64 (re-weighted OLS) to 0.68 (LAD) using the last five years ending May 2008) using median returns.

The ACG’s point equity beta estimates provide a range from 0.64 (2003 to 2008 – re-weighted OLS – median returns, and 2003 to 2008 – LAD – average returns) to 0.87 (pre and post ‘technology bubble’ – LAD – median returns) not including the updated results. The ACG’s equity beta point estimates provide a range from 0.64 (2003 to 2008 – re-weighted OLS – median returns, and 2003 to 2008 – LAD – average returns) to 0.91 (pre and post ‘technology bubble’ – LAD – median returns) using the updated results. The AER observes that statistically the true equity beta of 1 cannot be rejected for five out of the 12 estimates, and nine out of the 12 estimates for a true equity beta of 0.9 at the 95 per cent level of significance. As discussed in section 8.5.3.8, the AER considers that portfolios constructed using time-varying weights (such as those used in the ACG) may be affected by measurement error and Associate Professor Henry has raised concerns over the use of observations beyond September 2008. Further, the increased amount of weight placed upon AGL in this sampling period compared to other portfolios is unlikely to improve the precision of the equity beta estimate. The AER has placed less weight on the highest estimate of 0.91 being representative of a forward looking estimate given the concerns of measurement error and the increased weighting to AGL outweighing the benefit of covering a longer time period.

The AER notes that Henry did not include AGL, GasNet and Alinta in the analysis as Henry has concerns about the impact of merger and acquisition activity and the quality of the data available.<sup>733</sup> The AER observes that the estimated betas derived from the portfolios that Henry constructed (to ensure a balanced sample of businesses was used) include varying estimation periods and sample businesses in each portfolio. Tables 8.8 to 8.9 summarise his results.

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<sup>733</sup> O. Henry, *op. cit.*, November 2008, p. 8.

**Table 8.8: Re-levered portfolio equity beta estimates – Henry’s results – monthly observations**<sup>734</sup>

	P1'	P1	P2	P3	P4	P5	Avg (P1-5)	Avg (P1'-5)
Estimation period	Jan 2002 – Sep 2008	Oct 2003 – Sep 2008	Aug 2004 – Sep 2008	Dec 2004 – Sep 2008	Dec 2005 – Sep 2008	Mar 2007 – Sep 2008	Jan 2002 – Sep 2008	Jan 2002 – Sep 2008
Businesses	ENV, APA	ENV, APA	ENV, APA, DUE	ENV, APA, DUE, HDF	ENV, APA, DUE, HDF, SPN	ENV, APA, DUE, HDF, SPN, SKI	ENV, APA, DUE, HDF, SPN, SKI	ENV, APA, DUE, HDF, SPN, SKI
Equal weighted								
<b>OLS</b>	<b>0.44</b>	<b>0.55</b>	<b>0.50</b>	<b>0.59</b>	<b>0.59</b>	<b>0.62</b>	<b>0.57</b>	<b>0.55</b>
OLS <sub>U</sub>	0.66	0.80	0.72	0.86	0.90	1.02	N/A	N/A
OLS <sub>L</sub>	0.22	0.29	0.28	0.31	0.27	0.22	N/A	N/A
<b>LAD</b>	<b>0.45</b>	<b>0.60</b>	<b>0.70</b>	<b>0.57</b>	<b>0.62</b>	<b>0.81</b>	<b>0.66</b>	<b>0.63</b>
LAD <sub>U</sub>	0.67	0.85	0.93	0.85	0.94	1.23	N/A	N/A
LAD <sub>L</sub>	0.23	0.34	0.46	0.29	0.31	0.40	N/A	N/A
Value weighted								
<b>OLS</b>	<b>0.47</b>	<b>0.58</b>	<b>0.52</b>	<b>0.61</b>	<b>0.55</b>	<b>0.60</b>	<b>0.57</b>	<b>0.55</b>
OLS <sub>U</sub>	0.72	0.86	0.76	0.89	0.84	0.97	N/A	N/A
OLS <sub>L</sub>	0.23	0.29	0.29	0.33	0.26	0.22	N/A	N/A
<b>LAD</b>	<b>0.57</b>	<b>0.75</b>	<b>0.52</b>	<b>0.55</b>	<b>0.49</b>	<b>0.94</b>	<b>0.61</b>	<b>0.65</b>
LAD <sub>U</sub>	0.81	1.04	0.75	0.83	0.78	1.35	N/A	N/A
LAD <sub>L</sub>	0.32	0.46	0.28	0.27	0.20	0.52	N/A	N/A

Source: Henry<sup>735</sup>

<sup>734</sup> Actual gearing of stocks is calculated on annual averages rather than semi-annual, and is now adjusted for loan notes and double leveraging. Value weights calculated on average market capitalisation sampled over each stock’s trading period.

<sup>735</sup> O. Henry, op. cit., 23 April 2008, pp. 21-22.

**Table 8.9: Re-levered portfolio equity beta estimates – Henry’s results – weekly observations**<sup>736</sup>

	P1'	P1	P2	P3	P4	P5	Avg (P1-5)	Avg (P1'-5)
Estimation period	Jan 2002 – Sep 2008	Oct 2003 – Sep 2008	Aug 2004 – Sep 2008	Dec 2004 – Sep 2008	Dec 2005 – Sep 2008	Mar 2007 – Sep 2008	Jan 2002 – Sep 2008	Jan 2002 – Sep 2008
Businesses	ENV, APA	ENV, APA	ENV, APA, DUE	ENV, APA, DUE, HDF	ENV, APA, DUE, HDF, SPN	ENV, APA, DUE, HDF, SPN, SKI	ENV, APA, DUE, HDF, SPN, SKI	ENV, APA, DUE, HDF, SPN, SKI
Equal weighted								
<b>OLS</b>	<b>0.45</b>	<b>0.51</b>	<b>0.46</b>	<b>0.58</b>	<b>0.59</b>	<b>0.62</b>	<b>0.54</b>	<b>0.54</b>
OLS <sub>U</sub>	0.56	0.64	0.57	0.72	0.74	0.81	N/A	N/A
OLS <sub>L</sub>	0.34	0.38	0.35	0.45	0.44	0.42	N/A	N/A
<b>LAD</b>	<b>0.35</b>	<b>0.42</b>	<b>0.42</b>	<b>0.51</b>	<b>0.54</b>	<b>0.64</b>	<b>0.51</b>	<b>0.49</b>
LAD <sub>U</sub>	0.46	0.55	0.54	0.65	0.69	0.84	N/A	N/A
LAD <sub>L</sub>	0.24	0.29	0.31	0.37	0.39	0.44	N/A	N/A
Value weighted								
<b>OLS</b>	<b>0.51</b>	<b>0.57</b>	<b>0.49</b>	<b>0.60</b>	<b>0.52</b>	<b>0.56</b>	<b>0.55</b>	<b>0.54</b>
OLS <sub>U</sub>	0.63	0.72	0.61	0.74	0.67	0.76	N/A	N/A
OLS <sub>L</sub>	0.39	0.43	0.37	0.46	0.37	0.36	N/A	N/A
<b>LAD</b>	<b>0.45</b>	<b>0.51</b>	<b>0.51</b>	<b>0.53</b>	<b>0.57</b>	<b>0.61</b>	<b>0.55</b>	<b>0.53</b>
LAD <sub>U</sub>	0.57	0.66	0.64	0.67	0.72	0.81	N/A	N/A
LAD <sub>L</sub>	0.32	0.36	0.39	0.38	0.42	0.41	N/A	N/A

Source: Henry<sup>737</sup>

The AER observes that the range of individual portfolio equity beta estimates range from 0.35 (Portfolio 1' – 2002 to 2008 – LAD – equal weights – weekly observations) to 0.94 (Portfolio 5 – 2007 to 2008 – LAD – equal weights – monthly observations).

<sup>736</sup> Actual gearing of stocks is calculated on annual averages rather than semi-annual, and is now adjusted for loan notes and double leveraging. Value weights calculated on average market capitalisation sampled over each stock's trading period.

<sup>737</sup> O. Henry, op. cit., 23 April 2008, pp. 23-24.



The AER observes that statistically the true value of an equity beta of 1 cannot be rejected for four out of the 48 estimates, and eight out of the 48 estimates for an equity beta of 0.9. The AER notes that the highest equity beta point estimate of 0.94 is from a sample size of 18 observations. The AER has calculated averages for Henry's portfolios given that SFG has raised concerns over Henry's individual portfolio estimates.<sup>738</sup> The average equity beta estimates for the portfolios range from 0.49 (2003 to 2008 – LAD – equal weights – weekly) to 0.66 (2002 to 2008 – LAD – equal weights – monthly).

In addition, Henry estimated portfolios with time varying weights, consistent with the ACG's methodology as instructed by the AER. The AER notes that Henry considers that portfolios with time-varying weights are likely to be affected by measurement error (as discussed in section 8.5.3.8).

**Table 8.10: Re-levered time-varying portfolio equity beta estimates – Henry's results – equal weights**

	Average (2002 – 2008)	Median (2002 – 2008)	Average (2003 – 2008)	Median (2003 – 2008)
Monthly observations				
<b>OLS</b>	<b>0.55</b>	<b>0.55</b>	<b>0.67</b>	<b>0.68</b>
OLS <sub>U</sub>	0.76	0.67	0.91	0.92
OLS <sub>L</sub>	0.34	0.54	0.42	0.44
<b>LAD</b>	<b>0.57</b>	<b>0.68</b>	<b>0.78</b>	<b>0.63</b>
LAD <sub>U</sub>	0.78	0.76	1.03	0.87
LAD <sub>L</sub>	0.36	0.91	0.54	0.39
Weekly observations				
<b>OLS</b>	<b>0.56</b>	<b>0.51</b>	<b>0.64</b>	<b>0.58</b>
OLS <sub>U</sub>	0.66	0.60	0.76	0.69
OLS <sub>L</sub>	0.45	0.42	0.52	0.47
<b>LAD</b>	<b>0.55</b>	<b>0.43</b>	<b>0.66</b>	<b>0.52</b>
LAD <sub>U</sub>	0.66	0.52	0.78	0.62
LAD <sub>L</sub>	0.45	0.34	0.54	0.41

Source: Henry<sup>739</sup>

<sup>738</sup> SFG, op. cit., 1 February 2009(a), p. 36.

<sup>739</sup> O. Henry, op. cit., 23 April 2008, pp. 27-28.

The AER observes that:

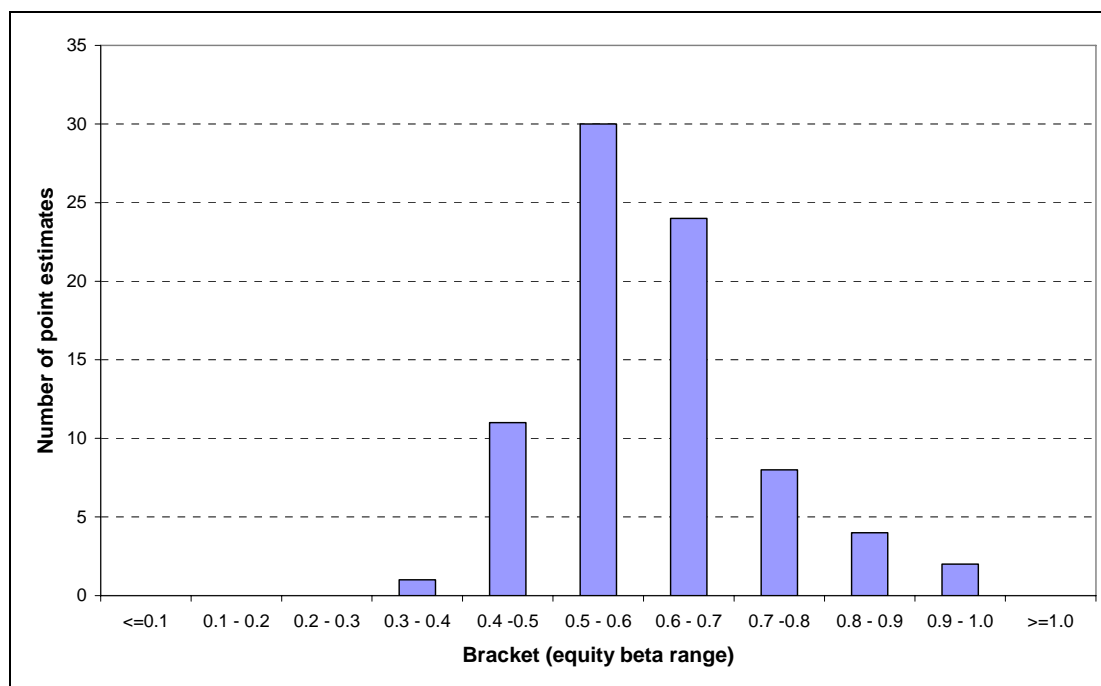
- portfolio equity beta estimates using average returns:
  - range from 0.55 (LAD – weekly) to 0.57 (LAD – monthly) using the post ‘technology bubble’ period ending September 2008, and
  - range from 0.64 (OLS – weekly) to 0.78 (LAD – monthly) using the last five years ending September 2008
- portfolio equity beta estimates using median returns:
  - range from 0.43 (LAD – weekly) to 0.68 (LAD – monthly) using the post ‘technology bubble’ period ending September 2008, and
  - range from 0.52 (LAD – weekly) to 0.68 (OLS – monthly) using the last five years ending May 2008.

Henry’s equity beta point estimates provide a range from 0.43 (LAD – post ‘technology bubble’ – weekly) to 0.78 (LAD – 2003 to 2008 – monthly). The AER also observes that statistically the true value of the equity beta of 1 cannot be rejected for one of the 16 estimates, and three of the 16 estimates for an equity beta of 0.9 (within a 95 per cent level of confidence).

The AER observes that Henry’s and the ACG’s portfolios provide a range of individual portfolio estimates from 0.35 (Portfolio 1 – 2003 to 2005 – LAD – equal weights – weekly observations) to 0.94 (Portfolio 5 – 2007 to 2008 – LAD – equal weights – monthly observations). That said, the AER considers that a portfolio which uses 18 observations is likely to have an insufficient number of observations. The AER also observes that the true value of the equity beta of 1 cannot be rejected for ten out of the 76 estimates, and 21 out of the 76 estimates for an equity beta of 0.9. Therefore, for approximately 75 per cent of the estimations it can be rejected that the true value of the equity beta is at the level of the lowest previously adopted value of 0.9.

Figure 8.2 summarises the number of re-levered portfolio equity beta estimates (of a total of 76 estimates provided by the ACG and Henry) that fall within 0.1 increments of the equity beta point estimates.

**Figure 8.2 – Number of portfolio equity beta estimates**



Source: AER analysis

The AER observes that there are 66 equity beta estimates falling within the 0.4 to 0.7 range of equity beta estimates. The AER also observes that this is consistent with Henry's views that balance of the evidence points towards the point estimate of the equity beta of the benchmark efficient NSP lying in the range of 0.4 to 0.7.

When examining the AER's preferred estimation period post 'technology bubble', Henry's equity beta point estimate in conjunction with the ACG's estimates for the JIA, provide a range of estimates from 0.41 (Henry – post 'technology bubble' period – LAD – monthly observations) to 0.68 (ACG – 2003 to 2008). The AER notes that the highest estimate (0.68) is well below the previously adopted equity betas of 0.9 or 1.0.

#### ***Stability of equity beta estimates***

The AER observes that the ACG continues to not rely upon its visual tests (examining recursive estimates) to determine that equity beta estimates are unstable. Rather, it argues:

- Henry's Hansen's tests demonstrates that four out of the nine business in the sample show significant instability
- that results from the Hansen's tests and visual examination can only consider the stability of estimates within the period the equity beta measures and not future market conditions, and

- given the imprecision of the equity beta estimates that the odds are stacked against finding a statistically significant instability in the equity beta estimates.<sup>740</sup>

As discussed in section 8.5.3.6 the AER considers that it would be inappropriate to make inferences about future market conditions (over the next 10 years) which are unobservable. Examining Henry's November 2008 report for the AER, the AER observes that of four businesses that show significant instability at the 5 per cent level of confidence, only one business demonstrates instability at the 1 per cent level of confidence (AGL).<sup>741</sup> However, when applying Hansen's tests to his own portfolios, Henry found that none of the portfolios show significant instability at the 6 per cent level of confidence.<sup>742</sup>

Henry has conducted recursive estimates of the Australian portfolios and Hansen's test for structural stability.<sup>743</sup>

These tables demonstrate that the null of no structural instability for the estimated equity betas and constants is not rejected at the 1 per cent level of significance. The null of no structural stability is rejected at the 5 per cent level of confidence for the equity beta when using weekly observations for four out of the 32 portfolios (i.e. balanced and time varying portfolios). The AER also notes the null of no instability is rejected at the 5 per cent level for the variance, which is the likely primary contributor to the instability suggested by the results of the joint tests. This instability in the variance in turn implies instability in the width of the confidence intervals associated with the point estimates. On the issue of the stability of equity beta estimates, after examining his own recursive estimates and Hansen's stability tests, Henry finds:

There is no overwhelming issue with instability. It is the case that the OLS and LAD estimates of  $\beta$  differ. However as the estimators are maximizing very different functions, this difference is somewhat unsurprising.

Neither of the recursive least squares estimators appears to demonstrate convincing evidence of parameter instability.

...

The use of the Hansen (1992) test for parameter instability produces systematic evidence of instability in the regression models. Where this instability is detected it is almost uniformly due to a change in the error variance in the regression model. There is no evidence of parameter instability associated with the coefficients of the regression models themselves. This evidence is largely consistent with the view that asset specific volatility may have been unstable during the period examined by the consultant.<sup>744</sup>

In its report for the JIA, the ACG argues that given the imprecision with which equity betas are estimated, the odds are stacked against finding evidence of statistically

<sup>740</sup> ACG, op. cit., January 2009(b), pp. 6 and 17-18.

<sup>741</sup> O. Henry, op. cit., November 2008, p. 7.

<sup>742</sup> *ibid.*, p. 33.

<sup>743</sup> O. Henry, op. cit., November 2008, p. 33.

<sup>744</sup> O. Henry, op. cit., 23 April 2009, pp. 48-49.

insignificant instability in those estimates.<sup>745</sup> Henry has examined this statement and considers it as erroneous, as it confuses the concepts of parameter instability and precision of estimation.<sup>746</sup> Henry notes that the finding of statistically insignificant instability or lack thereof is independent of the precision of the estimate.<sup>747</sup> The ACG also stated in its report that an alternative explanation for finding no statistically significant instability in the true equity beta reflects the poor precision of the underlying equity beta estimates.<sup>748</sup> Henry considers that this statement is incorrect, as his report states:

The absence of evidence against stability in the coefficients is independent of the precision of the estimates. While one might attempt to mount an argument that the Hansen test has poor size or power properties in this situation, such an argument is unlikely to carry much weight given the consistency of the evidence across different sample periods and sampling frequencies for data on stock and portfolio returns.<sup>749</sup>

On examining the Hansen's test and the recursive estimates, Henry finds:

Neither of the recursive least squares estimators appears to demonstrate convincing evidence of parameter instability. It is important to note that these estimators are not sufficient in the sense that they do not employ all available information. The use of the Hansen (1992) test for parameter instability produces systematic evidence of instability in the regression models. Where this instability is detected it is almost uniformly due to a change in the error variance in the regression model. There is no evidence of parameter instability associated with the coefficients of the regression models themselves. This evidence is largely consistent with the view that asset specific volatility may have been unstable during the period examined by the consultant.<sup>750</sup>

Given the ACG's and Henry's analysis the AER considers that there is little evidence of parameter instability in the point estimate of the equity beta. However, the AER observes that caution should be taken when considering confidence intervals and the individual estimates (as it cannot be rejected that four of the nine individual equity beta estimates are unstable at the 95 per cent level of confidence). That said, the AER considers that examining the averages of individual equity beta estimates is of value given the limitations identified by the JIA, the ACG and Henry about the portfolio estimations.

### **Foreign equity beta estimates**

As discussed in section 8.5.2, the AER has also examined the point estimates of foreign equity betas as a cross check on the Australian equity beta estimates.

The AER observes that the ACG did not update its foreign equity beta estimates since its initial report. In the initial report the ACG examined gas and electricity networks

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<sup>745</sup> ACG, op. cit., January 2009, p. 17.

<sup>746</sup> O. Henry, op. cit., 23 April 2009, p. 34.

<sup>747</sup> *ibid.*

<sup>748</sup> ACG, op. cit., January 2009, p. 17.

<sup>749</sup> O. Henry, op. cit., 23 April 2009, p. 36.

<sup>750</sup> *ibid.*, pp. 48-49.

for the United States as its foreign comparator to the Australian estimates. The ACG found that the re-levered equity betas using the last five years ranged between 0.97 (for the portfolio betas using average returns) and 1.0 (for the average of individual betas).<sup>751</sup> When accounting for differences in market gearing and cross sectoral issues, this range dropped to 0.86 (for the portfolio betas using average returns) and 0.89 (for the portfolio betas using median returns).<sup>752</sup> The ACG found that the re-levered equity betas using the pre and post ‘technology bubble’ ranged between 0.54 (for the portfolio betas using average returns) and 0.73 (for the average of individual betas).<sup>753</sup>

As discussed in sections 8.5.3 and 8.5.4, the AER considers there are a sufficient number of businesses in the United States to examine equity beta estimates which include data prior to the ‘technology bubble’. The ACG correctly identifies that the AER included portfolio estimates in its considerations that included gas businesses.<sup>754</sup> The AER has requested that Associate Professor Henry provide portfolio estimates and as a result has chosen to place less weight on the ACG’s portfolio estimates for the final decision. Further, the AER considers that using a longer estimation period is likely to provide more precise equity beta estimates. The AER observes that the average of electricity, and, gas and electricity networks in the United States ranges from 0.64 (LAD) to 0.77 (OLS) for the pre and post ‘technology bubble’ data and for the last five years ranges from 0.82 (LAD) to 0.95 (OLS).<sup>755</sup>

As discussed in section 8.5.2.2, the AER considers that there is a sufficient number of electricity networks (electricity, and hybrid gas and electricity), with longer trading histories, to determine an informative estimate of the equity beta of a benchmark efficient electricity NSP, without the inclusion of ‘pure play’ gas businesses in the sample. The AER observes that electricity businesses in the United States provide generally lower equity beta estimates than gas businesses.

Henry has estimated the re-levered equity betas for the United States. Tables 8.11 to 8.12 report the average and portfolio results.

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<sup>751</sup> ACG, op. cit., 17 September 2008 (b), p. 49.

<sup>752</sup> *ibid.*, p. 53.

<sup>753</sup> ACG, op. cit., 17 September 2008 (b), p. 48.

<sup>754</sup> ACG, op. cit., January 2009(b), p. 26.

<sup>755</sup> ACG, op. cit., 17 September 2008(b), p. 48.

**Table 8.11: Average re-levered equity beta estimates for United States –Henry’s results**

	2002-2008 - monthly	2002-2008 - weekly	2003-2008 - monthly	2003-2008 - weekly	1990-1998 and 2002- 2008) - monthly	1990-1998 and 2002- 2008) - weekly
OLS	0.78	0.68	0.81	0.85	0.71	0.60
LAD	0.65	0.73	0.76	0.86	0.59	0.54

Source: Henry<sup>756</sup>

(a) Averages calculated by the AER.

For the purposes of comparison, the AER has compared the ACG’s results to Henry’s results. The AER observes that the average ranges from 0.54 (LAD - weekly) to 0.71(OLS - monthly) for the pre and post ‘technology bubble data and for the last five years, ranges from 0.76 (LAD - monthly) to 0.86 (LAD - weekly). The AER notes that Henry’s estimates are 0.1 (lower bound) and 0.06 (upper bound) lower than the ACG’s range for its longer term data. For the shorter estimation period (2003 to 2008), the lower end of Henry’s range is 0.06 (lower bound) and 0.09 (upper bound) lower than the ACG’s range.

**Table 8.12: Portfolio re-levered equity beta estimates for United States –Henry’s results**

	2002-2008 - monthly	2002-2008 - weekly	2003-2008 - monthly	2003-2008 - weekly	1990-1998 and 2002- 2008) - monthly	1990-1998 and 2002- 2008) – weekly <sup>(a)</sup>
OLS	<b>0.90</b>	<b>0.69</b>	<b>0.81</b>	<b>0.85</b>	<b>0.71</b>	<b>0.58</b>
OLS <sub>U</sub>	1.17	0.79	1.14	0.97	0.88	0.64
OLS <sub>L</sub>	0.64	0.59	0.48	0.73	0.54	0.51
LAD	<b>0.51</b>	<b>0.74</b>	<b>0.56</b>	<b>0.76</b>	<b>0.47</b>	<b>0.52</b>
LAD <sub>U</sub>	0.80	0.84	0.90	0.88	0.64	0.58
LAD <sub>L</sub>	0.22	0.64	0.22	0.65	0.30	0.46

Source:

(a) Time-varying portfolio (all other portfolios have balanced weights).

The AER recognises that the United States has differences to the Australian economy (as noted by the ACG)<sup>757</sup> and therefore the AER has placed limited weight on the

<sup>756</sup> O. Henry, op. cit., 23 April 2009, p. 41-46.

<sup>757</sup> ACG, op. cit., January 2009(b), p. 26.

equity beta estimates. Further, the AER has chosen not to adjust the foreign re-levered equity beta estimates given its concerns noted in section 8.5.2.2.

The AER observes that the ACG's highest portfolio equity beta point estimate using the longest term (pre and post 'technology bubble' data) is 0.68. However, given the presence of gas businesses the AER has placed less weight on this estimate. Henry's estimates for the same period using a sample of electricity, and, electricity and gas businesses provide a range from 0.47 (LAD – monthly) to 0.71 (OLS – monthly). This AER notes that 0.71 is marginally higher than the upper bound of the range of estimates on which it considers the most weight should be placed (0.68 - which uses the AER's preferred estimation period for Australian beta estimates).

Accordingly, the estimated Unites Sattes equity betas confirm that that an equity beta of 0.7 of a benchmark efficient NSP, based upon market evidence could be considered reasonable.

#### **8.5.4.4 Interpretation of results**

The JIA notes that the ACG observes that a proper interpretation of the AER's and its own work justifies a point estimate of the equity beta between 0.6 and 0.9.<sup>758</sup> The ACG also observes that this range is above the ESC's adopted range of 0.5 to 0.8.<sup>759</sup> The ACG concludes that with its updated estimates that there is no persuasive evidence that the equity beta is different from one.<sup>760</sup> Henry concludes that the balance of the evidence points towards the point estimate of the equity beta of the benchmark efficient NSP lying in the range of 0.4 to 0.7 (having regard to the average of individual equity beta point estimates and a number of portfolios of different compositions and lengths).<sup>761</sup>

The AER observes that the ESC informed its views about its preferred range on the basis of all of the Australian and United States empirical equity beta estimates provided to it by the ACG.<sup>762</sup> The AER agrees that the empirical range would have an upper bound of 0.9 if it were to include all estimates provided by both the ACG and Associate Professor Henry. However, the AER has already noted that it has a number of concerns over the applicability of foreign data to an Australian benchmark (see section 8.5.2.2) and does not consider that the United States equity beta estimates form an appropriate upper bound for a benchmark efficient NSP. Further, the AER notes that the equity beta estimates that contain 0.9 are based upon shorter term data that are likely to be less reliable than data which use longer sampling periods (i.e. the post 'technology bubble' period for Australia and pre and post 'technology bubble' for the United States (section 8.5.3.4). Further, the AER notes that the regulatory framework applying to the ESC at the time of the decision is different to the NER and it remains a matter of judgement for the AER on how it forms its views under the regulatory framework that applies under the NER.

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<sup>758</sup> *ibid.*

<sup>759</sup> ACG, *op. cit.*, January 2009(b), p. 28.

<sup>760</sup> ACG, *op. cit.*, January 2009(b), p. 1.

<sup>761</sup> O. Henry, *op. cit.*, 23 April 2009, p. 49.

<sup>762</sup> ESC, *Gas access arrangement review 2008-2012*, Final decision – public version, 7 March 2008, p. 463.



The JIA and Evestra also note that market practitioners (such as Grant Samuel) have identified limitations with the CAPM approach and provided equity beta estimates. The AER considers that equity beta estimates used for valuation purposes have been used for purposes other than regulatory processes and therefore any adjustment made to the measured equity betas may not be appropriate. Further, the AER notes that interested parties have only provided one example that may be perceived as relevant to this review (AGL's infrastructure assets). That said, the AER observes that the ranges provided by interested parties range from 0.8 to 0.9 which is consistent with the equity beta adopted in the explanatory statement.

The AER observes that RARE Infrastructure notes all of its internal equity beta estimates used in modelling and valuing listed Australian securities are above the 0.8 equity beta in the explanatory statement. In one case it estimates the equity beta at 1.19.<sup>763</sup> However, it is difficult to evaluate the estimates provided by RARE infrastructure when the underlying assets being valued are unclear, and equity beta estimates used for the purpose of the valuation may not be appropriate for regulatory processes.

The AER observes that NSW Treasury observes a strong correlation between the ASX 200 Utilities Index versus the ASX All Ordinaries.<sup>764</sup> However, as it notes in its own submission, the Utilities index contains a number of businesses that are not directly comparable to electricity networks (as the index includes businesses with elements of unregulated activities).<sup>765</sup> The AER considers that it is inappropriate to form a view on the equity beta of a benchmark efficient NSP on a measurement that includes a number of firms that do not face inelastic demand, face significant competition, and, in some cases, are not subject to a similar regulatory regime.

In forming its view of the equity beta of a benchmark efficient NSP the AER observes that:

- the highest average of Australian individual equity betas of 0.71 is well below the previously adopted equity betas of either 0.9 or 1.0
- the highest Australian individual portfolio equity beta estimate of 0.68 (ACG – 2003 to 2005) is well below the previously adopted equity betas of either 0.9 or 1.0
- it can be rejected for approximately 75 per cent of the portfolio equity beta estimates that the true value of the equity beta is 0.9, and
- the upper bound of Henry's estimates for the longest period using the United States electricity, and, electricity and gas businesses sample is 0.71.

The AER considers if only the point estimates of equity betas were to be considered that an equity beta of 0.7 may be appropriate.

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<sup>763</sup> RARE infrastructure, *Submission in response*, op. cit., 27 January 2009, p. 2.

<sup>764</sup> NSW Treasury, *Submission in response*, op. cit., 28 January 2009, p. 6.

<sup>765</sup> *ibid.*

### 8.5.5 Sharpe-Lintner CAPM

The NER provide that the cost of equity ( $k_e$ ) is to be determined using the capital asset pricing model (CAPM), and is calculated as:

$$k_e = r_f + \beta_e \times MRP$$

where:

- $r_f$  = the nominal risk-free rate
- $\beta_e$  = the equity beta
- MRP = the market risk premium<sup>766</sup>

Whilst the NER does not name this version of the CAPM, the formula specified is that of the version known as the Sharpe-Lintner CAPM (or simply, the Sharpe CAPM).

#### Summary of position in explanatory statement

In its submission on the issues paper, the JIA recognised that the use of the Sharpe CAPM is mandated by the NER, but argued that to make a ‘sound estimate’ of the return on equity in accordance with the NER, the ‘deficiencies’ of the Sharpe CAPM must be recognised.

The particular NER requirement the JIA were referring to was that in reviewing the WACC parameters the AER must have regard to the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing regulated services.<sup>767</sup> Read together, the above statements suggested that the JIA considered that there is a conflict between the regulatory requirement to use the Sharpe CAPM and the requirement to have regard to the need to set a forward looking rate of return commensurate with prevailing conditions in the market for funds and the risk involved in providing regulated services. As noted above, the JIA’s position on the ‘deficiencies’ of the Sharpe CAPM was based on a report it commissioned by CEG.

CEG argued on both theoretical and empirical grounds against using the Sharpe CAPM. It stated that the Sharpe CAPM is based on a number of unrealistic assumptions, some of which have been relaxed in subsequent versions of the CAPM. In particular:

- the Black CAPM relaxes the assumption that investors can borrow (and lend) at the risk-free rate, and
- the Merton (or intertemporal) CAPM relaxes the ‘single period’ assumption, and introduces the concept that investors also care about the correlation between returns in this period and the profitability of reinvesting those returns in the next

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<sup>766</sup> NER, cls. 6.5.2(b) and 6A.6.2(b).

<sup>767</sup> *ibid.*, p.119.

period (reinvestment opportunities). Under the Merton CAPM, factors other than the equity beta drive equity returns.

CEG argued that forecasts based on the Sharpe CAPM result in biased estimates of the returns actually observed in capital markets. It considered the Sharpe CAPM underestimates returns for betas less than one and overestimates returns for betas greater than one. In other words, the sensitivities of observed returns to beta are less than that predicted by the Sharpe CAPM. CEG cited several overseas studies, including a 1972 paper by Black, Jensen and Scholes and a 1973 paper by Fama and MacBeth, which it claimed find that the Black CAPM outperforms the Sharpe CAPM as a predictor of returns. CEG stated that it replicated the approach of Fama and MacBeth to Australian equities and found similar results. CEG found that there does not appear to be any significant relation between equity betas and returns in the Australian market.

CEG recommended that the AER either:

- reject the use of the Sharpe CAPM and replace this with the Black CAPM, or
- makes an adjustment to the Sharpe CAPM to make it mathematically equivalent to the Black CAPM.

CEG noted that implemented consistently, either approach would give the same result. Accordingly which option is adopted 'is a matter of form and not substance'.<sup>768</sup>

The AER agreed with the JIA that the NER mandates the use of the Sharpe CAPM in determining the cost of equity. Essentially this meant that neither recommendation of CEG, both of which are a departure from the Sharpe CAPM, was permissible under the NER. The AER noted that this could present a dilemma if this requirement was in conflict with other requirements of the NER, however the AER did not consider the JIA or CEG had established that there is a conflict with the use of the Sharpe CAPM and the other requirements of the NER.

Additionally, while the AER had concerns over some of CEG's critique of the Sharpe CAPM, the AER had not adopted a 'mechanical' approach in applying the empirical beta estimates derived from regression analysis using the Sharpe CAPM. Empirical estimates suggested an equity beta in the range of 0.44 and 0.68, however taking all considerations into account, the AER adopted an equity beta of 0.8. Accordingly, to the extent that there are potential limitations of the Sharpe CAPM in estimating the cost of equity these concerns were likely to have been addressed by the AER adopting an equity beta between 0.12 and 0.36 higher than what empirical estimates would suggest.

The AER's concerns with CEG's analysis and position were as follows.

Associate Professor Handley advised the AER that the empirical evidence presented by CEG was not new (excluding CEG's own analysis).<sup>769</sup> CEG noted that the seminal

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<sup>768</sup> CEG, op. it., 15 September 2008; CEG, op. cit., 14 September 2008, p.50.

papers on the issues it was raising were published in the early 1970's – Black, Jensen and Scholes and Fama and MacBeth.<sup>770</sup> Despite these possible limitations of the Sharpe CAPM being known for decades, it has been consistently and constantly adopted by regulators and market practitioners. The AER was not aware of any instances where an Australian regulator has adopted an alternative model. As displayed in the following table, Truong, Partington and Peat found that 72 per cent of Australian businesses who responded to their survey adopt the (Sharpe) CAPM in formulating their capital budgeting decisions. Only one business used a multi-factor asset pricing model and no business adopted the Fama and French three factor model.<sup>771</sup>

**Table 8.13: Practices adopted by Australian firms in estimating the cost of capital for capital budgeting**

Method	No. of responses	% of total
(Sharpe) CAPM <sup>772</sup>	53	72
Cost of debt plus some premium for equity	35	47
Cost of debt	25	34
E/P ratio	11	15
Average historical returns	8	11
Dividend yields plus forecast growth rate	7	9
By regulatory decisions	3	4
Multi-factor asset pricing model	1	1
Fama and French three factor model	0	0
Other technique	0	0
	<b>143</b>	<b>100%</b>

Source: Truong, Partington and Peat<sup>773</sup>

While it would be difficult to state the Sharpe CAPM is without limitations, the AER considered a likely reason why it has been adopted by all Australian regulators and is

<sup>769</sup> J. C. Handley, *Comments on the CEG reports: "estimation of, correction for, biases inherent in the Sharpe CAPM formula" and "an analysis of implied market cost of equity for Australian regulated utilities"*, Report prepared for the AER, 20 November 2008, p.4.

<sup>770</sup> CEG, op. cit., 15 September 2008; CEG, op. cit., 14 September 2008, p.7.

<sup>771</sup> G. Truong, G. Partington and M. Peat, 'Cost of capital estimation and capital budgeting practices in Australia', *Australian Journal of Management*, Vol. 33, No. 1, June 2008, p.108.

<sup>772</sup> While Truong, Partington and Peat (2008) do not explicitly state this survey results relate to the Sharpe CAPM, it appears reasonable that this is so as in other parts of the report the authors simply refer to the Sharpe CAPM as 'the CAPM'.

<sup>773</sup> G. Truong, G. Partington and M. Peat, op. cit., June 2008, p.108.

the dominant approach adopted by Australian businesses is that there is no consensus on an alternative model which is better than the Sharpe CAPM.

Noting the studies cited by CEG that test the Sharpe CAPM, Associate Professor Handley further stated:

There is no consensus as to how the empirical evidence should be interpreted.

For example, Roll (1977) argues the choice between alternative forms of the CAPM is extremely sensitive to the choice of the proxy for the market portfolio and in particular, while the results of Black, Jensen and Scholes (1972) and Fama and MacBeth (1973) appear to support the Black CAPM over the Sharpe CAPM, “their results are fully compatible with the Sharpe-Lintner model and a specification error in the measured ‘market’ portfolio” (p.131).

...

Roll (1977) argues that the market portfolio, which includes all assets, can never be empirically identified and therefore the CAPM can never be empirically tested. This limitation is recognised by Fama and French (2004, p.25)...<sup>774</sup>

CEG tested the predictive power of the Sharpe CAPM on Australian equities, finding a relationship between beta and returns that is flatter than that predicted by the Sharpe CAPM. CEG considered that these results suggested that the Black CAPM may be a better predictor of returns than the Sharpe CAPM, however it did not test the predictive power of the Black CAPM. Furthermore, CEG found that there did not appear to be any significant relation between equity beta and equity returns in the Australian market. Accordingly, the AER considered that little, if any, useful information can be obtained from the shape of the slope (which was not found to be statistically significant).

As Handley noted:

...there is an implicit inconsistency in arguing on the one hand that beta and therefore the Sharpe CAPM is irrelevant, but then seeking to use the empirical results of a regression of (portfolio) returns against (portfolio) betas as the basis for estimating equity returns. As Fama and French (2004) state, “If betas do not suffice to explain expected returns, the market portfolio is not efficient and the CAPM is dead in its tracks” (p.36) – in other words, if beta is deemed irrelevant, then any analysis of returns based on beta is also irrelevant.<sup>775</sup>

Furthermore, of the six different data sets used by CEG to test the Sharpe CAPM, five comprise equal-weighted portfolios and one comprises value-weighted portfolios. As the market portfolio in the Sharpe CAPM is value-weighted, the AER considered this may mean that the five regressions based on equal-weighted portfolios are not a test of the Sharpe CAPM. Of the one regression that adopts value-weighted portfolios, CEG found a slightly negative, though also statistically insignificant, relationship between the equity beta and returns. This is driven by the intercept which CEG

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<sup>774</sup> J. C. Handley, op. cit., 20 November 2008, p.4.

<sup>775</sup> *ibid.*, 20 November 2008, p.6.

interpreted as the return on the zero-beta portfolio being higher than the return on the market portfolio. Yet a conclusion of the Black CAPM, assuming restrictions on borrowing at the risk-free rate but not lending, is that the expected return on the zero-beta portfolio must be less than the expected return on the market portfolio (and greater than the risk-free rate). On a result like that found by CEG, Black stated:

But if this is possible, it means that the market portfolio is not efficient. Thus the inequality must hold.<sup>776</sup>

Accordingly, while CEG's results may have suggested a relationship between beta and returns that are flatter than the Sharpe CAPM would predict. The AER considered these results may not have necessarily supported the Black CAPM.

CEG also discussed the Merton (intertemporal) CAPM and the Consumption CAPM, suggesting that the Merton CAPM may be able to explain the movement of utility stock betas during the 'technology bubble' and 'commodity boom'. However, CEG did not test the predictive power of either of these versions of the CAPM either. It was also not clear how CEG formed the view that the Sharpe CAPM should be rejected in favour of the Black CAPM, rather than either the Merton CAPM or Consumption CAPM.

While CEG's overall recommendation was to reject the Sharpe CAPM and adopt the Black CAPM (or equivalent thereof), CEG also noted:

... more recent empirical tests of the CAPM have rejected the use of any model that has equity beta as the sole determinant of relative risk (this includes the Black CAPM).<sup>777</sup>

While recommending the AER adopt the Black CAPM, CEG did not appear to consider the Black CAPM was the best predictor of returns. Rather CEG appeared to consider that the Fama and French three factor model was the best predictor of equity returns. This model adds two additional risk factors, being firm size and book-to-market ratio, onto the equity beta to explain equity returns.

Given CEG's opinion of the Fama and French three factor model, the AER was unsure why CEG did not recommend replacing the Sharpe CAPM with this model, which it seemed to consider as the best predictor of equity returns. In essence, CEG recommended replacing what it considered to be an inferior asset pricing model which is near universally used by regulators and market practitioners (the Sharpe CAPM), with what it considered to be another inferior asset pricing model, which is used neither by regulators nor market practitioners (the Black CAPM).<sup>778</sup>

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<sup>776</sup> F. Black, 'Capital market equilibrium with restricted borrowing', *The Journal of Business*, Vol.45, No.3, 1972, p.454.

<sup>777</sup> CEG, op. cit., 15 September 2008; CEG, op. cit., 14 September 2008, p.17.

<sup>778</sup> While acknowledging that the Sharpe CAPM is mandated by the NER, CEG appears to believe that the AER could adopt alternative versions of the CAPM so long as beta was the sole determinant of risk, but that the AER could not adopt alternative asset pricing models where beta was not the sole determinant of risk. The AER is unsure how CEG came to this position.

While CEG considered that the Fama and French three factor model is superior among asset pricing models, the AER noted that this was not a view without controversy. For example, as Associate Professor Handley advised:

Roll and Ross (1994) similarly suggest the results on Fama and French (1992) can alternatively be explained by an inefficient market proxy while Kothari, Shaken and Sloan (1995) suggest the Fama-French results are partly explained by data frequency and survivorship bias.<sup>779</sup>

The AER concluded that as the NER mandates the use of the Sharpe CAPM in determining the cost of equity, CEG's recommendation to reject the Sharpe CAPM and adopt the Black CAPM is not permissible under the NER. At any rate, the AER did not consider that CEG had provided compelling evidence that the Sharpe CAPM was an inappropriate approach to setting the cost of equity, and resulted in a downwards biased estimate. The AER further noted that even if these concerns were valid, the equity beta proposed by the AER was 0.12 to 0.36 higher than suggested by regression analysis using the Sharpe CAPM, being that any possible issue of bias was likely to have been negated.

### **Summary of submissions in response to explanatory statement**

In response to the explanatory statement, CEG (being commissioned by the JIA) makes the following arguments:

- Its report should be considered in the context of what it claims is the overall objective of accurately estimating the return on equity that efficient benchmark service providers must offer equity holders.
- Without this 'holistic objective' in mind, the AER may define parameters in a particular way such that, even if they are accurately estimated according to that definition, they nonetheless do not result in an accurate estimate of the cost of equity.
- The explanatory statement made the assumption that the NER equity beta can be accurately proxied by estimating the historical covariance between the return on a publicly listed equity with the historical average return on the listed equity market.
- Theoretically correct definition of the equity beta is the covariance between returns on one asset and the average return on all assets in the economy, not just listed equity.
- The uncontested finding from the empirical literature is that an estimate of 1.0 for the equity beta provides a better estimate of the cost of equity than an equity beta derived from stock market data.

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<sup>779</sup> J. C. Handley, op. cit., 20 November 2008, p.4.

- The empirical findings demonstrate that the AER cannot reasonably rely on empirical estimates of the equity beta (derived from stock market returns) that are below 1.0 to set the regulatory equity beta below 1.0.<sup>780</sup>

### Issues and AER's considerations

The AER commissioned Associate Professor Handley to review the response from CEG. On CEG's argument, Handley notes:

The JIA/CEG argument is primarily an empirical one relying, in particular, on the results of the two well know international empirical studies, Black Jensen and Scholes (1972) and Fama and MacBeth (1973), in addition to the results of a CEG study using Australian data. There is no dispute concerning the results reported by Black, Jensen and Scholes (1972) and Fama and Macbeth (1973). Both studies find that the empirical security line is flatter and has a higher intercept than is predicted by the Sharpe CAPM. There is, however, uncertainty as to how this empirical evidence should be interpreted i.e. what do the empirical results imply about the validity of the Sharpe CAPM as a model for estimating expected returns.<sup>781</sup>

Handley notes that CEG and the JIA do not appear concerned about the lack of a clear explanation for these empirical results. Handley concludes:

In other words (and notwithstanding Roll's caution concerning empirical tests of the CAPM), the JIA/CEG suggest the model should be adjusted to fit the empirical results and in particular the beta should be set equal to one. But in my view this is tantamount to choosing a different model—in effect the JIA/CEG suggest the AER use an “empirical CAPM” to estimate equity returns. **To be clear, the solution proposed by JIA/CEG is not the Sharpe CAPM.** [emphasis added]

Contrary to the view of the JIA/CEG, the fact that we don't have a clear explanation for the empirical results is of critical importance. In short, if there was a problem with the model (and again, the analysis of Roll suggests that this is not necessarily the case) then we would need to know exactly what that problem was before we could consider making any adjustments to the model's output. Further and as mentioned in my previous report, in this case, the most appropriate way to proceed would be to completely replace the Sharpe CAPM with an appropriate alternative asset pricing model. Simply making an ad hoc adjustment to the CAPM determined rate of return as suggested by CEG (albeit to tie it back to their empirical results) would be definition by arbitrary and therefore could not be justified. Unless one knows first, whether there is a problem and second, what is the source of the problem then one cannot possibly come up with an appropriate “solution”.<sup>782</sup>

The issue of the use of the CAPM also arose in the appeal by the Victorian gas distributors against the Essential Services Commission's (ESC's) decision to draft and approve its own amendments to the distributors' third access arrangement. In forming its view on the issue, the ESC considered a report from CECG (now CEG), submitted to it by the gas distributors, on the potential limitations of the Sharpe CAPM. The

<sup>780</sup> CEG, *Estimating the NER equity beta based on stock market data—a response to the AER draft decision—A report for the JIA*, January 2009.

<sup>781</sup> J. C. Handley, *Further comments on the Sharpe CAPM*, Report prepared for the AER, 16 March 2009, pp.4-5.

<sup>782</sup> J. C. Handley, op. cit., 16 March 2009, p.6.



CEG report submitted by the JIA to the AER is substantially similar to the CECG report submitted to the ESC. The ESC concluded:

Having considered the evidence before it, the Commission acknowledges that it is possible that for low beta stocks the (Sharpe) CAPM may not be the best predictor of returns for firms with a beta other than 1.0.

However, the Commission is not satisfied that it is positively the case that the (Sharpe) CAPM may not accurately predict returns for firms with a beta less than 1.0, such that it could make an adjustment for this issue. Even if the Commission was satisfied that some adjustment should be made as a result of estimation bias in the application of the Sharpe CAPM, there was not sufficient material before the Commission that would permit it to assess this magnitude of any such adjustment.<sup>783</sup>

Among other matters, this conclusion of the ESC was appealed by the gas distributors. The ESC Appeal Panel noted that the gas distributors had argued that if the equity beta was to be set at a level lower than 1.0, there was evidence that the CAPM model, initially devised by Sharpe, would produce a downward bias. In an attempt to address this tendency, two refinements to the model had been made by, respectively, Black and Merton. The gas distributors maintained that the ESC had wrongly declined to implement either of these refinements and allowed the CAPM to be applied in its original form. The Appeal Panel noted:

In response, the Commission argued that, on the basis of a report from Allen Consulting Group, there was doubt about the soundness of the contention of under estimation in the Sharpe model and that it was entitled, on this evidence, to apply the Sharpe model without adjustment. It also submitted that the unadjusted Sharpe model remains the conventional and usual method of assessing CAPM and that it was entirely proper for it to rely on this model.

The Appeal Panel found:

Whilst there are arguments in favour of either approach in differing circumstances the Panel is not satisfied that the approach adopted by the Commission constituted an error or incorrect exercise of discretion on its part. There was sufficient evidence in support of the original Sharpe model to enable the Commission to reasonably apply that model without adjustment.

The AER notes that the material before it (submitted by the JIA) is substantially the same as that considered by the ESC (submitted by the gas distributors). The AER similarly concludes that it is reasonably open to the AER to apply the Sharpe CAPM in the conventional way.

The conventional way of applying the CAPM is to recognise that the model is a reasonable, but perhaps not the best predictor of returns on equity. Applying the CAPM in the conventional way:

- does not mechanistically adopt empirical estimates for each of the parameters (which at any rate, are only an estimate of each of the unobservable ‘true’ parameters)

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<sup>783</sup> ESC, *Review of gas arrangements 2008-2012—Further final decision and approval of Commission’s amended revisions to access arrangement—SP AusNet*, 19 May 2008, p.16.

- recognises the importance of consistency between parameters. For example, while the CAPM is a single period model of unspecified length, for consistency, once a term has been adopted for one parameter that same term should be adopted for all other parameters
- recognises the importance of integrity in the individual parameters. That is, the risk free rate should only compensate for a risk free rate of return, the MRP should only compensate for market risk, and the equity beta should only represent the relative risk of the asset compared to the market
- is to only compensate for systematic (i.e. non-diversifiable) risk through the WACC (with compensation for other forms of risk, if appropriate, not through the WACC but through other mechanisms)
- is to have regard to both theoretical considerations and empirical estimates in informing each of the WACC parameters, but to exercise a level of judgment in determining the final parameters, taking account of the limitations evident in the empirical and other information used.

### **AER's conclusion**

The AER concludes that:

- as the NER mandates the use of the Sharpe CAPM in determining the cost of equity, the use of alternative asset pricing models, such as the Black CAPM, is not permissible under the NER.
- it is reasonably open to the AER is to apply the Sharpe CAPM in the conventional way, as is established regulatory practice.
- the Sharpe CAPM is a reasonable predictor of equity returns, though at the same time the AER acknowledges that it is not without limitations
- in determining the equity beta the AER has adopted a value higher than that suggested by empirical estimates using the Sharpe CAPM (specifically 0.12 to 0.39 higher), meaning that any possible issue of bias is likely to have been negated.

## **8.6 AER's conclusion**

The AER considers that conceptual considerations do not give grounds to form a conclusive view on the equity beta of a benchmark efficient NSP.

The AER also considers that there is not compelling evidence to suggest that the equity beta should differ based on the form of control (revenue cap vs. price cap). The MEU and JIA agree with this position.

The AER has examined empirical evidence from Australian and foreign data, and considers that:

- Given the differences between estimating equity betas using discrete and continuous returns are minimal, it is appropriate to use the standard approach, which is to use continuous returns.
- It is appropriate to examine Australian data from the post ‘technology bubble’ period onwards. That said, the AER has examined the ACG’s estimates which include pre ‘technology bubble’ observations.
- It is appropriate to examine equity beta estimates using weekly observations as well as equity beta estimates that use monthly observations.
- On the R-squared statistic:
  - while the R-squared is a measure of the model’s power to explain total risk, it is not a direct measure of the precision or stability of the beta point estimate,
  - a low R-squared demonstrates that there is a high level of non-systematic (asset specific) risk, and
  - noting the reservations about SFG’s simulation analysis, observes that the majority of the individual estimates using monthly observations have an R-squared greater than 10 per cent.<sup>784</sup> The AER also observes that the estimates which use weekly observations have lower R-squared statistics. That said, the AER has considered monthly estimates as well as weekly estimates in forming its views about the range of empirical equity beta estimates.
- Given the presence of the additional uncertainties and the indeterminate nature of the adjustments that may be required to ensure the United States equity beta estimates are comparable with the Australian equity beta estimates, the AER continues to place a limited amount of weight upon the United States equity beta estimates (treating the estimates as a check on the reasonableness of the Australian equity beta estimates).
- More weight has been given to an average of individual equity beta estimates due to concerns raised by interested parties and consultants about portfolio estimates. The AER has also placed weight on portfolio estimates of equity betas.
- It agrees with the JIA and the ACG that if confidence intervals were to be considered it is appropriate to consider the bound which contains the previously adopted value. Given that the point estimates generated by regressions are more likely to represent the ‘true’ point estimate the AER has given greater weight to point estimates than confidence intervals. However, the AER has had regard to confidence intervals and observes that approximately 75 per cent of the portfolio equity beta estimates do not contain the previously adopted value.

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<sup>784</sup> SFG has claimed in its reports that equity beta estimations with an R-squared of less than 10 per cent are downwardly biased and/or unreliable.

- Noting that caution should be taken with individual equity beta estimates, there is little evidence of parameter instability.
- Neither the Blume nor Vasicek adjustments (assuming a ‘prior belief’ equity beta of one) should be applied in a regulatory context as either adjustment is likely to introduce an upwards bias in the beta estimates.
- The empirical evidence considered by the AER suggests that the equity beta of a benchmark efficient NSP is in the range of 0.41 (average portfolio estimated by the AER for Australian businesses post ‘technology bubble’) to 0.68 (average portfolio estimated by the ACG for the JIA using a five-year estimation period).
- On the potential limitations of the Sharpe CAPM the AER concludes that:
  - as the NER mandates the use of the Sharpe CAPM in determining the cost of equity, the use of alternative asset pricing models, such as the Black CAPM, is not permissible under the NER.
  - it is reasonably open to the AER is to apply the Sharpe CAPM in the conventional way, as is established regulatory practice.
  - the Sharpe CAPM is a reasonable predictor of equity returns, though at the same time the AER acknowledges that it is not without limitations
  - in determining the equity beta the AER has adopted a value higher than that suggested by empirical estimates using the Sharpe CAPM (specifically 0.12 to 0.39 higher), meaning that any possible issue of bias is likely to have been negated.
- Market data suggests a value lower than 0.8. However, the AER has given consideration to other factors, such as the need to achieve an outcome that is consistent with the importance of regulatory stability. Having taken a broad view, the AER considers the value of 0.8 is appropriate.

Accordingly, the AER considers that there is persuasive evidence to depart from either the previously adopted equity beta of 1.00 or 0.90.

In accordance with the NER, the AER considers that an equity beta of 0.80:

- is supported by the most recent available and reliable empirical evidence, which the AER considers is persuasive in support of adopting a lower equity beta
- is an appropriate estimate of a forward looking rate commensurate with prevailing conditions in the market for funds for a benchmark efficient NSP, and
- is likely to promote efficient investment in providing prescribed transmission services or standard control services in current market conditions.

In determining the value of the equity beta, the AER has also taken into account the revenue and pricing principles. The market data suggests a value lower than 0.8, however, the AER has given consideration to other factors, such as the need to

achieve an outcome that is consistent with the NEO (in particular, the need for efficient investment in electricity services for the long term interests of consumers of electricity). The AER has also taken into account the revenue and pricing principles and the importance of regulatory stability. Having taken a broad view, the AER considers that an equity beta of 0.8 for a benchmark efficient NSP is appropriate.

On this basis, the AER considers that its proposed value achieves an outcome that is consistent with and is likely to contribute to the achievement of the NEO.<sup>785</sup>

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<sup>785</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

## 9 Credit rating level

### 9.1 Introduction

The credit rating is an input into deriving the debt risk premium (DRP) which is defined in cl 6.5.2 (e) of the NER as the difference between the Australian benchmark corporate bond rate and the risk-free rate. The purpose of including a DRP within the expected cost of debt is to compensate a regulated firm for the benchmark cost of debt capital.

The AER considers that both the term structure of the corporate bond and the credit rating are important factors in determining the magnitude of the DRP for a benchmark efficient NSP. The AER is required to examine the credit rating of a benchmark efficient NSP as part of its WACC review. Given that the NER require that the term-to-maturity to derive the DRP must match the maturity of the nominal risk-free rate, this chapter only considers issues related to the selection of a credit rating for a benchmark efficient NSP. As a general rule, the cost of debt is higher (lower) when the credit rating is lower (higher), as investors (lenders) require increased (decreased) compensation before committing funds from the debt issuer due to the higher (lower) risk of default. Chapter six includes a discussion of issues relating to the selection of the appropriate term-to-maturity for the risk-free rate and by implication the term-to-maturity used to derive the DRP.

This chapter outlines the NER requirements and the issues relating to the credit rating levels.

### 9.2 Regulatory requirements

#### 9.2.1 Matters the AER must have regard to under the NER

In undertaking a review of the WACC parameters, the NER sets out several matters that the AER must have regard to. Relevant to the review of the credit rating level are:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing regulated transmission or distribution services (as the case may be)
- the need for the return on debt to reflect the current cost of borrowings for comparable debt
- the need for the credit rating level to be based on a benchmark efficient transmission or distribution network service provider (as the case may be)
- the need to achieve an outcome that is consistent with the NEO, and

- the need for persuasive evidence before adopting a credit rating level that differs from the credit rating level that has previously been adopted for it<sup>786</sup>.

The AER's reasoning as to why each of these matters appear relevant to the review of the credit rating level of gearing is discussed in chapter three on the regulatory framework.

In addition, as discussed in chapter three, the AER has decided to take into account the revenue and pricing principles. The revenue and pricing principles which are directly relevant to this review are:

- providing a service provider with a reasonable opportunity to recover at least the efficient costs
- providing a service provider with effective incentives in order to promote efficient investment, and
- having regard to the economic costs and risks of the potential for under and over investment.

### **9.2.2 Previously adopted value**

As with all other WACC parameters, the credit rating level of a benchmark efficient NSP is not directly observable. As a result, it must be estimated and cannot be determined with certainty. Therefore, in addition to the other relevant factors, the AER must have regard to the need for persuasive evidence and the need to achieve an outcome which is consistent with the NEO before adopting a credit rating level that differs from the credit rating level that has previously been adopted.

The NER deemed the initial credit rating level for TNSPs in all jurisdictions and the DNSPs in NSW and the ACT to be BBB+.<sup>787</sup> For the remaining DNSPs, the NER did not deem an initial credit rating level and the previously adopted credit rating levels in these jurisdictions are those from the most recent distribution determination.

As illustrated in table 9.1, for the purposes of the NER, the previously adopted credit rating level for TNSPs and DNSPs in all jurisdictions is BBB+.

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<sup>786</sup> NER, cls. 6.5.4(e) and 6A.6.2(j).

<sup>787</sup> NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

**Table 9.1: Previously adopted value – credit rating level**

Service provider	Source	Credit rating level
Transmission (all jurisdictions)	NER	BBB+
Distribution (NSW)	NER	BBB+
Distribution (ACT)	NER	BBB+
Distribution (Tasmania)	OTTER (2007)	BBB+
Distribution (Victoria)	ESC (2006)	BBB+
Distribution (Queensland)	QCA (2005)	BBB+
Distribution (South Australia)	ESCOSA (2005)	BBB+
<b>Overall range</b>		<b>BBB+</b>

Source: NER<sup>788</sup>, OTTER<sup>789</sup>, ESC<sup>790</sup>, QCA<sup>791</sup>, ESCOSA<sup>792</sup>.

The AER notes that in setting the initial credit rating for transmission determinations, the AEMC noted that the specification of a credit rating of BBB+ in the NER was made on the basis of analysis in various submissions (i.e. analysis by Lally and the ACG on the behalf of the AER and ETNOF, respectively), previous regulatory decisions,<sup>793</sup> credit rating agency methods, model assumptions, and observed credit ratings.

### 9.3 Summary of position in explanatory statement

Having regard to the submissions and available data regarding the credit rating of a benchmark efficient NSP, the AER:

- Considered that examining median credit ratings of sample businesses is the most appropriate approach to determine a credit rating.
- Disagreed with the JIA submission that a limitation of using a median credit rating was that the sum of the businesses may not equate to the benchmark credit rating.
- Acknowledged the JIA's criticism that credit ratings are discrete variables (i.e. variables which may have a non-normal distribution), making it difficult to form conclusive inferences about the credit rating from applying either a simple average or a regression approach. On this basis the AER considered that a simple

<sup>788</sup> NER, cls. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

<sup>789</sup> OTTER, op. cit., September 2007, p.152.

<sup>790</sup> ESC, op. cit., October 2006, p.332.

<sup>791</sup> QCA, op. cit., April 2005, p.97.

<sup>792</sup> ESCOSA, op. cit., April 2005, p.161.

<sup>793</sup> AEMC, National Electricity Amendment (Economic Regulation of Transmission Services) Rule 2006 No. 18, Rule Determination, 16 November 2006, p. 89.



average of credit ratings and estimates from regression analysis should only be used as a cross-check on the estimate derived from median credit rating values.

- Considered that the presence of a non-normal distribution makes inferences on confidence intervals inappropriate. Accordingly, the point estimates from regressions were only used as a cross-check on the estimates derived from median credit rating values.
- Considered the ‘best comparators’ approach was unlikely to provide any guidance on whether there was persuasive evidence to depart from the previously adopted credit rating given the number of deficiencies of the ‘best comparators’ approach (e.g. such as the use of single annual observations from regulatory decisions to form a view on a benchmark efficient NSP).
- Agreed with the JIA, the MEU and previous advice from the ACG that for the purposes of examining market evidence, the credit ratings of both transmission and distribution businesses should be included in the sample of comparator businesses and as a result the same credit rating should apply to both electricity distribution and transmission businesses.
- Broadened the sample of comparator businesses to include both gas networks and government owned networks. It recognised that some caution should be exercised by including these networks in the sample as these businesses may have some characteristics which are different from a benchmark efficient NSP.
- Observed:
  - the ACG’s 2006 report had also considered that a financially supportive parent impacts on credit ratings (i.e. affects both private and government owned businesses)
  - the JIA acknowledged that government owned businesses are treated on a standalone basis by Standard and Poor’s in determining credit ratings, and
  - the impact on credit ratings of including gas businesses and government businesses will offset each other relative to a median credit rating derived from the private electricity sample.
- Acknowledged that its sample of comparator businesses included government owned (electricity, and, gas and electricity) businesses and privately owned (electricity, and, gas and electricity) businesses with supportive parents, which the AER considered are reasonable but not perfect comparators to a benchmark efficient NSP.
- The number of upwardly and downwardly biased businesses related to the credit ratings<sup>794</sup> offset each other and the need for the sample to be sufficiently large to

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<sup>794</sup> The AER observes that gas businesses tend to have a lower credit rating (and a higher level of gearing) than electricity businesses and government owned businesses typically have a higher credit rating than privately owned businesses).

form a reliable estimate. Therefore, the AER considered that the inclusion of these businesses in the sample of comparators is appropriate.

- Considered a number of financial measures to inform its view of credit ratings in the context of the regression analysis given the ‘best comparators’ approach was not likely to be informative. The AER considered the following financial measures in its regression analysis:
  - credit ratings for comparator businesses, and
  - credit rating metrics such as gearing, interest cover, funds from operations to total debt, free operating cash flow to total debt, and the ratio of cash flow to capital expenditure.
- Incorporated the expected impact of selected qualitative factors in its regression analysis to examine impacts of qualitative factors (such as ownership or the presence of gas networks) on the overall benchmark credit rating.

Based on submissions, available data, the AER’s analysis and the considerations and conclusions made above, the AER considered that there was sufficient persuasive evidence to depart from the previously adopted credit rating of BBB+ of a benchmark efficient NSP and proposed a credit rating of A-.

In accordance with the NER, the AER considered that a credit rating of A-:

- was supported by the most recent available and reliable empirical evidence, which the AER considers is persuasive in support of a change to the existing value
- generated a forward looking rate of return that is commensurate with prevailing conditions in the market for funds, and
- generated a return on debt that reflects the current cost of borrowings for comparable debt.

On this basis the AER considered that its proposed credit rating achieved an outcome that is consistent with the National Electricity Objective.<sup>795</sup>

## **9.4 Summary of submissions in response to the explanatory statement**

In response to its explanatory statement, the AER received submissions on the credit rating of a benchmark efficient NSP from:

- the APA Group
- Citipower, ETSA Utilities and Powercor

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<sup>795</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

- Energex
- Energy Supply Association of Australia
- Ergon Energy
- Envestra
- the Financial Investors Group (FIG)
- Grid Australia
- the JIA
- Macquarie Research on behalf of equity market participants
- the MEU
- NSW Treasury
- the Queensland Government, and
- Queensland Treasury Corporation (QTC).

The MEU argues that the benchmark credit rating should be set at A+. <sup>796</sup> By contrast, the JIA subsequent to the release of the explanatory statement proposes that the credit rating should be set at BBB. <sup>797</sup> The JIA's submission is supported by advice provided by the ACG which examines the credit rating of a benchmark efficient transmission business and the contemporary views of credit ratings agencies. <sup>798</sup> The JIA have provided a subsequent submission which argues that the global financial crisis has resulted in abnormal observations and uncertainty making it difficult to depart from the previously adopted value (BBB+). <sup>799</sup> The FIG submits that there is no evidence to support the AER's proposal to adopt a stronger credit rating of A-. <sup>800</sup> The Queensland Government submit that there would appear to be no persuasive evidence for the AER to depart from its previously adopted credit rating of BBB+. <sup>801</sup>

Submissions from the CitiPower, Energex, Ergon Energy, ETSA Utilities, Grid Australia, Powercor and United Energy support the positions taken in the JIA submission. Submissions mainly focus on the following issues:

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<sup>796</sup> MEU, *Submission in response*, op. cit., January 2009, p. 25.

<sup>797</sup> JIA, *Submission in response*, op. cit., February 2009, p. 126. The JIA had previously proposed no change in the credit rating of BBB+ (see JIA, *Network Industry Submission – AER Issues Paper – Review of the weighted average cost of capital (WACC) parameters for electricity transmission and distribution*, Submission in response, September 2008, p. 132.)

<sup>798</sup> *ibid.*

<sup>799</sup> JIA, *Submission in response*, op. cit., 19 March 2009, p. 2.

<sup>800</sup> FIG, *Submission in response*, op. cit., January 2009, p. 41.

<sup>801</sup> Queensland Government, *Submission in response*, op. cit., January 2009, p. 3.

- standalone credit ratings
- the ‘negative credit ratings environment’, and
- the impact of gas businesses on credit ratings.

## **9.5 Issues and AER’s considerations**

The AER has considered submissions in response to its explanatory statement under four general themes, these are:

- the negative outlooks on the credit ratings of energy networks
- the different analytical methods used
- the selection of comparator businesses and parent ownership, and
- credit rating metrics and other issues.

### **9.5.1 Negative outlook environment**

The AER observes that from time-to-time that Standard and Poor’s do not change the actual credit rating of businesses but rather change the outlook as a potential signal to the market. Standard and Poor’s has five different outlooks, these are negative, watch negative, stable, watch positive and positive. It has been brought to the attention of the AER in response to its explanatory statement that a number of energy networks have been placed on a negative outlook which may potentially result in a lower credit rating.

#### **9.5.1.1 Position in explanatory statement**

This issue was not raised in response to the issues paper and was therefore not addressed in the explanatory statement.

#### **9.5.1.2 Submissions in response to explanatory statement**

The JIA consider that there is no evidence to support an increase in the credit rating of a benchmark efficient NSP above BBB+, taking into consideration the negative ratings environment<sup>802</sup>

Envestra notes that its credit rating position is based upon the views of Standard and Poor’s negative outlooks.<sup>803</sup>

#### **9.5.1.3 Issues and AER’s considerations**

In response to the JIA’s and Envestra’s assertions that the upcoming financial risks are likely to result in a lower credit rating for electricity networks, the AER assumes that the JIA are referring to the current state of global financial markets. The JIA and

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<sup>802</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 135.

<sup>803</sup> Envestra, *Submission in response*, op. cit., 28 January 2009, p. 10.

a number of interested parties refer to the 27 October 2008 Standard and Poor's Industry Report Card:

Australian utilities rated by Standard & Poor's Ratings Services continue to face a challenging environment. Key challenges over the next two years include constrained credit markets, higher debt-funding costs, significant capital-expenditure plans, the expected introduction of a carbon-pollution-reduction scheme (CPRS), and the fallout from any sale of the New South Wales (NSW) government-owned energy retailers. Our recent rating actions and distribution of rating outlooks for the sector support the negative tone: eight of the nine rating actions in the past six months have been negative, while about half of the 33 Australian utilities we rate have negative outlooks. The increasingly negative ratings trend reflects **a combination of concerns regarding balance-sheet management, capital-expenditure funding, and operational issues** (see charts 1 and 2). Any difficulty in raising equity for committed capital works and/or rectifying operational difficulties could see some further downward ratings transition. A favorable note is that the sector's refinancing task is relatively modest until 2010. (Emphasis added)<sup>804</sup>

This statement clearly demonstrates there are a number of concerns that have lead to negative outlooks, and not merely the current state of financial markets. The AER notes that while regulated businesses are highly geared, Standard and Poor's also states in the same Report Card:

Standard & Poor's expects that Australian utilities will take a proactive approach to capital management. Indeed, **actions may need to be initiated to de-lever balance sheets to improve financial metrics** at a given rating level. A number of entities on negative outlook have either already initiated the repair mechanism or committed to the improvement through a combination of new equity raisings, the introduction of dividend reinvestment plans, and/or dividend reduction. (Emphasis added)<sup>805</sup>

The AER also notes that a number of network businesses which have negative outlooks either have levels of gearing approaching 80 per cent, low cash flow credit metrics due to high levels of debt and are involved in or have the desire to increase their unregulated activities. For example, in Standard and Poor's latest report on ElectraNet, it states:

The negative outlook reflects the potential downward pressure on the rating if underperformance to forecasts continues or **no tangible steps are taken to aid in the strengthening of metrics** to, at minimum, policy levels in the near term. Based on the current business profile of ElectraNet, where unregulated business represents less than 15% of total revenue, credit metrics of **2.3x-2.5x FFO interest cover** and **9%-10% FFO to total debt** would be expected for the 'BBB+' rating. The above ElectraNet Pty Ltd financial thresholds would change **if ElectraNet's business profile were to change, such as an accelerated growth in unregulated business, or the balance sheet is used to fund unregulated business. The outlook is unlikely to return to stable until ElectraNet achieves credit metrics commensurate with the 'BBB+'**

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<sup>804</sup> Standard and Poor's, *As Risks Heat Up, Can Australian Utilities Strengthen Their Balance Sheets?*, Industry Report Card, 27 October 2008, p. 1.

<sup>805</sup> Standard and Poor's, *As Risks Heat Up, Can Australian Utilities Strengthen Their Balance Sheets?*, Industry Report Card, 27 October 2008, p. 3.

**rating and operates, at a minimum, at that level for a sustained period of time.** (Emphasis added)<sup>806</sup>

The AER notes that ElectraNet's credit metrics have fallen well below these levels with funds from operations (FFO) to interest cover of 1.7, a FFO to total debt of 6.4 per cent while the gearing level is 79.4 per cent, which is 19.4 per cent above the benchmark efficient level of gearing deemed in the NER.<sup>807</sup>

That said, the current financial market conditions are expected to more severely impact on the ability of businesses to maintain current levels of debt and it is expected that in the medium term those businesses with higher levels of gearing may converge towards a level of gearing more reflective of the adopted 60 per cent level of gearing of a benchmark efficient NSP. Whilst Standard and Poor's views about the future actions by NSPs are based upon expectations, the expectation of businesses changing their financing structures to ensure that they maintain their credit rating is based upon years of experience with providing impartial judgements. In any event it would not be appropriate for the AER to reflect any potential credit rating downgrade in the final decision where the levels of indebtedness of comparator businesses result in a level of gearing beyond the level of gearing of a benchmark efficient NSP. In other words, the credit rating of a benchmark efficient NSP set by the AER should reflect a benchmark efficient NSP with a gearing of 60 per cent. The impact of current financial market conditions and the regulated benchmark cost of debt are discussed in section 2.4.

#### **9.5.1.4 AER's conclusion**

The AER considers:

- The negative outlook environment has been driven by a number of factors and not just the current state of global financial markets. That said, the current state of the financial markets has decreased the likelihood that credit ratings would be upgraded.
- It would not be appropriate for the AER to reflect any potential credit rating downgrade in its final decision where the actual gearing levels and associated credit rating metrics<sup>808</sup> and activities depart from a benchmark efficient NSP.

#### **9.5.2 Analytical methods**

The AER observes that, in general, there have been three analytical methods adopted by regulators in the past to examine the benchmark credit rating. These include:

- obtaining a simple average or median credit rating from a sample of comparator businesses

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<sup>806</sup> Standard and Poor's, *ElectraNet Pty Ltd.*, Company Credit Report, 2 December 2008, pp. 2-3. See also Standard and Poor's, *Envestra Ltd.*, Company Credit Report, 18 August 2008, p. 8.

<sup>807</sup> *ibid.*, p. 7.

<sup>808</sup> Although these credit metrics are not explicit benchmarks, the other credit metrics calculated in the regulatory decisions by the ACG are likely to reflect efficient benchmarks, given that cash flows are determined by efficient costs and the other WACC parameters.

- applying a statistical regression to a sample of comparator businesses (as developed by Lally), and
- applying the ‘best comparators’ approach which attempts to replicate a credit rating decision process (as developed by the ACG).

#### **9.5.2.1 Position in explanatory statement**

The AER considered in its explanatory statement that:

- examining median credit ratings of sample businesses is the most appropriate approach to determine the credit rating of a benchmark efficient NSP
- the median credit rating is not examining the sum of businesses but rather the median decision applied to the sample of comparator businesses which incorporates Standard and Poor’s assessment of business and financial risk
- there are inherent weaknesses with using discrete variables (which may exhibit a non-normal distribution), to form conclusive inferences about the credit rating from either a simple average or a regression approach
- given this weakness, a simple average of credit ratings and estimates from regression analysis should only be used as a cross check on the median credit rating values, and
- based on the number of deficiencies of the ‘best comparators’ approach (e.g. such as the inherent difficulties associated with deriving a relevant credit rating benchmark) it was considered unlikely that it could be used as a method to inform the AER on the appropriate credit rating of a benchmark efficient NSP.

#### **9.5.2.2 Submissions in response to explanatory statement**

The JIA submit that a fundamental flaw in the approach adopted by the AER is its implicit assumption that credit ratings are additive, divisible and generally amenable to statistical analysis. The AER assigns weights to alternative Standard and Poor’s ratings, which are assumed to be equidistant between ratings. The JIA argue that the AER has provided no evidence to demonstrate that this assumption holds.<sup>809</sup>

The JIA also argue the AER has provided no supporting evidence that Standard and Poor’s itself supports this assumption of equidistant weights and methodological approach. The JIA submit that there is no evidence in the AER’s document that it consulted Standard and Poor’s about the methodological approach and whether this corresponds with the approach applied by credit rating agencies in general.<sup>810</sup> The JIA contend that the resulting regression and median credit rating information therefore cannot be relied upon for decision making.<sup>811</sup>

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<sup>809</sup> JIA, *Submission in response*, op. cit., February 2009, p. 129.

<sup>810</sup> *ibid.*

<sup>811</sup> *ibid.*

The JIA submit that the AER also provided some preliminary results for an ordered logit regression approach in support of its findings. The ACG has advised the JIA that due to the insufficient number of observations the results could not be reasonably considered reliable.<sup>812</sup>

In particular, based on advice from the ACG the JIA argue that there are too few valid observations to undertake statistical regression or logit analysis as the AER has done. In doing so, the AER has introduced spurious data that delivers meaningless outputs. This is due to the same reasons that the AER's median and simple average approaches failed to derive a meaningful result.<sup>813</sup>

The JIA note that the 'best comparators' approach derives forecasts of the relevant financial indicators for the benchmark energy network business which are then used to form a judgement on the appropriate credit rating that a benchmark efficient NSP would be likely to maintain. The JIA argue that this method is analogous to that used by ratings agencies.<sup>814</sup>

### 9.5.2.3 Issues and AER's considerations

#### Simple average and median approach

##### *Simple average value of credit ratings*

The AER notes that it recognised in its explanatory statement the shortcomings of assigning equidistant values to credit ratings and therefore did not place primary weight on either using simple averages or the regression approach (noting that caution should be taken before drawing inferences).<sup>815</sup> The AER is aware that this is a simplifying assumption and is unlikely to be reflective of the distances between credit ratings (e.g. distance between BBB+ and A-, compared to distance between A- and A). On this basis the AER will continue to place limited weight on outcomes calculated from simple averages or regression techniques.

##### *Median value of credit ratings*

The AER observes that the following statement was made by the ACG in support of the JIA's submission:

The AER assumed that by calculating the median credit rating, the degree of distortion caused by this approach could be minimised. While **it is true that the degree of distortion could be reduced by estimating medians rather than average ratings**, it cannot be eliminated by this means. Yet this flawed approach underpins the AER's opinion that there is 'persuasive evidence' that the appropriate credit rating of a benchmark efficient network service provider should be raised from BBB+ to A- (emphasis added).<sup>816</sup>

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<sup>812</sup> *ibid.*

<sup>813</sup> *ibid.*, p. 131.

<sup>814</sup> *ibid.*, p. 132.

<sup>815</sup> AER, *op. cit.*, 11 December 2008, p. 259.

<sup>816</sup> ACG, *Credit rating for the 'benchmark efficient network service provider' – Commentary on the AER's 'Explanatory statement'*, Report to Grid Australia, Energy Network Association and Australian Pipeline Association, January 2009, p. 12.



In response the AER notes that the ACG recognise that the degree of distortion is reduced when using medians. However, the AER also recognises that the distortion is not eliminated by using medians. That said, all of the WACC parameters cannot be estimated with certainty and the empirical evidence is likely to be affected by qualitative factors that in some circumstances may result in the observed value departing from the underlying value. It is important to emphasise that if the AER were to ignore empirical evidence that may be affected by qualitative factors, this may preclude the AER from considering any empirical evidence and ignoring information that is relevant to the estimation of the WACC parameters in general. It is noteworthy that the ACG argue that the AER should consider the ‘best comparators’ approach as the best approach for informing the credit rating of a benchmark efficient NSP. This approach also relies upon comparing businesses, which are likely to suffer from distortions that affect their credit rating metrics, to a benchmark efficient NSP. Therefore, in general the AER’s preference is to utilise information in the knowledge of its limitations and or biases as this will guide the AER in terms of the relative weight that should be placed on the available evidence. The AER also requires the AER to have regard to ratings from Standard and Poor’s<sup>817</sup>, which necessitates that the AER inform its view based on the data and information available.

As noted in its explanatory statement, the AER disagrees with the view that a limitation of using a median credit rating is that the sum of the businesses may not equate to the benchmark credit rating.<sup>818</sup> The AER considered:

... the median credit rating is not examining the sum of businesses but rather the median decision applied to the comparator businesses considered to be closely representative of the benchmark efficient business facing levels of business and financial risk as those observed for regulated electricity businesses.<sup>819</sup>

The AER considers that the JIA or its consultant have not provided any new information in response to the explanatory statement that would limit the weight that the AER should place on results from the median analysis.

### **Regression analysis**

The use of regression analysis involves examining the relationship between the dependent variable (in this case the credit rating) and independent variables (such as financial cash flow measures and qualitative variables).<sup>820</sup> In statistical analysis there are a number of different regression approaches that can be used to analyse the relationships between different variables (from raw data). Ordinary Least Squares (OLS) regressions<sup>821</sup> are often used as an initial approach when examining statistical

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<sup>817</sup> NER, cls. 6.5.2(e) and 6A.6.2(e).

<sup>818</sup> AER, *Explanatory statement*, op. cit., 11 December 2008, p. 259.

<sup>819</sup> *ibid.*

<sup>820</sup> When applied to credit ratings the regression analysis assumes that the independent variables are set to zero and that the remaining value in the analysis apart from the dependent variable (also known as the constant) provides the numerical representation of the credit rating.

<sup>821</sup> The OLS approach attempts to get a line of best fit by minimising the squared difference between actual observations and averages (means).

relationships. Another approach that is used when examining decision making processes is the logit approach.

In response to the explanatory statement, the JIA sought the advice of the ACG to examine the regression analysis conducted by the AER. The JIA notes the same criticism that applies to the use of averages (i.e. the assumption of equidistance between credit ratings) also applies to the use of OLS regressions.<sup>822</sup> The AER has previously recognised in the context of simple averages in its explanatory statement that the assumption of equidistance of credit ratings is unlikely to be reflective of the distances between actual credit ratings.<sup>823</sup> On this basis the AER attributes limited weight on any approach that relies primarily upon any weighting system (regardless of whether uniform or non-uniform are used) placed upon different credit ratings.

As the AER has previously recognised in its explanatory statement a method to overcome the weighting issue in regression analysis when examining variables that are ranked from highest to lowest would be to apply an ordered logit regression approach. This approach is likely to be more appropriate than an OLS regression approach for the purposes of examining credit rating decisions. The ordered logit regression estimates the probability of a specific decision being made (i.e. Standard and Poor's giving a credit rating of BBB+, A-, A, etc.) assuming that the business' credit rating metrics are currently at the values of a benchmark efficient NSP (e.g. 60 per cent gearing). The credit rating of a benchmark efficient NSP would be informed by the estimated probabilities (with the highest probability credit rating decision being used for of a benchmark efficient NSP).<sup>824</sup>

However, the AER agrees with the JIA, that there are an insufficient number of observations relating to energy networks for an ordered logit approach to reliably inform the AER on the credit rating of a benchmark efficient NSP.<sup>825</sup> Accordingly, the AER considers that regression approaches are unlikely to provide further information at this point in time. This is because the OLS approach is unlikely to add further information other than the information provided by calculating average credit ratings as there are insufficient observations to conduct a reliable regression analysis (such as a probit or ordered logit regression). That said, the AER will consider probit or logit analysis when it can be demonstrated that:

- there is a sufficient amount of data or, at least
- it is similarly informative to the currently adopted approaches (i.e. to either medians or the 'best comparators' approach).

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<sup>822</sup> JIA, *Submission in response*, op. cit., February 2009, p. 129.

<sup>823</sup> AER, *Explanatory statement*, op. cit., 11 December 2008, p. 259.

<sup>824</sup> The AER considers that in order to for the AER to accept a binary logit approach that it needs to be demonstrated that the outcome from the analysis cannot be manipulated. The only requirement for an ordered logit regression is that each decision have a unique value, whether the values are in a specific order is of less relevance.

<sup>825</sup> A reliable ordered logit estimation is likely to require a large number of observations (greater number of years than cross-sections) relating to energy networks for an ordered logit approach to reliably inform the AER on the benchmark efficient credit rating.

## Best comparators approach

The ACG has previously noted that the regression approach used by Lally suffers from two challenges. First, there are a myriad of variables that may affect credit ratings and many of these cannot be measured. Second, even if the relevant variables could be measured, there may be insufficient credit-rated Australian firms to establish a reliable estimate.<sup>826</sup> Given these challenges, the ACG developed the ‘best comparators approach’ to conduct further analysis of benchmark credit ratings.

In response to the explanatory statement the ACG provided clarification to the JIA in its report about the steps involved in applying the ‘best comparators’ approach:

To derive an estimate of the credit rating that a benchmark efficient firm would maintain, we first derived the most relevant financial indicators for a sample of firms that have been the subject of the recent AER draft or final decisions. The firms we examined were the NSW electricity distributors, Transend, TransGrid and ElectraNet. Our estimates of these firm’s projected credit metrics (FFO/Interest Cover and FFO/Total Debt) over the next regulatory period shown in Table ES.1 below...

**Table ES. 1 – Electricity Distribution/Transmission: FFO/Interest Cover & FFO/Debt (%)**

Years	2009	2010	2011	2012	2013	2014	Ave.
NSW Distributors		2.1	2.1	2.1	2.1	2.1	<b>2.1</b>
		10%	10%	10%	9%	10%	<b>10%</b>
Tasmanian Transmission		2.3	2.2	2.1	2.2	2.2	<b>2.2</b>
		11%	10%	10%	10%	11%	<b>10%</b>
NSW Transmission		2.1	2.1	2.1	2.0	2.0	<b>2.1</b>
		10%	10%	10%	9%	9%	<b>9%</b>
SA Transmission	2.1	2.0	2.0	2.0	2.0		<b>2.0</b>
	10%	10%	9%	10%	10%		<b>10%</b>

Source: ACG<sup>827</sup>

We then compared these financial indicators to those of the relevant listed Australian entities that we discussed above.<sup>828</sup>

The relevant listed Australian entities the ACG selected are ElectraNet, GasNet (prior to 2007), United Energy (prior to 2004), Envestra, and DUET as its list of best comparators.<sup>829</sup> However, the ACG notes that it places less weight on United Energy due to its telecommunications (fibre broadband) activities and DUET because of its

<sup>826</sup> ACG, *Credit rating for a benchmark electricity transmission business*, Report to Electricity Transmission Network Owners Forum, May 2006, p. 20.

<sup>827</sup> ACG, op. cit., January 2009(c), p. 6.

<sup>828</sup> *ibid.*

<sup>829</sup> *ibid.*

strategy involving mergers and acquisitions.<sup>830</sup> The ACG concludes that ElectraNet is the single best comparator as its financial credit metrics were sometimes above and sometimes below the target metrics range.<sup>831</sup>

The AER observes that the ACG has made several changes to its previous report in 2006, which the AER considered in its explanatory statement. In response to the explanatory statement the ACG has:

- removed SP AusNet from the list of best comparators
- removed the net cash flows to capex ratio (although noting the way it forecasts net cash flows is still appropriate)<sup>832</sup> from the list of financial credit metrics, and
- used an average of the forecast cash flows over a number of regulatory determinations rather than relying upon a single forecast year in a single determination.

The AER considers that the ACG's removal of the net cash flow measure (section 9.5.4 discusses credit rating metrics) and the use of averages (across a number of years and regulatory determinations) is likely to increase the reliability of the estimated credit rating metrics of a benchmark efficient NSP. The AER considers that the two credit rating metrics retained by the ACG are likely to be the most relevant for the credit rating decision. Further, the AER accepts that the issue of the credit rating of a benchmark efficient NSP adopted in decisions (BBB+) predetermining the outcome of the 'best comparators' approach is unlikely to be of significance when deciding between a credit rating of BBB+ and A-. This is because the difference in the cost of debt (which affects interest payments) and the overall return (which affects return on capital) between BBB+ and A- is likely to be minimal under most circumstances. That said, the issues of 'circularity' may become more important if either there is significant divergence in credit spreads between BBB+ and A-, or a large range of credit ratings (i.e. from BBB- to AAA+) are considered.

However, the AER notes that the ACG has not addressed the issue of its best comparator businesses having activities which are perceived as riskier (e.g. non-electricity activities or non-natural monopoly activities) to determine the credit rating of a benchmark efficient NSP.<sup>833</sup> That said, as the AER has already noted for median credit ratings, if the AER were to ignore empirical evidence that may be affected by qualitative factors (such as riskier activities), this may preclude the AER from considering any empirical evidence and ignoring information that is relevant to the estimation of the WACC parameters in general.

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<sup>830</sup> *ibid.*

<sup>831</sup> *ibid.*, p. 7.

<sup>832</sup> It should be noted that the arguments raised by the ACG relate to the issue of equity raising costs and how dividend yields are determined for the purposes of determining equity raising costs for a benchmark business. Given that equity raising costs are outside of the scope of this review any arguments relating to the assumed dividend yield will be addressed in transmission and distribution determinations.

<sup>833</sup> This issue relates to the selection of businesses to the form the sample and is discussed further in sections 4.4 and 9.5.3.

Further, the AER observes that all of the best comparator businesses selected by the ACG have higher levels of gearing than a benchmark efficient NSP which indirectly affects the credit metrics selected by increasing the amount of debt carried by the selected businesses and their interest obligations. This is just one example that demonstrates that the ‘best comparators’ approach is a simplistic approach which focuses on a limited number of factors (i.e. two credit rating metrics) when compared to a highly complex credit rating process which examines a myriad of factors. That said, the AER recognises that all the approaches considered in this section have limitations. However, the AER considers that due to the modifications the ACG has applied and for the reasons discussed, the ‘best comparators approach’ is a satisfactory approach which can be used to inform the credit rating of a benchmark efficient NSP.

#### **9.5.2.4 AER’s conclusion**

The AER considers that:

- Examining median credit ratings of sample businesses and the ‘best comparators’ approach are appropriate approaches to determine the credit rating of a benchmark efficient NSP. As noted in its explanatory statement, the AER disagrees with the view that a limitation of using a median credit rating is that the sum of the businesses may not equate to the benchmark credit rating.<sup>834</sup>
- Neither the JIA nor its consultant have provided any new information that would limit the amount of weight that the AER should place on the results from the median analysis.
- It previously recognised the shortcomings associated with assigning equidistant weights to credit ratings and therefore did not place primary weight on either using simple averages or the regression approach (noting that caution should be taken before drawing inferences).<sup>835</sup>
- The OLS regression approach is unlikely to add further information than that provided by calculating average credit ratings and that there are insufficient observations to conduct any meaningful regression analysis using other approaches (such as a probit or ordered logit regression).
- Given the modifications the ACG has applied in response to the explanatory statement, the AER considers that the ‘best comparators approach’ is a satisfactory approach which can be used to inform the credit rating of a benchmark efficient NSP.

Accordingly, the AER has had regard to the outcomes from using median credit ratings and the ‘best comparators’ approach in informing its view of the credit rating of a benchmark efficient NSP. The AER considers that the outcomes provided from these approaches are likely to:

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<sup>834</sup> AER, *Explanatory statement*, op. cit., 11 December 2008, p. 259.

<sup>835</sup> *ibid.*, p. 259.

- provide the most recent available and reliable empirical evidence, which the AER may consider is persuasive in support of a change to the existing value
- generate a credit rating which can be used to determine a forward looking rate of return that is commensurate with prevailing conditions in the market for funds, and
- result in an outcome which generates a return on debt that reflects the current cost of borrowings for comparable debt.

### **9.5.3 Selection of comparator businesses**

The AER observes that regulators have selected a group of comparator businesses to determine the credit rating for a benchmark NSP rather than adopting a market-wide benchmark. As the AER must have regard to a benchmark efficient NSP, the AER's considerations in this regard are discussed in sections 3.4.6 and 4.4. The AER considers that there are a number of considerations when selecting the businesses to be used for informing the AER's decision on the credit rating of a benchmark efficient NSP, these include:

- the extent to which the sample businesses are expected to reflect a benchmark efficient NSP
- the availability of data
- qualitative factors which may lead to biased outcomes, and
- empirical issues such as statistical robustness and selection bias.

#### **9.5.3.1 Position in explanatory statement**

In its explanatory statement the AER considered that both government and gas businesses were reasonable but not perfect comparators. Furthermore, when considering the offsetting biases in these businesses and the need for the sample to be large enough to form a reliable benchmark, the AER considered that the offsetting biases are unlikely to have a significant impact on the overall outcome.<sup>836</sup> The following businesses were included as the AER considered that these businesses are sufficiently close comparators to a benchmark efficient NSP:

- Citipower Trust
- Country Energy
- Dampier Bunbury Natural Gas Pipeline Trust
- Diversified Utility and Energy Trusts
- ElectraNet Pty Ltd

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<sup>836</sup> AER, *Explanatory statement*, op. cit., 11 December 2008, p. 271.

- Energy Australia
- Energy Partnership (Gas) Pty Ltd (EPG)
- Envestra Ltd
- Ergon Energy Corporation
- ETSA Utilities
- GasNet Australia (Operations) Pty Ltd
- Integral Energy
- Powercor Australia
- Rowville Transmission Facility Pty Ltd
- SPI PowerNet Pty Ltd, and
- United Energy.<sup>837</sup>

#### **9.5.3.2 Submissions in response to explanatory statement**

The MEU submits that two thirds of the regulated electricity businesses (on a RAB basis) are government owned firms, and have a high credit rating (with many as high as AA+, with all being at least AA). It notes that privately owned electricity businesses have an average credit rating of A-. It argues that despite the AER observing that it considers the ownership of the firms should not be a criterion for setting the credit rating, the outcome of its assessment effectively excludes the impact of this government ownership.<sup>838</sup>

The MEU observes that the AER includes gas transportation businesses in its assessment. The impact of the inclusion of the predominantly privately owned gas transport sector is to reduce the overall energy transport sector credit rating, which the AER then uses as a benchmark efficient NSP. It submits that the gas sector introduces an element of higher risk and uncertainty due to gas transport businesses being more susceptible to revenue reductions due to weather than electricity. It argues that the inclusion of the gas transport businesses introduces conservatism into the analysis that should not be present.<sup>839</sup>

The MEU notes that its submission to the issues paper recommended a credit rating level of A+ and this level is supported by the analysis of the AER when assessing purely electricity transport, as this review is required to do.<sup>840</sup>

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<sup>837</sup> *ibid.*, pp. 273-274.

<sup>838</sup> MEU, *Submission in response*, op. cit., 30 January 2009, p. 19.

<sup>839</sup> *ibid.*, pp. 19-20.

<sup>840</sup> *ibid.*, p. 25.

The JIA notes that as a matter of logical consistency the benchmark credit rating must relate to the benchmark energy network businesses. The AER has previously defined the benchmark energy network business as:

It is assumed by the AER that in setting a benchmark allowance for equity raising costs it is regulating a hypothetical efficient benchmark firm. The efficient benchmark firm should be a large listed firm and while firms may operate under different structures to this, compensation should not be provided for any deviation from the benchmark.<sup>841</sup>

Therefore, the JIA argue energy network businesses with characteristics materially different to the benchmark will not provide any relevant information to the AER for comparative analysis purposes.<sup>842</sup>

The JIA observe that government owned businesses that are rated tend to have two credit ratings—a public rating and a private rating. The public rating reflects the actual ownership structure and the explicit or implicit financial support provided by the Government as parent. The private rating, which cannot be publicly disclosed, assesses the Government owned businesses on a stand-alone basis. This private rating can be used for a number of purposes but has mainly been used to estimate the likely cost of debt that the Government owned business would face if it had to raise debt without the benefit of Government ownership (and hence is used to calculate competitive neutrality fees).<sup>843</sup>

The JIA argue the AER has assumed that the public credit rating is the private credit rating (i.e. stand-alone rating) which it submits is incorrect. The public rating, which is relied upon by investors and the wider market, reflects the ratings agency's assessment of the business 'as it is', which is a Government-owned business with explicit or implicit financial support. Further, the JIA observe there is evidence to suggest that Government ownership has had a significant impact on the rating outcome for these businesses.<sup>844</sup>

The JIA submit that in order to better inform the AER of its misinterpretation of public ratings for government owned businesses, a number of government owned regulated businesses have provided information on their private stand-alone rating to the AER on a confidential basis. The JIA submit that this information clearly demonstrates that the AER's starting position of AA for government owned businesses is incorrect.<sup>845</sup>

The JIA argue where a subsidiary is rated but the parent company is not, what the AER obtains is most likely to be an estimate of what rating the parent company would have if it were rated. By including such subsidiaries the AER has introduced

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<sup>841</sup> AER *New South Wales draft distribution determination 2009-10 to 2013-14*, Draft decision, op. cit., 21 November 2008, p. 193.

<sup>842</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 125.

<sup>843</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 126.

<sup>844</sup> *ibid.*

<sup>845</sup> *ibid.*, p. 127.



observations that introduce spurious information and confound the relationship that is being sought: the likely credit rating of a stand-alone benchmark efficient NSP.<sup>846</sup>

The JIA also argue the key issue looked at by Standard & Poor's and other ratings agencies is whether the operations of the subsidiary are considered core by the parent. In the event the parent can be expected to intervene if required, the rating of the parent is given to the subsidiary irrespective of the subsidiary's actual credit metrics.<sup>847</sup>

AMP Capital Investors argue that the proposal contained in the explanatory statement to assign a credit rating level of A- to the sector is inappropriate given the fact that not a single private sector participant in the sector holds a standalone (no support from parents assumed) credit rating at this level.<sup>848</sup>

Ergon Energy notes that its public credit rating hinges primarily on the implicit support provided by the Queensland Government. The impact of Government support is highlighted in the following extract from the Standard and Poor's public credit rating report on Ergon Energy Corporation Limited:

The rating on Australian electricity distributor and retailer Ergon Energy Corp. Ltd. (EEC) principally reflects the very strong support of the company's government owner, the State of Queensland (AAA/Stable/A-1+).<sup>849</sup>

Ergon Energy argues that the public credit rating of a Government owned corporation (GOC) is not representative of a benchmark efficient NSP. Further, it notes under the National Competition Policy Principles a GOC must pay a competitive neutrality fee to equate its actual cost of funds to a corporate issuer with the same credit rating as the GOC's standalone credit rating. As the name suggests, a standalone credit rating is issued by a credit rating agency on the assumption that the GOC does not receive any explicit or implicit support from its government shareholders.<sup>850</sup>

Ergon Energy notes that its standalone credit rating is confidential, however, it targets an investment grade credit rating in the BBB- to BBB+ range. Consistent with this range it targets a capital structure of 60 per cent debt and 40 per cent equity. The impact of the explanatory statement on Ergon's cash flow metrics (e.g. EBITDA interest cover) would likely necessitate a reduction in gearing to maintain an investment grade credit rating on a standalone basis.<sup>851</sup>

Envestra argues that publicly owned energy businesses are not rated using the same methodology as corporate borrowers, as the credit enhancement provided by the shareholder (AAA rated State Government) is taken into account. Use of credit ratings on publicly owned energy businesses biases upwards the observed sector wide

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<sup>846</sup> *ibid.*, p. 130.

<sup>847</sup> *ibid.*

<sup>848</sup> Equity market participants, *Submission in response*, op. cit., 30 January 2009, p. 5.

<sup>849</sup> Ergon Energy, *Submission in response*, op. cit., 2 February 2009, p. 1.

<sup>850</sup> *ibid.*, p. 2.

<sup>851</sup> *ibid.*

historical credit ratings and is inconsistent with the AER's own definition of the benchmark energy network business, which is a large listed firm.<sup>852</sup>

Envestra notes that the AER has observed the historical rating of a number of network entities and made an assessment based on history. However, it has taken no account of the fact that some of those entities have ratings that substantially reflect the ownership of these companies, being largely either State or Singapore government entities or Hong Kong based entities. This is inconsistent with the intended regulatory model which posits an 'efficient stand-alone network entity' capable of sustainable long-term investment. It is this 'mythical creature' that should be the subject of the ratings assessment and which has quite reasonably in the past been set at BBB/BBB+.<sup>853</sup>

The ESAA argues that the AER's decision adopts a credit rating assumption that does not appear to be based on a rating that would be achieved by a true 'standalone' private sector entity with no capacity to access public financing arrangements, or the capital of an associated parent company.<sup>854</sup>

Grid Australia observes that the data which has been used for government-owned networks are ratings which include government support, rather than the 'standalone' ratings of the businesses. Grid Australia argues that it is the standalone rating which is relevant and fit for purpose. This rating is materially different to the government supported rating which the AER has used in its analysis.<sup>855</sup>

Grid Australia argue that the AER has excluded the ratings of significant players in the electricity network business, and this also acts to create an upward bias in the data used in the assessment of the benchmark rating.<sup>856</sup>

Jemena submits that its credit rating is based on the business that it is in (the energy network industry) and an assessment of whether it is managing its exposures as well as others in that industry. However, the rating is also partly a result of the ownership structure. Singapore Power (AA-/Aa3) ultimately has a 100 per cent holding in Jemena. Jemena understands from Standard and Poor's rating reports that it has the benefit of a ratings uplift that takes into account its ownership by a more highly rated parent.<sup>857</sup>

NSW Treasury observes the AER appear to have mistakenly assumed that Standard & Poor's include stand-alone ratings for government owned businesses in its industry report cards. This is not the case for NSW Government owned electricity network businesses.<sup>858</sup>

NSW Treasury submits stand-alone credit ratings are currently determined by Fitch Ratings for NSW electricity networks that exclude any credit rating enhancement

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<sup>852</sup> Envestra, *Submission in response*, op. cit., 28 January 2009, p. 9.

<sup>853</sup> *ibid.*, p. 10.

<sup>854</sup> ESAA, *Submission in response*, op. cit., 3 February 2009, p. 3.

<sup>855</sup> Grid Australia, *Submission in response*, op. cit., 2 February 2009, p. 6.

<sup>856</sup> *ibid.*, p. 7.

<sup>857</sup> Jemena, *Submission in response*, op. cit., 2 February 2009, p. 7.

<sup>858</sup> NSW Treasury, *Submission in response*, op. cit., 28 January 2009, p. 11.

associated with Government ownership. The public rating used in Standard and Poor's industry report card is not a stand-alone rating but rather assumes implicit support from the NSW Government.<sup>859</sup>

NSW Treasury discloses that the median stand-alone rating of the four NSW energy networks businesses is BBB+, consistent with the median ratings of the private energy network businesses reported in table 9.4 of the explanatory statement, and materially different to the AA median credit rating reported for Government businesses.<sup>860</sup>

The Queensland Government notes that the small sample size exposes the AER's analysis to a heightened risk of bias.<sup>861</sup>

The Queensland Government submits that government-owned businesses are imperfect comparators in that, by virtue of a financially-supportive parent, they have characteristics which distinguish them from 'benchmark' efficient businesses. To the extent that no compensating adjustment is made, their inclusion would bias any assessment upwards.<sup>862</sup>

The Queensland Government observes that for both 2007 and 2008, Ergon Energy is the only government-owned network included within the sample of comparator firms. It argues that the statistical properties of the sample, which is used to assess the median credit rating across all network providers, are severely weakened by the AER's failure to include any other government-owned transmission and distribution entities in that sample.<sup>863</sup>

The Queensland Government argues that the AER has relied on the use of Ergon's AA+ public credit rating. This rating is inappropriate, being inclusive of the Queensland Government's implicit guarantee of financial support.<sup>864</sup>

The Queensland Government notes it undertakes capital structure reviews of Queensland GOCs on a stand alone basis to determine appropriate capital structures and maintain investment grade credit ratings (greater than BBB-) – with stand alone credit ratings for the individual GOCs likely to be 'investment grade'.<sup>865</sup>

United Energy argues the AER has moved away from accepted regulatory practice that the benchmark efficient NSP should be standalone and privately owned.<sup>866</sup>

United Energy notes that the sample used by the AER to inform the credit rating of a benchmark efficient NSP contains a number of businesses which have either implicit or explicit parental support. Credit rating agencies typically take account of the balance sheets of parents, and the likelihood that parents will support businesses if

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<sup>859</sup> *ibid.*

<sup>860</sup> *ibid.*, p. 12.

<sup>861</sup> Queensland Government, *Submission in response*, 30 January 2009, p. 2.

<sup>862</sup> *ibid.*

<sup>863</sup> *ibid.*

<sup>864</sup> *ibid.*, p. 3.

<sup>865</sup> *ibid.*

<sup>866</sup> United Energy, *Submission in response*, *op. cit.*, 2 February 2009, p. 9.

those businesses fall into need. The rating agencies will assume such support even if there are no specific contractual arrangements in place and the child businesses are legally ringfenced.<sup>867</sup>

### 9.5.3.3 Issues and AER's considerations

The ACG notes the NER require the credit rating to 'be based on a benchmark efficient NSP'. It then goes on to add that the task is to determine the credit rating that an entity with the same characteristics as a benchmark efficient NSP would be expected to obtain. As noted in section 9.5, the AER considers that taking such a literal interpretation would preclude the AER from considering any empirical evidence, as there are no Australian businesses that solely provide either prescribed services (electricity transmission) or standard control services (electricity distribution). For example, the business that the ACG considers the 'best comparator' is ElectraNet, Standard and Poor's observe in its most recent company report card that:

About 92% of the company's revenue is derived from regulated business with ETSA Utilities Partnership (ETSA Utilities Finance Pty Ltd. Rated A-/Stable/-) contributing more than 85% of that revenue.<sup>868</sup>

By the standard set by the ACG, the AER would be unable to consider ElectraNet as it does not have the 'same' characteristics as a benchmark efficient NSP. ElectraNet does not have the same characteristics as a benchmark efficient NSP as it has unregulated activities (which are considered riskier than natural monopoly activities) and its gearing levels approach 80 percent<sup>869</sup> (well above the benchmark of 60 per cent).

The AER observes that a number of interested parties have referred to the definition of a benchmark business as defined in the NSW distribution draft decisions for 2009-2014 on equity raising costs. The AER stated in its draft decision:

It is assumed by the AER that in setting a benchmark allowance for equity raising costs it is regulating a hypothetical efficient benchmark firm. The efficient benchmark firm should be a large listed firm and while firms may operate under different structures to this, compensation should not be provided for any deviation from the benchmark.<sup>870</sup>

The JIA and Envestra argue that the AER's inclusion of government owned businesses in its sample of comparator businesses is inconsistent with this definition of a benchmark efficient NSP. As previously noted in section 3.4.6, the AER considers that a benchmark efficient NSP is a 'pure play' regulated electricity network (transmission and/or distribution business) operating within Australia without parent ownership.<sup>871</sup>

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<sup>867</sup> *ibid.*

<sup>868</sup> Standard and Poor's, *ElectraNet Pty Ltd.*, Company report card, 2 December 2008, p. 1.

<sup>869</sup> *ibid.*, p. 7.

<sup>870</sup> AER, *op. cit.*, 21 November 2008, p. 190.

<sup>871</sup> AER, *Explanatory statement*, *op. cit.*, 11 December 2008, p. 56.

The AER has responded to submissions on the conceptual definition and application of the conceptual definition in sections 3.4.6 and 4.4 of this final decision. The AER has clarified its position in its final determination for NSW distribution that a benchmark efficient NSP is a ‘pure play’ regulated electricity network business operating within Australia without parent ownership.

Interested parties have focused upon two main groups of businesses that the AER included in its sample, these include:

- businesses with strong parent owners and/or government owned network businesses, and
- gas network businesses.

The JIA, its consultant the ACG and parties supporting its submission consider that it is inappropriate to include businesses that have support from their owners. The JIA and the ACG, argue that the presence of support results in a credit rating that no longer reflects the credit rating suggested by the financial credit metrics of a natural monopoly business.<sup>872</sup>

The AER previously recognised in its explanatory statement that the presence of parent ownership is one factor amongst a myriad of factors (albeit a significant factor) which may result in a credit rating decision departing from an assessment of the credit rating of a benchmark efficient NSP. In the case of the sample selected to obtain median credit ratings, the AER recognised that the presence of a supportive parent was likely to result in a higher credit rating.<sup>873</sup> That said, the AER observes that the JIA have taken the following view from the ACG in the presence of an unrated parent:

...the AER has included **subsidiary business where the credit rating of the parent is not recorded**. The error from including such business is that **there is no connection between the credit rating for the subsidiary and the key credit metrics for that subsidiary**. Where a subsidiary is rated but the parent company is not, what the AER obtains is an estimate of the rating of the parent company if it were rated. By including any subsidiaries the AER has introduced spurious information that confounds the relationship being sought: what is the likely credit rating of an independent benchmark efficient network service provider? (emphasis added)<sup>874</sup>

In order to consider this statement by the ACG, the AER sought the views of Standard and Poor’s to clarify the credit ratings process. Representatives from Standard and Poor’s confirmed that in most circumstances the ACG’s position is not correct.<sup>875</sup> Only under specific circumstances would the financial position of the subsidiary be ignored and the AER considers that this is unlikely to be the case for the majority of the businesses used in the sample.

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<sup>872</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 125 and ACG, *Report to Grid Australia, Energy Network Association and Australian Pipeline Association*, op. cit., January 2009, p. 2.

<sup>873</sup> AER, op. cit., 11 December 2008, p. 269.

<sup>874</sup> ACG, op. cit., January 2009 (c), p. 13.

<sup>875</sup> Standard and Poor’s, *E-mail to the AER*, 9 February 2009.

The AER's understanding of the credit ratings process for a subsidiary, as confirmed by representatives from Standard and Poor's, is as follows:

- 1) an assessment of the subsidiary's financial risks (financial credit rating metrics) is made
- 2) an assessment of the subsidiary's business risks (operational, managerial, shareholder expectations, competitive and other factors are examined) is then conducted, and
- 3) an examination of its relationship with its parent and to other group companies is made (a number of factors are taken into account including an assessment of the parent's credit quality and the group credit quality).<sup>876</sup>

United Energy argues that rating agencies will assume parent support even if there are no specific contractual arrangements in place and the 'child' businesses are legally ringfenced.<sup>877</sup> The AER also sought views from representatives from Standard and Poor's on the circumstances in which it ignores parent ownership. Representatives from Standard and Poor's indicated that parent ownership is ignored in circumstances where there is a strong financial ring-fence between the parent and subsidiary business to mitigate any ownership issues. A strong financial ring-fence usually includes limitations on security and dividends, additional debt and on other factors which may normally provide a link to the parent business.<sup>878</sup> That said, the AER considers that the presence of strong ringfencing arrangements is unlikely to be a factor for the majority of the businesses in the sample as it appears most businesses either enjoy neutral or positive support from parent owners.

The AER agrees with the submissions from the JIA, Queensland Government and NSW Treasury that the publicly listed credit ratings imply government support and are not used for the purposes of debt neutrality.<sup>879</sup> The AER received a confidential submission from the JIA noting the standalone credit rating is below A-.<sup>880</sup> However, the AER notes that NSW Treasury and the JIA's median standalone credit ratings are based predominantly on either Fitch or Moody's ratings. The NSW Treasury submits that Moody's ratings are the equivalent of Standard and Poor's BBB+ rating. The Queensland Government submits that the Queensland GOCs 'targeted' an investment grade credit rating.<sup>881</sup> The AER notes the view that there is a general consensus between GOCs that the underlying credit rating, assuming neutral parent ownership,

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<sup>876</sup> Standard and Poor's, *RE: Follow up questions from yesterday's meeting*, E-mail to the AER, 9 February 2009.

<sup>877</sup> United Energy, *Submission in response*, op. cit., 2 February 2009, p. 9.

<sup>878</sup> Standard and Poor's, *E-mail to the AER*, 9 February 2009.

<sup>879</sup> Queensland Government, *Submission in response*, op. cit., 30 January 2009, p. 2; and NSW Treasury, *Submission in response*, op. cit., 28 January 2009, p. 12.

<sup>880</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 130.

<sup>881</sup> Queensland Government, *Submission in response*, op. cit., 30 January 2009, p. 3. Ergon Energy submits that it targets within the BBB- to BBB+ range Ergon Energy, *Submission in response*, op. cit., 2 February 2009, p. 2.

is BBB/BBB+. <sup>882</sup> That said, the AER notes that the information provided in these submissions has limited application other than to confirm that businesses with supportive parents obtain a higher credit ratings as the AER has previously acknowledged.

The AER notes that its exclusion of government businesses from the sample to determine the term of the risk-free rate, as discussed in section 6.5.3, is to be distinguished. In relation to the risk-free rate, the AER's reason for excluding government businesses from the sample was that government businesses did not face the same refinancing risks as private businesses (i.e. government businesses obtain funds from the State or Federal Treasury while private businesses must obtain funds from the private market). The AER considers that refinancing risk has a direct impact on the term for which a private business can obtain funds. For the credit rating it is likely that the reduced re-financing risk faced by government-owned businesses may increase the size of the upward bias but when considering medians, as previously discussed, the size of the bias is a less relevant consideration. Rather, the number of upwardly and downwardly biased businesses is a more relevant consideration. This emphasises why the AER has placed a limited amount of weight on average credit ratings.

Further, the AER notes that the NER require the credit rating to be based upon a credit rating from Standard and Poor's. <sup>883</sup> Given that Moody's, Fitch, and Standard and Poor's are likely to have variations in analytical approaches, the AER can only consider businesses rated by Standard and Poor's. This reliance on Standard and Poor's ratings has resulted in the public ratings of businesses using other rating agency services of a number of businesses being excluded from the analysis. Given the NER requirements, the AER considers it is only appropriate to consider information from Fitch or Moody's in the context of qualitative factors used in assessing ratings.

Given further views provided in submissions, the AER accepts that ElectraNet should be considered as the only business in the NEM which does not benefit from support from its parents and may be considered the closest comparator to a benchmark efficient NSP in relation to a stand-alone credit rating. The AER observes that interested parties have highlighted that Standard and Poor's, and Moodys do not consider that ElectraNet has parent owners in credit rating reports on ElectraNet. The AER also observes that ElectraNet has a credit rating of BBB+ with a negative outlook in 2008.

However, the AER considers that there are other factors that need to be considered in the context of a benchmark efficient NSP. The AER notes that the negative outlook for ElectraNet in 2008 is a product of a number of factors including high levels of gearing (approaching 80 per cent—which is 20 percentage points above the level assumed for a benchmark efficient NSP) and an increased appetite for unregulated activities (activities which are perceived as riskier and are not covered by the AER's

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<sup>882</sup> NSW Treasury, *Submission in response*, op. cit., 28 January 2009, pp. 11-12; Ergon Energy, *Submission in response*, op. cit., 2 February 2009, p. 2; and Queensland Government, *Submission in response*, 30 January 2009, p. 3.

<sup>883</sup> NER, cls. 6.5.2(e) and 6A.6.2(e).

WACC review).<sup>884</sup> The AER notes that representatives from Standard and Poor's consider that, all else being equal, that a lower level of gearing would be a positive for a credit rating decision.<sup>885</sup>

The AER also noted in its explanatory statement that the gas network businesses provide a negative bias in the sample of comparators. The AER observes that all but one standalone business selected in the ACG's 'best comparators' analysis is a regulated gas business (with one business containing observations ending in 2006). The ACG considers that GasNet and Envestra are very good comparators, singling out that GasNet charges for its services in a manner that is almost identical to gas and electricity distributors.<sup>886</sup> The AER considers that this does not address all of the concerns identified in the explanatory statement, which were based upon submissions from the MEU and the APIA.<sup>887</sup> The AER notes that representatives from Standard and Poor's consider that in general gas networks are exposed to a slightly greater risk than electricity networks and would require mitigating factors such as stronger credit metrics to maintain a similar credit rating.<sup>888</sup> This view can be further evidenced in Standard and Poor's peer comparison of Energy Partnership (Gas) Pty Ltd where it states:

Most recently, this has resulted in the gas distributors' credit quality weakening more substantially than similarly located electricity distributors due to the differences in their demand profiles and therefore profitability. Multinet and Envestra Ltd. (BBB-/Negative/A-3) are two examples of this, with the ratings on both recently moving to 'BBB-' from 'BBB', largely because lower than expected profitability could no longer support their highly leveraged financial profiles at the previous rating level. Conversely, **while United Energy Distribution Pty Ltd. (BBB/Stable/—) operates in the same region as Multinet, its volume of electricity distributed has remained solid and it has maintained stronger financial metrics.** (emphasis added)<sup>889</sup>

This appears to be consistent with the view put forward by the MEU in its submission that gas networks are more susceptible to volume variations (and consequently cash flow variations) due to weather volatility than electricity networks.<sup>890</sup> The AER acknowledges that gas network businesses with similar financial credit metrics to electricity network businesses may have lower credit ratings. In addition, the presence of supportive parents also introduces businesses with arguably overstated credit ratings similar to electricity businesses with supportive parents. The AER disagrees with the MEU's argument that gas businesses should be excluded from the sample as there would be equally valid grounds to exclude other businesses with characteristics that depart from a benchmark efficient NSP.

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<sup>884</sup> Standard and Poor's, *Company report card*, op. cit., 2 December 2008, pp. 1-2.

<sup>885</sup> Standard and Poor's, *E-mail to the AER*, 9 February 2009.

<sup>886</sup> ACG, , op. cit., January 2009(c), p. 7.

<sup>887</sup> AER, op. cit., 11 December 2008, p. 56.

<sup>888</sup> Standard and Poor's, *E-mail to the AER*, 9 February 2009.

<sup>889</sup> Standard and Poor's, *Energy Partnership (Gas) Pty Ltd.*, Company report card, 18 January 2009, p. 6.

<sup>890</sup> MEU, *Submission in response*, op. cit., 30 January 2009, p. 20.



As discussed in section 3.4.6, the AER considers that the previous position held by the JIA in response to the issues paper was a reasonable approach. In response to the issues paper the JIA submitted that there was the conceptual benchmark which should be kept separate from the sample used to conduct empirical analysis. The AER agrees with this approach and therefore used the conceptual definition of a benchmark efficient NSP as a basis for selecting which businesses should be included in the sample. The AER considers that the following factors are relevant to selecting the sample:

- how closely the selected firms resemble the conceptual definition of a benchmark efficient NSP (e.g. operational and ownership differences)
- the size of the sample businesses and the likelihood that a robust estimate can be obtained
- the availability of data (e.g. historical data, market and book valuations, unlisted businesses), and
- the reliability of data (i.e. presence of outliers observations and events).

Also, as previously noted in section 9.5, if the AER were to remove comparator businesses that do not perfectly reflect a benchmark efficient NSP it would be left with no samples of comparator businesses.

The AER does not accept the ACG's argument that it added 'flawed' observations to offset the impact of gas businesses.<sup>891</sup> In its explanatory statement the AER was merely making the observation that a number of comparator businesses that had upwardly biased (supportive parent) credit ratings were generally offset by the number of businesses that had downwardly (gas) biased credit ratings when examining median credit rating results.<sup>892</sup> For this final decision the AER has considered both businesses with supportive parents and gas networks on the understanding that the credit ratings from these businesses will be inherently biased in opposite directions relative to that of a benchmark efficient NSP.

#### **9.5.3.4 AER's conclusion**

The AER notes that it has defined a benchmark efficient NSP as a 'pure play' regulated electricity network (transmission and/or distribution business) operating within Australia without parent ownership.<sup>893</sup>

Further, the AER:

- Accepts submissions from the Queensland Government and NSW Treasury that the publicly listed credit ratings imply government support and are not used for the purposes of debt neutrality.<sup>894</sup>

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<sup>891</sup> ACG, op. cit., January 2009 (c), p. 18.

<sup>892</sup> As opposed to averages, biases in medians are more likely to be affected by skewed data in terms of numbers of businesses rather than large values.

<sup>893</sup> AER, op. cit., 11 December 2008, p. 56.

- Notes that the information provided in submissions from NSW Treasury and the Queensland Government has limited application other than to confirm that businesses with supportive parents result in higher credit ratings as the AER has previously acknowledged.
- Also Notes that the NER require the credit rating to be based upon a credit rating from Standard and Poor's.<sup>895</sup> Given that is likely that Moody's and Standard and Poor's are likely to have variations in analytical approaches, the AER has only considered businesses rated by Standard and Poor's.
- Is aware that gas networks with similar financial credit metrics to electricity network businesses may provide credit ratings that are lower than electricity networks and the presence of supportive owners also introduces businesses with overstated credit ratings.
- Has considered both businesses with supportive parents and gas networks on the understanding that the credit ratings from these businesses will be inherently biased in opposite directions relative to a benchmark efficient NSP.

The AER considers that the outcomes provided from benchmark businesses will be likely to:

- generate a credit rating which can be used to determine a forward looking rate of return that is commensurate with prevailing conditions in the market for funds, and
- result in an outcome which generates a return on debt that reflects the current cost of borrowings for comparable debt.

#### **9.5.4 Credit rating metrics and other issues**

In order to inform the credit rating of a benchmark efficient NSP, credit rating metrics have been used as variables to estimate a credit rating. In the past regulatory practice has involved examining the level of gearing in conjunction with the credit rating. However, the ACG noted that Standard and Poor's considers a number of different factors when setting a credit rating. The factors that Standard and Poor's considers either relate to a business's exposure to business or financial risk. Business risk relates to a number of qualitative factors (e.g. management behaviour) and the competitive position of the business. Financial risk relates to a business's financial policies and a number of different financial measures (e.g. cash flow measures and the level of gearing).

##### **9.5.4.1 Position in explanatory statement**

In the explanatory statement the AER used simple averages, medians and regression approaches. In applying these approaches the AER considered the following financial measurements in its analyses:

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<sup>894</sup> Queensland Government, *Submission in response*, op. cit., 30 January 2009, p. 2; and NSW Treasury, *Submission in response*, op. cit., 28 January 2009, p. 12.

<sup>895</sup> NER, cls. 6.5.2(e) and 6A.6.2(e).

- credit ratings for comparator businesses, and
- credit rating metrics such as gearing, interest cover, funds from operations to total debt, free operating cash flow to total debt, and the ratio of cash flow to capital expenditure.<sup>896</sup>

The AER also incorporated the expected impact of selected qualitative factors in its regression analysis to examine impacts of these qualitative factors on the overall assumed credit rating of a benchmark efficient NSP.<sup>897</sup>

#### 9.5.4.2 Submissions in response to explanatory statement

The JIA submit the AER's inclusion of the AAA-rated Rowville Transmission Facility's \$28 million credit wrapped bonds is very strange as it is not a regulated network business, and bears little resemblance to a benchmark efficient NSP that is the AER's concern. Furthermore, the AAA credit rating attributed to the Rowville Transmission Facility significantly biases the AER's econometric analysis.<sup>898</sup>

The JIA note Standard and Poor's defined the two most important credit metrics that it applies to ElectraNet as follows:<sup>899</sup>

Based on the current business profile of ElectraNet, where unregulated business represents less than 15% of total revenue, credit metrics of 2.3x-2.5x FFO interest cover and 9%-10% FFO to total debt would be expected for the 'BBB+' rating.<sup>900</sup>

Grid Australia argues that given the importance of the decision and the small number of businesses in this category (businesses with private credit ratings), it is reasonable to expect that the AER will now use the relevant, broader data on standalone credit ratings provided in the JIA submission.<sup>901</sup>

The Queensland government argues that it is disappointing that the AER has limited its sample of comparator firm to those with publicly-available credit ratings. In doing so, the regulator has excluded from the data set several businesses with unpublished ratings – including Powerlink, a large electricity transmission network service provider. Given the importance of the analysis, and relatively small effort required to obtain this additional information, it would be reasonable for the AER to expand its information base.<sup>902</sup>

#### 9.5.4.3 Issues and AER's considerations

As discussed in section 9.5.3 the AER considers median credit ratings and the modified 'best comparators' approach are appropriate when examining the credit

<sup>896</sup> AER, op. cit., 11 December 2008, p. 273.

<sup>897</sup> *ibid.*

<sup>898</sup> JIA, *Submission in response*, op. cit., 2 February 2009, p. 130.

<sup>899</sup> *ibid.*, p. 132.

<sup>900</sup> *ibid.*, p. 133.

<sup>901</sup> Grid Australia, *Submission in response*, op. cit., 2 February 2009, p. 7.

<sup>902</sup> Queensland Government, *Submission in response*, op. cit., 30 January 2009, p. 2; and NSW Treasury, *Submission in response*, op. cit., 28 January 2009, p. 2.

rating level of a benchmark efficient NSP. Accordingly, the AER has considered financial credit rating metrics in the context of median credit ratings and the ‘best comparators’ approach. The AER agrees with the JIA that the financial credit metrics; FFO to interest cover; and FFO to total debt are the most appropriate metrics when applying the ‘best comparators’ approach given that Standard and Poor’s specifically refer to these credit rating metrics (and not other credit rating metrics such as net cash flow to capital expenditure) in its reports. As noted in section 9.5.1.2, the AER continues to consider that net cash flows to capex is an inappropriate consideration on the basis that it considers that the ACG has used the dividend yield approach which can lead to unusual outcomes such as dividend payout ratios well in excess of 100 per cent. Further, the AER in the explanatory statement demonstrated that net cash flows are highly susceptible to changes in forecast capex.<sup>903</sup>

The AER acknowledges an error in the credit rating for the Rowville Transmission Facility based on advice provided by representatives from Standard and Poor’s that the appropriate credit rating for this facility is A-. Given that the AER is not relying on econometric techniques to inform its view of the credit rating, the AER notes that this error is unlikely to affect the assumed credit rating. Moreover, as the Rowville Transmission has its revenue fixed for 30 years and is relatively small in the nature<sup>904</sup> the AER has removed this business from the sample and therefore will not be used to inform the median credit rating. That said, the AER notes that the removal of this business has little impact on the overall estimated credit ratings.

In response to interested parties on the use of private ratings, the AER considers there are two issues that need to be carefully considered when examining published or unpublished standalone credit ratings.

First, there is a need for transparency in a public process. Despite the limited amount of effort that may be required to obtain private credit ratings from the individual businesses this information is generally not publicly available.<sup>905</sup>

Second, the reasons for providing standalone credit ratings will vary depending on the purpose of these ratings have been set for. In some circumstances Standard and Poor’s publish standalone credit ratings as requested by the client to provide an indication to prospective lenders what the floor of the business’s credit quality might be. The AER considers that a floor on the credit quality may be a conservative evaluation. Accordingly, the AER considers it may be inappropriate to place significant weight on standalone credit ratings in the context of this review other than to provide an indicator of bias in estimates of the credit rating.

#### **9.5.4.4 AER’s conclusion**

The AER will be considering the following financial measurements in its ‘best comparators’ analysis:

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<sup>903</sup> AER, *Explanatory statement*, op. cit., 11 December 2008, pp. 264-265.

<sup>904</sup> ACG, op. cit., January 2009 (c), p. 15. For example the revenue generated by the Rowville Transmission facility is about 185 times smaller than the average network business.

<sup>905</sup> The AER considers that providing ranges for one business (e.g. from BBB- to A+) cannot be used in either the median or ‘best comparators’ approach.

- credit ratings for comparator businesses, and
- financial credit rating metrics such as interest cover and FFO to total debt, free operating cash flow to total debt, and the ratio of cash flow to capital expenditure.

The AER considers:

- Given that the Rowville Transmission has its revenue fixed for 30 years and is relatively small in the nature<sup>906</sup> the AER has removed this business from the sample. It may be inappropriate to consider standalone credit ratings in the context of this review other than to provide an indicator of bias in the estimates of the credit rating.

The AER considers that the outcomes provided from financial credit rating metrics identified above will provide a range of credit rating values that is likely to:

- provide the most recent available and reliable empirical evidence, which the AER may consider is persuasive in support of a change to the existing value
- generate a credit rating which can be used to determine a forward looking rate of return that is commensurate with prevailing conditions in the market for funds, and
- result in an outcome which generates a return on debt that reflects the current cost of borrowings for comparable debt.

## 9.6 AER's analysis

In the explanatory statement, the AER considered a number of approaches to estimate the credit rating, including median credit ratings, simple average credit ratings and OLS regressions. It examined data from 2002 to 2008 (differing across approaches). The AER found that:

- private electricity businesses had a median credit rating of A-
- gas networks had a median credit rating of BBB
- private energy networks had a median credit rating of BBB+
- government networks had a median credit rating of AA, and
- energy networks had a median credit rating of A-.

The AER then examined averages and regression approaches which confirmed that there was sufficient persuasive evidence to depart from the previously adopted credit rating of BBB+ to a credit rating of A- of a benchmark efficient NSP.

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<sup>906</sup> ACG, op. cit., January 2009 (c), p. 15.

### 9.6.1 Submissions in response to explanatory statement

The MEU argues the credit worthiness of stable revenue secure businesses will see enhancement in times of financial distress, when compared to businesses with a more volatile revenue stream. The MEU submit that the cost of debt (the debt risk premium) could increase overall, although the Federal Government is endeavouring to minimise this impact. It concludes that to change the credit rating to recognise the current availability of debt is neither necessary nor appropriate.<sup>907</sup>

The JIA considered that there is no evidence to support an increase in the credit rating of a benchmark efficient NSP above BBB+, taking into consideration:

- the negative ratings environment
- the benchmark credit metrics contained in table 7.2 of its submission, and the fact that those metrics are below the levels stated by Standard and Poor's as required for the ElectraNet BBB+ rating
- the median credit metrics in table 7.3 of its submission
- the JIA's expert advice and
- further evidence provided in its submission, including in relation to government owned businesses.<sup>908</sup>

The JIA argued that there is not only persuasive evidence to maintain the currently adopted credit rating of BBB+, but that persuasive evidence exists to support a reduction in the credit rating to BBB.<sup>909</sup>

The JIA argue that the global financial crisis has resulted in abnormal observations and uncertainty making it difficult to depart from the previously adopted value (BBB+).<sup>910</sup>

AMP Capital Investors note that ratings agencies pay particular attention to the asset's debt service cover ratios. It argues that the current gearing level is consistent with the characteristics of a BBB rated entity. The proposed revision of the equity beta to 0.8, coupled with a requirement for an A- credit rating, may impose an obligation on current asset owners to de-leverage their investments.<sup>911</sup>

AMP Capital Investors argue that the credit rating proposal is at odds with the rating of BBB+ which was adopted by the AER in its draft transmission determination for

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<sup>907</sup> *ibid.*, p. 33.

<sup>908</sup> JIA, *Submission in response*, *op. cit.*, 2 February 2009, p. 135.

<sup>909</sup> *ibid.*

<sup>910</sup> JIA, *Submission in response*, *op. cit.*, 19 March 2009, p. 2.

<sup>911</sup> Equity market participants, *Submission in response*, *op. cit.*, 30 January 2009, p. 5.

Transgrid, an entity that is publicly owned by a AAA rated entity, less than six weeks prior to the draft statement of regulatory intent.<sup>912</sup>

The APA Group argues the cost of debt for regulated electricity transmission assets are well above the cost of debt implied for an A- asset under the explanatory statement.<sup>913</sup>

Brook Asset Management submits that while they generally concur with the AER that the credit worthiness of network operators should improve (credit rating from BBB+ to A-) this should be reflected in a lower level of benchmark gearing (60 per cent to 50 per cent).<sup>914</sup>

Envestra contends that the data used by the AER to inform its estimates for the equity beta and credit rating is from the 2002-2007 credit bubble period, which is now widely acknowledged by governments and financial market participants to be a period which under-priced risk.<sup>915</sup>

Envestra argues that the AER's 'backwards looking' credit ratings analysis is not valid. Envestra notes that its position is based upon the views of Standard and Poor's negative outlooks, the current economic climate, the high level of gearing (60 per cent) held by energy network businesses, and, the heightened presence of refinancing and regulatory risk.<sup>916</sup>

Envestra submits that these factors make it reasonable to conclude that credit ratings on energy network businesses are likely to reduce in the future and supports a move from the BBB+ benchmark to BBB. Accordingly, there is no basis for increasing the benchmark credit rating.<sup>917</sup>

The FIG argues a credit rating of A-:

- is above the current stand-alone credit rating of any of the Standard and Poor's rated regulated participants in the sector and inconsistent with 60:40 gearing. Those with A- ratings (i.e. Spark Infrastructure and SP AusNet have parent company support), and
- could be as much as two notches above the stand-alone credit rating of regulated businesses in the event that ratings are further reduced in light of the AER's proposals, as S&P has cautioned.<sup>918</sup>

Grid Australia notes that, in response to the AER's explanatory statement, ratings agencies have indicated a likelihood of a ratings downgrade on the basis of the AER's decision. Whilst Grid Australia recognises that there is a certain circularity in this,

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<sup>912</sup> *ibid.*

<sup>913</sup> APA Group, *Submission in response*, op. cit., 3 February 2009, p. 3.

<sup>914</sup> Equity market participants, *Submission in response*, op. cit., 30 January 2009, p. 4.

<sup>915</sup> Envestra, *Submission in response*, op. cit., 28 January 2009, p. 2.

<sup>916</sup> *ibid.*, p. 10.

<sup>917</sup> *ibid.*, p. 10.

<sup>918</sup> FIG, *Submission in response*, op. cit., 29 January 2009, p. 5.

surely it must require the AER, in the ‘persuasive evidence’ test, to lift the barrier to change.<sup>919</sup>

Macquarie Bank believes the proposal to depart from a previously adopted credit rating of BBB+ for a benchmark efficient NSP and adopt a credit rating of A- may put significant financial pressure on some regulated entities. It also notes that Standard and Poor’s has since stated in response to the draft WACC decision that it leaves companies vulnerable to a lowering in credit ratings by one notch.<sup>920</sup>

The Queensland Government argues that especially in the current financial and investment environment, the AER credit rating parameter is not considered to be representative. Given the shortcomings of the AER’s analysis, and in lieu of a more comprehensive analysis being undertaken, there would appear to be no persuasive evidence for the AER to depart from its previously-adopted benchmark credit rating of BBB+.<sup>921</sup>

Queensland Treasury observes that credit spreads have widened significantly and credit ratings are generally weakening, yet a stronger credit rating of A- has been proposed.<sup>922</sup>

### **9.6.2 Credit rating sample issues**

As noted in section 9.5.2, the AER considers that gas network businesses and businesses with supportive parents are sufficiently close comparators to inform the credit rating of a benchmark efficient NSP. However, the AER is cognisant of these issues in interpreting the data such as the potential of double counting (i.e. including subsidiaries and parents), and the biases introduced due to qualitative factors (such as those that arise from gas networks and parent ownership). To address the issue of double counting the AER has examined a restricted sample and an unrestricted sample. The following businesses and dates have been included in the unrestricted sample as the AER considers that these businesses are sufficiently close comparators to a benchmark efficient NSP:

- AGL (2002 to 2005)
- Alinta (2002 to 2007)
- Alinta Infrastructure Holdings (2006)
- Alinta Network Holdings Pty Ltd (2003 to 2006)
- Citipower Trust (2002 to 2008)
- Country Energy (2002 to 2006)

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<sup>919</sup> Grid Australia, *Submission in response*, op. cit., 2 February 2009, p. 7.

<sup>920</sup> Equity market participants, *Submission in response*, op. cit., 30 January 2009, p. 7.

<sup>921</sup> Queensland Government, *Submission in response*, op. cit., 30 January 2009, p. 2.

<sup>922</sup> QTC, *Submission in response*, 30 January 2009, p. 1.



- DBNGP (2005 to 2008)
- DUET (2003 to 2008)
- ElectraNet Pty Ltd (2002 to 2008)
- EnergyAustralia (2002 to 2006)
- EPG (2002 to 2005 and 2006 to 2008)
- Envestra Ltd (2002 to 2008)
- Envestra Victoria Pty Ltd (2002 to 2005 and 2008)
- Ergon Energy Corporation (2002 to 2008)
- Ergon Energy Pty Ltd (2002 to 2005)
- ETSA Utilities (2002 to 2008)
- GasNet Australia (Operations) Pty Ltd (2002 to 2007)
- Integral Energy (2002 to 2006)
- Powercor Australia (2002 to 2008)
- SP AusNet Group (2006 to 2008)
- SPI Australia (2003 to 2008)
- SPI PowerNet Pty Ltd (2002 to 2008), and
- United Energy (2002 to 2008).

The following businesses and dates have been included in the restricted sample as the AER considers that these businesses are sufficiently close comparators to the benchmark efficient NSP:

- AGL (2002 to 2005)
- Alinta (2002 and 2007)
- Alinta Network Holdings Pty Ltd (2003 to 2006)
- Country Energy (2002 to 2006)
- Diversified Utility and Energy Trusts (2003 to 2008)
- ElectraNet Pty Ltd (2002 to 2008)
- Energy Australia (2002 to 2006)

- Envestra Ltd (2002 to 2008)
- Ergon Energy Corporation (2002 to 2008)
- ETSA Utilities (2002 to 2008)
- GasNet Australia (Operations) Pty Ltd (2002 to 2007)
- Integral Energy (2002 to 2006)
- SP AusNet Group (2006 to 2008), and
- SPI PowerNet Pty Ltd (2002 to 2005).

The AER notes that Envestra argues that the usage of the sampling period of 2002 to 2006 is inappropriate due to the ‘credit bubble’ which is likely to be unrepresentative of the future.<sup>923</sup> The AER observes that the JIA submission (which Envestra supports) has relied upon the ACG analysis to support its position on credit ratings (and the equity beta) which includes the 2002 to 2006 period in its analysis. Further, although Standard and Poor’s has noted the impact of the financial crisis in its assessments of credit ratings, there a number of other factors that have driven negative outlooks. The AER observes that the credit ratings in 2007 and 2008 have remained relatively stable, despite the negative outlooks. If the assertion made by Envestra was true, the AER would observe a reduction of credit ratings for energy networks across the board, which has clearly not occurred.

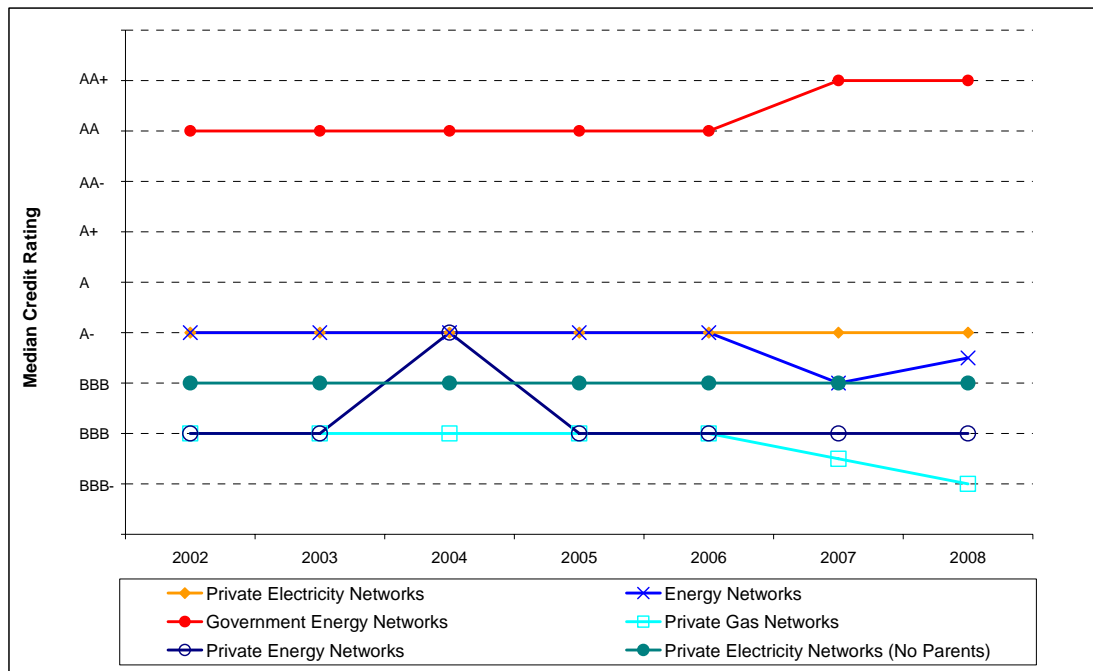
### **9.6.3 Median credit rating**

As a first step, the AER has examined credit ratings on an annual basis. Figures 9.1 and 9.2 demonstrate the median credit rating using the different samples discussed in section 9.5.2.

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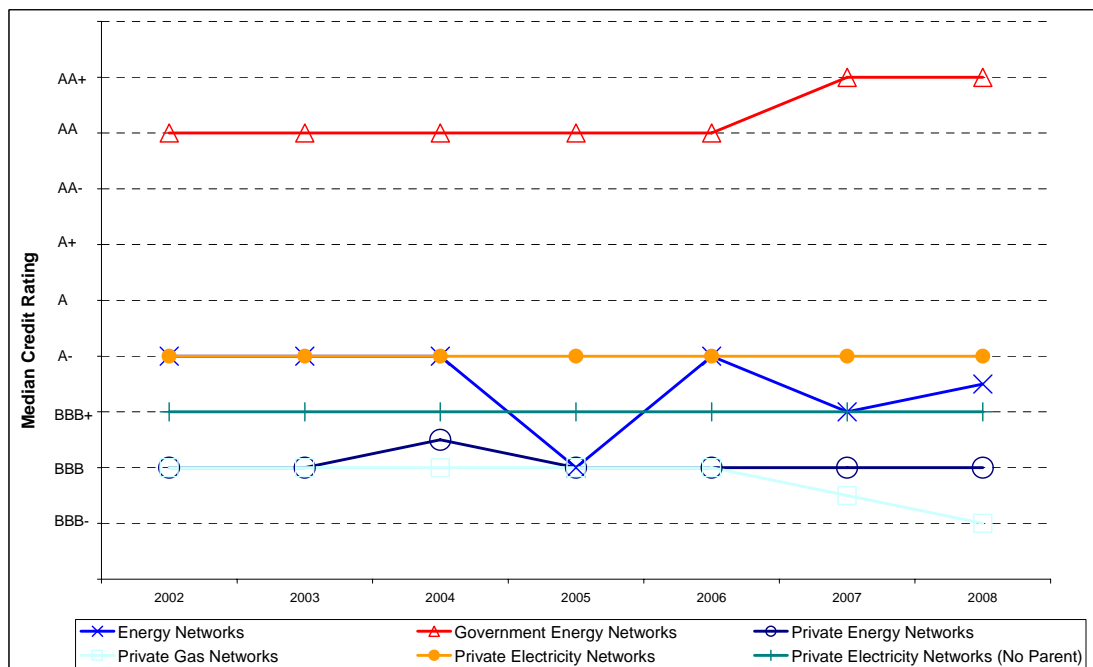
<sup>923</sup> Envestra, *Submission in response*, op. cit., 28 January 2009, p. 2.

**Figure 9.2: Annual median credit rating (2002 - 2008) – Restricted Sample**



Source: AER analysis, Medians obtained using Standard and Poor’s industry and company report cards (2002 - 2008)

**Figure 9.2: Annual median credit rating (2002 - 2008) – Unrestricted Sample**



Source: AER analysis, Medians obtained using Standard and Poor’s industry and company report cards (2002 - 2008)

In general, the median credit ratings across samples have been relatively stable over time. The main exception is the unrestricted sample, where in 2005 the number of gas

businesses (13 out of 23 businesses) dominates the sample and the AER observes that the median credit rating for the 2005 energy sample is BBB. As the AER has previously observed gas businesses tend to have lower credit ratings than electricity businesses for the reasons discussed in section 9.5.2.3 and therefore the inclusion of gas businesses results in a lower median credit rating than in the absence of gas businesses in the sample. On the other hand, businesses with supportive parents (for both gas and electricity businesses) tend to have higher credit ratings and increase the median credit rating. The AER considers that the median credit ratings of the private electricity networks (with no parents – i.e. ElectraNet), private electricity networks and energy networks provide a range of estimates that can be used to inform the credit rating of a benchmark efficient NSP.

The AER considers that using medians across a number of years (e.g. approximately five years) is more appropriate rather than the latest available year given the sensitivity of median credit ratings to the number and types of businesses in the sample. This is demonstrated by the volatility of credit from year-to-year in both the unrestricted sample (see 2007 and 2008) and the restricted sample (see 2006 to 2008). Further, using a number of years is consistent with the approach the AER has taken with deriving other industry specific parameters such as the equity beta and level of gearing. Accordingly, the AER has examined the median credit rating from 2002 to 2008.

**Table 9.2: Comparison of different samples (2002 - 2008)**

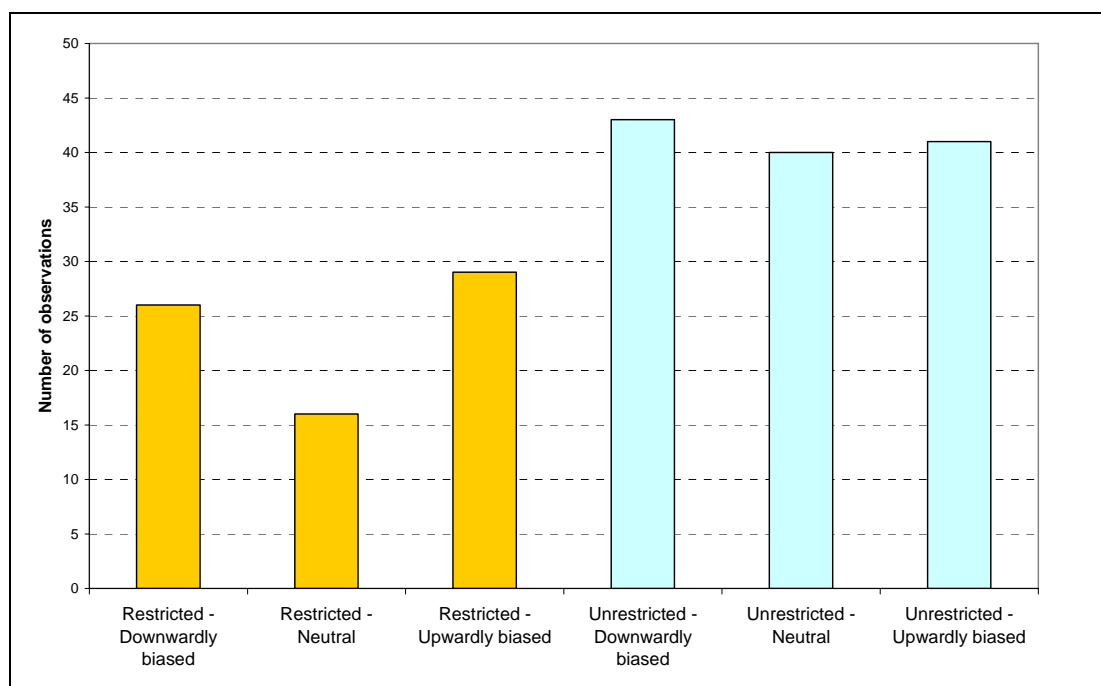
Measure	Energy Networks	Private Electricity Networks	Private Electricity Networks (No Parent)
Median Credit Rating (2002 – 2008) – Restricted Sample	A-	A-	BBB+
Median Credit Rating (2002 – 2008) – Unrestricted Sample	A-	A-	BBB+

Source: AER analysis, Medians obtained using Standard and Poor’s industry and company report cards (2002 - 2008)

The AER observes the range of credit ratings from BBB+ to A-. The AER notes that the private electricity networks (No parent) sample comprises one firm, which is ElectraNet. The AER notes that ElectraNet’s actual level of gearing has departed further away from the benchmark level of gearing in 2008 and that Standard and Poor’s noted that it had an increasing appetite to provide more unregulated services. The AER accordingly considers that ElectraNet’s position prior to 2008 is more likely to reflect the hypothetical benchmark.

Figure 9.3 demonstrates how the number of upwardly biased (i.e. businesses with supportive parents) observations offsets the number of downwardly biased (i.e. businesses with activities that have higher business risk) observations.

**Figure 9.3: Count of biased observations**



Source: AER analysis<sup>924</sup>

The AER observes in the unrestricted sample that the number of downwardly biased observations outnumbers the upwardly biased observations, while in the unrestricted sample the opposite occurs. The AER also observes that the median credit rating remains unchanged in both samples and therefore it is likely the impact of any biases is limited.

The private electricity sample contains more businesses than the private electricity (no parent) sample and has an average level of gearing more reflective of a benchmark efficient NSP (56.86 per cent).<sup>925</sup> However, the majority of businesses in the sample have supportive parents and therefore the sample is likely to be upwardly biased when compared with a benchmark efficient NSP.

The energy network sample contains the most businesses of all three samples and has a level of gearing that is similarly reflective of the level of gearing of a benchmark efficient NSP (65.03 per cent).<sup>926</sup> The AER also observes that the number of businesses with supportive parents is similar to the number of businesses with gas networks and therefore it is likely that the median credit rating is less likely to be skewed in one direction or another when compared with the other samples. On this basis, the AER considers that applying the median approach suggests the credit rating for a benchmark efficient NSP may be A-.

<sup>924</sup> The restricted sample only includes the credit rating of the parent business. The unrestricted sample includes all observations (parents and subsidiaries).

<sup>925</sup> AER, *Explanatory statement*, op. cit., 11 December 2009, p. 80.

<sup>926</sup> *ibid.*

#### 9.6.4 'Best comparators' approach

The following tables are taken from the ACG's report to the JIA:

**Table 9.3 – Electricity Distribution/Transmission: FFO/Interest Cover & FFO/Debt (%)**

Years	2009	2010	2011	2012	2013	2014	Ave.
NSW Distributors		2.1	2.1	2.1	2.1	2.1	<b>2.1</b>
		10%	10%	10%	9%	10%	<b>10%</b>
Tasmanian Transmission		2.3	2.2	2.1	2.2	2.2	<b>2.2</b>
		11%	10%	10%	10%	11%	<b>10%</b>
NSW Transmission		2.1	2.1	2.1	2.0	2.0	<b>2.1</b>
		10%	10%	10%	9%	9%	<b>9%</b>
SA Transmission	2.1	2.0	2.0	2.0	2.0		<b>2.0</b>
	10%	10%	9%	10%	10%		<b>10%</b>

Source: ACG<sup>927</sup>

<sup>927</sup> ACG, *Report to Grid Australia, Energy Network Association and Australian Pipeline Association*, op. cit., January 2009, p. 6.

**Table 9.4 – Electricity Distribution/Transmission: FFO/Interest Cover & FFO/Debt (%)**

Comparator	Metric	2002	2003	2004	2005	2006	2007	Ave. <sup>(a)</sup>
ElectraNet	Interest Cover	2.0	2.3	2.8	2.3	2.5	2.1	<b>2.3</b>
	FFO/Debt	6.8%	8.0%	10%	10%	9%	10%	<b>9%</b>
	Credit Rating	BBB+	BBB+	BBB+	BBB+	BBB+	BBB+	<b>BBB+</b>
GasNet <sup>(c)</sup>	Interest Cover	2.0	2.0		1.9	1.8	2.5	<b>2.0</b>
	FFO/Debt	7.0%	6.8%		5.7%	5.3%	13.8%	<b>7.7%</b>
	Credit Rating	BBB	BBB		BBB	BBB	BBB	<b>BBB</b>
United Energy <sup>(b)</sup>	Interest Cover		1.8					<b>1.8</b>
	FFO/Debt		11.3					<b>11.3%</b>
	Credit Rating		BBB					<b>BBB</b>
Envestra <sup>(c)</sup>	Interest Cover	1.5	1.59	1.6	1.5	1.6	1.6	<b>1.6</b>
	FFO/Debt	3.9	4.2	4.1	3.8	4.4	4.1	<b>4.1%</b>
	Credit Rating	BBB	BBB	BBB	BBB	BBB-	BBB-	<b>BBB</b>
DUET <sup>(b)</sup>	Interest Cover		2.0	2.0	2.2	1.8	1.6	<b>1.9</b>
	FFO/Debt		7.4%	6.9%	8.1%	5.8%	4.0%	<b>6.4%</b>
	Credit Rating		BBB-	BBB-	BBB-	BBB-	BBB-	<b>BBB-</b>

Source: Standard and Poor's industry report cards (2002 - 2008) and United Energy Company Report Card (23 December 2008)

Notes:

- (a) Median credit ratings used rather than averages.
- (b) The ACG places less weight on these businesses due to the presence of the businesses's other activities
- (c) These businesses are gas networks and are exposed more to volume risk.

The ACG states that on the basis of tables 9.3 and 9.4, ElectraNet and United Energy are the closest comparators. However, the ACG further states that due to United Energy's involvement in telecommunications activities, the credit rating of BBB is likely to be due to the increased levels of business risk from these unregulated activities. Accordingly, the AER considers that only ElectraNet is likely to be appropriate for the 'best comparators' analysis. The other businesses used as comparators by the ACG are involved in gas activities and may be exposed to higher business risks such as volume risk. Further, as noted in the median credit rating discussion, the AER considers that ElectraNet from 2002 to 2007 is likely to be a more appropriate comparator than ElectraNet in 2008 when compared with a conceptual benchmark efficient NSP. The AER concludes that the 'best comparators' approach, which includes gas businesses in the analysis, would suggest that a credit rating of a benchmark efficient NSP is BBB+.

The AER also observes that the FFO to interest cover in table 9.3 (2.1 to 2.2) has fallen since the 2006 analysis (2.3 to 2.5).<sup>928</sup> The AER considers that it is likely due to the increased cost of debt arising from the global financial crisis. That said, the AER notes that the financial credit rating metrics still remain within the BBB+ band and not that of a lower rating.

### **9.6.5 Average credit rating**

Examining simple averages provide a range of credit ratings from BBB+ to A-. However, as the case for the outcomes of regression analysis, the AER has placed limited weight on the results of simple averages.

### **9.6.6 Other issues and interpretation of results**

Interested parties submit a number of different views about the analysis and outcomes from the explanatory statement. The AER observes that the comments reflected a number of common themes, these are:

- issues of regulatory precedent
- the negative ratings environment
- the impact of prevailing market conditions on credit ratings,
- the use of historical data, and
- the circularity of the AER's WACC decision and linkages between the different WACC parameters.

A number of interested parties note that the proposed credit rating of a benchmark efficient NSP is at odds with regulatory precedent or other decisions made by the AER. The AER notes:

- Chapter 6A of the NER 'lock in' and require the AER to apply a credit rating of BBB+ for transmission NSPs as it is locked into the NER. To include recent decisions relating to transmission in any averages of regulatory decisions is therefore spurious, as it is including one decision (made by the AEMC) several times.
- Decisions on credit ratings that applied to gas distribution and transmission networks maybe of less relevance given that these networks have different characteristics to electricity networks, as discussed in section 9.5.2.3. Therefore, to include any gas decisions in the averages made in recent regulatory decisions may also be misleading.
- Prior to the AEMC locking the credit rating of BBB+ into the NER, the ACCC had used a benchmark credit rating of A for its statement of regulatory principles

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<sup>928</sup> See tables 9.2 and in 9.3 in AER, *Explanatory statement*, op. cit., 11 December 2008, pp. 263-264.



on the regulation of electricity transmission revenues.<sup>929</sup> This is one notch above the proposed credit rating of A-.

The AER has considered the issue of the negative ratings environment raised by a number of interested parties. This issue is also discussed in section 9.5. The AER considers that the assumption that the negative ratings outlook has solely been driven by prevailing market conditions is a simplistic view. This is evident from Standard and Poor's Statement in its October 2008 report card which interested parties have used in their own submissions:

Australian utilities rated by Standard & Poor's Ratings Services continue to face a challenging environment. Key challenges over the next two years include constrained credit markets, higher debt-funding costs, significant capital-expenditure plans, the expected introduction of a carbon-pollution-reduction scheme (CPRS), and the fallout from any sale of the New South Wales (NSW) government-owned energy retailers. Our recent rating actions and distribution of rating outlooks for the sector support the negative tone: eight of the nine rating actions in the past six months have been negative, while about half of the 33 Australian utilities we rate have negative outlooks. The increasingly negative ratings trend reflects **a combination of concerns regarding balance-sheet management, capital-expenditure funding, and operational issues** (see charts 1 and 2). Any difficulty in raising equity for committed capital works and/or rectifying operational difficulties could see some further downward ratings transition. A favorable note is that the sector's refinancing task is relatively modest until 2010. (Emphasis added)<sup>930</sup>

As this statement indicates, Standard and Poor's has identified a range of concerns. Standard and Poor's for example has identified that one of the drivers of these concerns is the level of debt, and a number of these businesses have levels of gearing above the 60 per cent level of gearing of a benchmark efficient NSP. As discussed in section 3.4.5, the AER has considered the impact of prevailing market conditions. This is evident in its final position on the market risk premium.

The AER observes that credit ratings are in essence forward looking decisions made by credit ratings agencies on the business's ability to meet its obligations based upon a myriad of factors (one of which would be the prevailing market conditions). By applying numerous techniques in its analysis, the AER considers it has obtained a range of individual estimates based upon decisions made by Standard and Poor's. Further, when examining the credit ratings the AER has examined whether the global financial crisis has had a material impact on overall credit ratings by examining annual averages from previous years. The analysis has demonstrated that the number and type of businesses used to examine credit ratings has a greater impact than the global financial crisis itself. That said, the current state of the financial markets has decreased the likelihood that credit ratings would be upgraded.

In chapter four, the AER notes that there are linkages between each of the WACC parameters. The AER considers that issues of 'circularity' relating to the impact of the

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<sup>929</sup> ACCC, *Statement of principles for the regulation of electricity transmission revenues*, Final Decision, 8 December 2004, p. 17.

<sup>930</sup> Standard and Poor's, *As Risks Heat Up, Can Australian Utilities Strengthen Their Balance Sheets?*, Industry Report Card, 27 October 2008, p. 1.

AER's WACC decision and how it might impact on a business' position are highly complex and may result in higher or lower credit ratings depending on a number of factors including how a business may respond to changes in individual parameters. For example, businesses may reduce their levels of gearing in response to prevailing market conditions which may result in lower levels of debt and interest expenses. This may, all other things being equal, lead to a higher credit rating.

The AER observes that these different techniques provide a range of credit ratings from BBB+ to A-. The AER considers there is more evidence to support a credit rating of A- than there is to support a credit rating of BBB, as a credit rating of BBB would be driven by three factors, these are:

- increased levels of debt that are likely to be above the benchmark level of gearing
- the provision of services that are exposed to competition or other risks (i.e. ElectraNet's increased appetite for unregulated activities, up to 15 per cent of revenue), and
- gas businesses which may be subject to greater volume risk.

That said, even though there appears to be more evidence for a credit rating of A- than BBB, the new information and evidence provided by interested parties has not persuaded the AER at this point in time to depart from the previously adopted value of BBB+ in Chapter 6A and jurisdictional determinations. The AER also notes that the JIA's own consultant's analysis indicates the likely credit rating of a benchmark efficient NSP is BBB+. <sup>931</sup>

The AER also does not consider that the current state of the financial markets may have decreased the likelihood that credit ratings would be upgraded in this current environment. This is evident when examining the decrease in the 'benchmark' FFO to interest coverage ratios in 2006 and 2009 in section 9.6.4 of this decision.

Given the submissions received, the updated data and evidence, and the prevailing market conditions, the AER is not persuaded at this point in time that the previously adopted credit rating of BBB+ in Chapter 6A and jurisdictional determinations should be departed from. The AER notes that in order for it to be persuaded otherwise, a departure:

- must be supported by the most recent available and reliable empirical evidence, which the AER considers is persuasive in support of a change to the existing value
- must generate a forward looking rate of return that is commensurate with prevailing conditions in the market for funds, and
- must generate a return on debt that reflects the current cost of borrowings for comparable debt.

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<sup>931</sup> ACG, op. cit., January 2009 (c), p. 1.

On this basis the AER considers that its proposed credit rating achieves an outcome that is consistent with the National Electricity Objective.<sup>932</sup>

## 9.7 AER's conclusion

Based upon the submissions received, the available data and evidence, and the considerations and conclusions made in sections 9.5 to 9.6, the AER considers the following approaches are most appropriate to analyse the credit rating of a benchmark efficient NSP:

- The AER considers it is inappropriate to assume that the negative outlook on credit ratings has been solely driven by the global financial crisis. Standard and Poor's has listed a number of different factors in its report cards that have led to the negative outlooks on businesses (section 9.5).
- Although the AER considers it is inappropriate to assume that the negative outlook has been solely driven by the global financial crisis, the current state of the financial markets has decreased the likelihood that credit ratings would be upgraded in the near future. In particular, the deterioration in the state of the financial markets is unlikely to result in a credit rating upgrade due to higher interest expenses and lower interest coverage ratios resulting in from higher debt margins (section 9.6.4 illustrates this point).
- The AER considers that examining median credit ratings of the energy network sample business is an appropriate approach to determine the credit rating of a benchmark efficient NSP. However, the AER has also given significant weight to the 'best comparators' approach as the JIA's submission has addressed a number of the AER's previous concerns identified in its explanatory statement with this approach (sections 9.5.1 and 9.6.3)
- The AER has given limited weight to regression analysis and simple averages for this final decision
- The AER also considers it is inappropriate to place significant weight on standalone credit ratings in the context of this review other than to provide an indicator of bias in estimates of the credit rating.
- In relation to the sample that has been selected, the AER observes that (section 9.5.2):
  - a financially supportive parent will have a positive impact on credit ratings (both for private and government owned businesses)
  - the publicly listed credit ratings of government owned businesses imply government support

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<sup>932</sup> NER, cl. 6A.6.2(j) and 6.5.4(e).

- Standard and Poor's consider that in general gas networks are exposed to a slightly greater risk than electricity networks and would require mitigating factors such as stronger credit metrics to maintain a similar credit rating,<sup>933</sup> and
- in general the upwards bias and downwards bias in credit ratings of gas businesses and government businesses is likely to offset each other relative to a median credit rating derived from the private electricity sample.

In summary, the AER observes that the modified best comparators approach and median analysis provide a range of credit ratings from BBB+ to A-, respectively. The AER in its explanatory statement considered that it is unlikely that the 'best comparators' approach could be used as a method to inform the AER on the appropriate credit rating, given the deficiencies identified. However, as these deficiencies have been addressed in the JIA's submission, the AER has now placed significant weight on this approach for this final decision. In addition, the AER agrees with submission that limited weight should be given to regression analysis and the simple average approach as these approaches are not considered reliable at this time. Accordingly, given the further submissions received and the updated data and balance of evidence, the AER is not persuaded at this time that the previously adopted credit rating of BBB+ should be departed from for this final decision. The AER notes that in order for it to be persuaded otherwise, a departure:

- must be clearly supported by the most recent available and reliable empirical evidence, which the AER considers is persuasive in support of a change to the existing value (the AER observes that some techniques and samples suggest A- is reasonable while other approaches suggest a credit rating of BBB+)
- must generate a forward looking rate of return that is commensurate with prevailing conditions in the market for funds (the AER also observes that the current state of the financial markets has decreased the likelihood that credit ratings would be upgraded due to the increase in debt margins resulting in higher interest expenses and subsequently lower interest coverage ratios), and
- must generate a return on debt that reflects the current cost of borrowings for comparable debt.

The AER has also considered the revenue and pricing principles. The AER considers the credit rating of BBB+ is consistent with the principle that a service provider being provided with a reasonable opportunity to recover at least efficient costs and the principle that a service provider being provided with effective incentives for efficient investment with respect to direct control or prescribed services as the case may be.

In determining the credit rating, the AER has also taken into account the revenue and pricing principles. The AER considers a credit rating of BBB+ for a benchmark efficient NSP:

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<sup>933</sup> Standard and Poor's, *E-mail to the AER*, 9 February 2009.

- together with values, methods and for the other parameters, provides a service provider with a reasonable opportunity to recover at least the efficient costs and provides a service provider with effective incentives for efficient investment, and
- is appropriate having regard to the economic costs and risks of the potential framework in under and over investment.

On this basis, the AER considers that its proposed value achieves an outcome that is consistent with and is likely to contribute to the achievement of the NEO.<sup>934</sup>

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<sup>934</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

# 10 Gamma

## 10.1 Introduction

Under the Australian imputation tax system, domestic investors receive a credit for tax paid at the company level (an ‘imputation credit’)<sup>935</sup> that offsets part or all of their personal income tax liabilities. For eligible shareholders, imputation credits represent a benefit from the investment in addition to any cash dividend or capital gains received.<sup>936</sup> Standard regulatory practice in Australia is to incorporate a value for imputation credits in determining the appropriate company tax allowance (the ‘corporate income tax building block’) to include in the required revenues of regulated businesses.<sup>937</sup>

The generally accepted regulatory approach to date in Australia has been to define the value of imputation credits in accordance with the Monkhouse definition.<sup>938</sup> Under this approach, ‘gamma’ ( $\gamma$ ) is defined as a product of the ‘imputation credit payout ratio’ (F) and the ‘utilisation rate’ ( $\theta$ ).

Gamma has a range of possible values from zero to one.

## 10.2 Regulatory requirements

### 10.2.1 Matters the AER must have regard to under the NER

In undertaking a review of the WACC parameters, the NER sets out several matters that the AER must have regard to. Of particular relevance to the review of the assumed utilisation of imputation credits are:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing regulated transmission or distribution services (as the case may be)
- the need to achieve an outcome that is consistent with the NEO, and
- the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it<sup>939</sup>.

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<sup>935</sup> In this chapter the terms ‘imputation credit’ and ‘franking credit’ are used interchangeably.

<sup>936</sup> Although foreign investors do not pay Australian personal income taxes, they may receive a credit for company tax paid from their home country government, depending on the inter-country tax arrangements.

<sup>937</sup> When deriving a vanilla WACC using the Officer (1994) framework in a regulatory context, the gamma will also influence the allowed revenues through the Monkhouse (1997) leveraging formula, which is used to lever and de-lever asset and equity betas.

<sup>938</sup> P. Monkhouse, ‘Adapting the APV Valuation Methodology and the Beta Gearing Formula to the Dividend Imputation Tax System’, *Accounting and Finance*, 37, vol. 1, 1997, pp. 69-88.

<sup>939</sup> NER, cls. 6.5.4(e) and 6A.6.2(j).

The AER's reasoning as to why these matters appear particularly relevant, while the other matters listed in the NER appear to be of lesser value to the review of the assumed utilisation of imputation credits, is discussed in chapter three on the regulatory framework.

In particular, it is noted that under cl. 6A.6.4 of the NER, the AER is not required to have regard to the need for the assumed utilisation of imputation credits to be based on a benchmark efficient TNSP. Whereas, cl. 6.5.4(e)(3) of the NER require the AER to consider whether there is a need to do so for DNSPs.

The AER has considered its obligations under cls. 6A.6.4 and 6.5.4(e)(3), and concludes that the assumed utilisation of imputation credits should not be based on a benchmark efficient NSP. Rather the AER considers that a best estimate of gamma should be based on a market-wide estimate for businesses across the Australian economy.

In addition, as discussed in chapter three, the AER has decided to take into account the revenue and pricing principles. The revenue and pricing principles which are directly relevant to this review are:

- providing a service provider with a reasonable opportunity to recover at least the efficient costs
- providing a service provider with effective incentives in order to promote efficient investment, and
- having regard to the economic costs and risks of the potential for under and over investment.

## 10.2.2 Previously adopted value

The NER prescribe the methodology for estimating the cost of corporate income tax for TNSPs and DNSPs, which is one of the building blocks under a post-tax building block approach.<sup>940</sup> The formula prescribed in the NER includes a parameter referred to as 'the assumed utilisation of imputation credits' (gamma), which differs for transmission and distribution, as follows:

The estimated cost of corporate income tax of a [Network Service Provider] for each regulatory year ( $ETC_t$ ) must be calculated in accordance with the following formula:

$$ETC_t = (ETI_t \times r_t) (1 - \gamma)$$

where:

**ETI<sub>t</sub>** is an estimate of the taxable income for that regulatory year that would be earned by a benchmark efficient entity as a result of the provision of [prescribed transmission / standard control] services if such an entity, rather than the [Network Service Provider], operated the business of the [Network

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<sup>940</sup> NER, cls. 6A.6.4(a) and 6.5.3(a).

Service Provider], such estimate being determined in accordance with the post-tax revenue model;

$r_t$  is the expected statutory income tax rate for that regulatory year as determined by the AER; and

### **Transmission**

$\gamma$  is the assumed utilisation of imputation credits, which is deemed to be 0.5.

### **Distribution**

$\gamma$  is the assumed utilisation of imputation credits.

The NER (for both transmission and distribution) allow the AER to review the value of and method used to calculate ‘the assumed utilisation of imputation credits’ (gamma) component of the estimated cost of corporate income tax.<sup>941</sup>

The NER deemed the initial assumed utilisation of imputation credits for TNSPs in all jurisdictions and the DNSPs in NSW and the ACT to be 0.5.<sup>942</sup> For the remaining DNSPs, the NER did not deem an initial assumed utilisation of imputation credits and the previously adopted assumed utilisation of imputation credits in these jurisdictions are those from the most recent distribution determination.

As illustrated in table 10.1, for the purposes of the NER, the previously assumed utilisation of imputation credits for TNSPs and DNSPs in all jurisdictions is 0.5.

**Table 10.1: Previously adopted value – assumed utilisation of imputation credits**

<b>Service provider</b>	<b>Source</b>	<b>Assumed utilisation of imputation credits</b>
Transmission (all jurisdictions)	NER	0.5
Distribution (NSW)	NER	0.5
Distribution (ACT)	NER	0.5
Distribution (Tasmania)	OTTER (2007)	0.5
Distribution (Victoria)	ESC (2006)	0.5
Distribution (Queensland)	QCA (2005)	0.5
Distribution (South Australia)	ESCOSA (2005)	0.5
<b>Overall range</b>		<b>0.5</b>

Source: NER<sup>943</sup>, OTTER<sup>944</sup>, ESC945, QCA<sup>946</sup>, ESCOSA<sup>947</sup>.

<sup>941</sup> NER, cls. 6A.6.4(d) and 6.5.4(d)(7).

<sup>942</sup> NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

<sup>943</sup> NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.



The initial value of 0.5 for gamma deemed by the NER for transmission determinations reflects the position of the ACCC in its *Statement of Regulatory Principles for the regulation of electricity transmission revenues (SRP)*.<sup>948</sup>

Table 10.2 outlines the gamma values previously adopted by jurisdictional regulators in the most recent distribution determinations for each jurisdiction. In addition, the jurisdictional regulators' separate estimates of the payout ratio and the utilisation rate are provided where applicable. The AER has included both electricity and gas distribution decisions on gamma in table 10.2, due to the (effective) equivalence of the issues across the two sectors.

**Table 10.2: Past regulatory practice – gamma in electricity and gas distribution determinations**

Regulator (year)	Sector	Payout ratio	Utilisation rate	Gamma (range)	Gamma (final)
ESC (2008)	Gas	1.00	0.72 – 1.00	0.72 – 1.00	0.50
OTTER (2007)	Electricity	N/A	N/A	N/A	0.50
ESCOSA (2006)	Gas	0.71 – 1.00	0.50 – 0.60	0.35 – 0.60	0.48
QCA (2006)	Gas	0.82	0.92 – 1.00	0.50 – 1.00	0.50
ESC (2006)	Electricity	0.80 – 1.00	0.50 – 0.60	N/A	0.50
QCA (2005)	Electricity	0.80	0.625	N/A	0.50
ESCOSA (2005)	Electricity	N/A	N/A	N/A	0.50
IPART (2005)	Gas	N/A	N/A	0.30 – 0.50	0.30 – 0.50
ICRC (2004)	Gas	N/A	N/A	0.30 – 0.50	0.30 – 0.50
IPART (2004)	Electricity	N/A	N/A	0.40 – 0.60	0.50
ICRC (2004)	Electricity	N/A	N/A	N/A	0.50
<b>Estimate (low-high)</b>	<b>Energy</b>	<b>0.71 – 1.00</b>	<b>0.50 – 1.00</b>	<b>0.30 – 1.00</b>	<b>0.30 – 0.50</b>

Source: ESC<sup>949</sup>, OTTER<sup>950</sup>, ESCOSA<sup>951</sup>, QCA<sup>952</sup>, IPART<sup>953</sup>, ICRC<sup>954</sup>.

<sup>944</sup> OTTER, op. cit., September 2007, p.152.

<sup>945</sup> ESC, op. cit., October 2006, p.332.

<sup>946</sup> QCA, op. cit., April 2005, p.97.

<sup>947</sup> ESCOSA, op. cit., April 2005, p.161.

<sup>948</sup> ACCC, *Statement of principles for the regulation of electricity transmission revenues*, Final Decision, December 2004, p.118.

<sup>949</sup> ESC, *Gas access arrangement review 2008-2012*, Final decision – Public version, 7 March 2008, pp.499-509; ESC, op. cit., October 2006, pp.400-413.

<sup>950</sup> OTTER, op.cit., September 2007, pp.141-143.

<sup>951</sup> ESCOSA, *Proposed revisions to the access arrangement for the South Australian gas distribution system*, Final decision, June 2006, p.79; ESCOSA, op. cit., April 2005, pp.157-160.

As table 10.2 indicates, for both electricity and gas distribution, jurisdictional regulators have consistently adopted a value for gamma of around 0.5 (with a range of 0.3 to 0.5) in their most recent decisions. After analysing the empirical data available at the time, jurisdictional regulators have in many cases cited as key reasons for adopting a gamma value of 0.5:

- the complexity of the issues,
- the wide divergence of expert views, and
- the need to maintain consistency with previous decisions.

However, despite the consistency in the final value for gamma adopted by the jurisdictional regulators in past decisions, it is clear from table 10.2 that there have been widely divergent views among jurisdictional regulators on the three key variables:

- the payout ratio (ranging from 0.71 to 1.00)
- the utilisation rate (ranging from 0.50 to 1.00) and
- the range adopted for gamma, from which a point estimate is determined (lower and upper bounds of 0.30 and 1.00).

This highlights the complexity of the issues in this area and the ongoing debate in the academic literature regarding the appropriate recognition of the value of imputation credits in the Australian regulatory context.

Table 10.3 indicates that the most recent estimates of the payout ratio (commonly referred to as 'F') quoted by Australian energy regulators have ranged between 0.39 and 1.00.

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<sup>952</sup> QCA, *Revised access arrangement for gas distribution networks: Allgas Energy*, Final decision, May 2006, pp.76-77; QCA, *Revised access arrangement for gas distribution networks: Envestra*, Final decision, May 2006, pp.111-112; QCA, op. cit., April 2005, pp.121-122.

<sup>953</sup> IPART, *Revised access arrangement for Country Energy gas network*, Final decision, November 2005, p.66; IPART, *Revised access arrangement for AGL gas networks*, Final decision, April 2005, pp.99-100; IPART, op. cit., June 2004, p.226-227.

<sup>954</sup> ICRC, *Review of access arrangement for ActewAGL natural gas system in ACT, Queenbeyan and Yarrowluma*, Final decision, October 2004, p.174-177; ICRC, op. cit., March 2004, p.70.

**Table 10.3: Recent estimates of the payout ratio (F)**

Study	Method	Sample	Study Period	Payout ratio (F)
Lally (2003) <sup>955</sup>	Financial accounts	Large firms	2002	1.00
Hathaway & Officer (2004) <sup>956</sup>	Tax statistics	Market	1988-2002	0.71
Envestra (2006) <sup>957</sup>	Financial accounts	Utilities	2000-2004	0.39 <sup>(a)</sup> 0.82 <sup>(b)</sup>
ESC (2008) <sup>958</sup>	Forecast revenues	Victorian gas distributors	2008-12	1.00
<b>Estimate (high-low)</b>				<b>0.39 – 1.00</b>

Notes:

- (a) based on tax expense  
(b) based on tax paid

Table 10.4 indicates that the most recent estimates of the utilisation rate (commonly referred to as ‘theta’) in the finance literature and in regulatory decisions have ranged between 0 and 0.81.

<sup>955</sup> M. Lally, ‘Regulation and the cost of equity capital in Australia’, *Journal of Law and Financial Management*, vol.2, no.1, November 2003, p.33.

<sup>956</sup> N. Hathaway and B. Officer, *The Value of Imputation Tax Credits – Update 2004*, Capital Research Pty Ltd, November 2004, p.11.

<sup>957</sup> Envestra, *Comments on the review of Martin Lally of the ‘The value of imputation credits for regulatory purposes’*, Submission to the QCA, February 2006, p.9.

<sup>958</sup> ESC, *Gas access arrangement review 2008-2012*, Draft decision, 28 August 2007, pp.427-430.

**Table 10.4: Recent estimates of the utilisation rate (theta)<sup>(a)</sup>**

Study	Method	Study Period	Utilisation rate (theta)
Cannavan, Finn & Gray (2002) <sup>959</sup>	Inference from derivatives	1994-1999	~0.50 <sup>(b)</sup> (pre 45-day rule**) ~0.00 <sup>(c)</sup> (post 45-day rule)
Hathaway & Officer (2004) <sup>960</sup>	Dividend drop-off	1986-2004	0.50
		post-2000	0.60
	ATO statistics	1988-2002	~0.40
Beggs & Skeels (2006) <sup>961</sup>	Dividend drop-off	1986-2004	0.57 (2001-2004)
SFG (2007) <sup>962</sup>	Dividend drop-off	1998-2006	0.20 - 0.40
Handley & Maheswaran (2008) <sup>963</sup>	ATO statistics	1988-2004	0.81 (2001-2004)
			0.71 (1990-2004)
<b>Estimate (high-low)</b>			<b>0.00 – 0.81</b>

Notes:

- (a) The ACG (2006) study prepared for ESCOSA has been excluded as it has not been made public.  
(b) pre 45-day rule<sup>964</sup>  
(c) post 45-day rule

It is important to note that the NER require the AER to estimate gamma on a forward-looking basis, commensurate with prevailing market conditions (as with all other WACC parameters).<sup>965</sup> Due to the lack of available data this is not possible, therefore an appropriate estimate of gamma must be based upon historical data. However to satisfy the NER requirements the AER considers that an appropriate estimate of gamma must be reflective of the current imputation tax regime. This has implications for the appropriate time period over which to derive an estimate of gamma (see section 10.5.4).

<sup>959</sup> D. M. Cannavan, F. J. Finn and S. F. Gray, 'The value of dividend imputation tax credits in Australia', *Journal of Financial Economics*, vol.73, 2004, p.192.

<sup>960</sup> N. Hathaway and B. Officer, *The Value of Imputation Tax Credits – Update 2004*, Capital Research Pty Ltd, November 2004, pp.13 and 24.

<sup>961</sup> D. Beggs and C. L. Skeels, 'Market arbitrage of cash dividends and franking credits', *The Economic Record*, vol.82, no.258, September 2006, p.247.

<sup>962</sup> SFG, *The impact of franking credits on the cost of capital of Australian companies*, Report prepared for Envestra, Multinet and SP AusNet, 25 October 2007, p.45.

<sup>963</sup> J. C. Handley and K. Maheswaran, 'A measure of the efficacy of the Australian imputation tax system', *The Economic Record*, vol.84, no.264, March 2008, p.90.

<sup>964</sup> In May 1997 the Australian Parliament introduced legislation that required investors to hold shares for a period of 45 days in order to become eligible to receive the imputation credit attached to dividends. The effect of this measure was to prevent trading around the ex-dividend date solely for the purposes of obtaining the imputation credit.

<sup>965</sup> NER, cls. 6A.6.2(j)(1) and 6.5.4(e)(1).

### 10.3 Summary of position in explanatory statement

In its explanatory statement the AER made the following conclusions with respect to the gamma parameter:

- A payout ratio of 1.0 should be adopted in the assessment of gamma, which is consistent with the standard approach to valuation as well as the Officer (1994) WACC framework. This represents a departure from current regulatory practice, which is based on the 'Monkhouse approach'.
- The AER proposed to adopt a conceptual framework of a domestic market of assets with foreign investors recognised to the extent they invest domestically. This conceptual framework recognises the realities implicit in domestic market data, and ensures consistency with the other WACC parameters.
- The AER proposed to estimate the utilisation rate (i.e. theta) based on post-2000 data only, given the July 2000 tax changes that allowed a full rebate of unused credits.
- A reasonable estimate of theta inferred from market prices is 0.57, based on the Beggs and Skeels (2006) study. The results of the most recent SFG (2008) study were given limited weight given that the reliability of the results could not be verified on the information presented to date by SFG.
- A reasonable estimate of theta from tax statistics in the post-2000 period is 0.74, based on the results from the Handley and Maheswaran (2008) study. This study was considered to have a sound conceptual basis as it provides a direct (rather than inferred) estimate of the value of imputation credits across the Australian economy.
- The issue of consistency between the gamma and the MRP was considered important as part of this review. Accordingly, the AER estimated an appropriately 'grossed-up' historical estimate of the MRP for consideration.
- The empirical results from dividend drop-off studies do not need to be adjusted based on CAPM consistency considerations, and the standard CAPM will continue to be used for the purposes of this review.

On this basis, and after considering the most recent available and reliable empirical evidence, the AER considered there to be persuasive evidence to depart from the previously adopted 'assumed utilisation of imputation credits' (i.e. gamma) of 0.5. Based on the evidence considered most relevant, reliable, comprehensive and theoretically appropriate, the AER considered that a reasonable range for gamma lies between 0.57 and 0.74.

Based upon an equal weighting of the two available methodologies, the AER proposed to adopt an 'assumed utilisation of imputation credits' (i.e. gamma) of 0.65.

## 10.4 Summary of submissions in response to explanatory statement

In response to the AER's position on gamma from the explanatory statement, the JIA state they are deeply concerned that:

...the breadth of the empirical evidence and the generally accepted theoretical framework set out by the JIA does not appear to have been fully considered on the individual merits of each point...

...Based on this further advice the JIA believes the AER and Associate Professor Handley have made a series of theoretical and methodological errors that result in an assumed value of gamma that is substantially overstated.<sup>966</sup>

The JIA's submission in response to the explanatory statement on gamma is supported by the following consultant reports:

- SFG Consulting, 'Market practice in relation to franking credits and WACC',<sup>967</sup>
- NERA Economic Consulting, 'AER's proposed WACC statement – Gamma',<sup>968</sup>
- SFG Consulting, 'Using redemption rates to estimate theta',<sup>969</sup>
- SFG Consulting, 'The value of imputation credits as implied by the methodology of Beggs and Skeels (2006)',<sup>970</sup>
- SFG Consulting, 'The consistency of estimates of the value of cash dividends',<sup>971</sup> and
- Synergies Economic Consulting, 'Peer review of SFG Consulting reports on gamma',<sup>972</sup>

As part of this final decision the AER has also had regard to the material provided in an earlier report received from the JIA's consultants SFG in response to issues raised at the AER's 10 October 2008 WACC review roundtable discussion.<sup>973</sup>

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<sup>966</sup> JIA, *Submission in response*, op. cit., February 2009, pp.140-141

<sup>967</sup> SFG, *Market practice in relation to franking credits and WACC: Response to AER proposed revision of WACC parameters*, Report prepared for ENA, APIA and Grid Australia, 1 February 2009 (b).

<sup>968</sup> NERA, *AER's proposed WACC statement – Gamma*, A report for the Joint Industry Associations, 30 January 2009.

<sup>969</sup> SFG, *Using redemption rates to estimate theta: Response to AER proposed WACC parameters*, Report prepared for ENA, APIA and Grid Australia, 1 February 2009 (c).

<sup>970</sup> SFG, *The value of imputation credits as implied by the methodology of Beggs and Skeels (2006)*, Report prepared for ENA, APIA and Grid Australia, 1 February 2009 (d).

<sup>971</sup> SFG, *The consistency of estimates of the value of cash dividends*, Report prepared for ENA, APIA and Grid Australia, 1 February 2009 (e).

<sup>972</sup> Synergies, *Peer review of SFG Consulting reports on gamma*, A report for the ENA, APIA and Grid Australia, January 2009.

The key arguments put forward by the JIA and its consultants in response to the explanatory statement are as follows:

- The evidence clearly suggests that the dominant market practice is to set gamma to zero when estimating WACC and performing valuation exercises. The AER's proposed approach to set gamma to 0.65 is therefore clearly inconsistent with market practice.
- Once time value loss is recognised, retained credits have little or no value to shareholders therefore gamma must continue to be defined as the product of an expected payout ratio (F) and the market value of imputation credits distributed as a portion of their face value ( $\theta$ ). On this basis the market average annual payout ratio of 0.71 from the Hathaway and Officer study should be adopted in the estimation of gamma.
- A zero value for theta is a reasonable lower bound on theoretical grounds, where the representative investor is a weighted average of the characteristics of all investors with the weights determined by investors' global wealth.
- Since there is no valid reason for eliminating the pre-2000 data, it should be included in the analysis. If a longer time period including pre-2000 data is used, the estimate of theta from dividend drop off studies will be more reliable, and it will be lower than the 0.57 estimate relied upon by the AER.
- There is compelling empirical evidence to suggest that the lower bound of any reasonable range for theta should be zero.
- If the Beggs and Skeels approach is applied to 2001-2006 data, including a small number of highly influential observations, the estimate of theta is 0.37. If those few unduly influential outliers are removed from the data set, the estimate of theta is 0.24. The SFG and Synergies reports both set out reasons why the latter estimate is statistically more reliable.
- Based on the evidence provided from experts to date it is clear that the rate at which imputation credits are redeemed has nothing to do with the market value of credits, therefore the AER is wrong to rely on tax statistics to estimate theta.
- The AER acknowledges the inconsistency between estimates of the value of cash dividends if a positive theta is adopted, yet has made no effort to reconcile this inconsistency. The importance of consistency in calculating the rate of return was highlighted by the Australian Competition Tribunal in the GasNet decision. The empirical evidence indicates that the inconsistency is best resolved by adopting a gamma of zero.

In essence, the JIA's position on gamma is summarised as follows:

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<sup>973</sup> SFG, *Response to issues raised at the AER roundtable*, Report prepared for ENA, APIA and Grid Australia, 28 October 2008.

- a market average payout ratio of 0.71 provided by Hathaway and Officer should be adopted
- the lower bound estimate of theta should be zero based on the appropriate theoretical framework, empirical studies, and market practice, and
- the upper bound estimate for theta should be 0.28 inferred from the most recent dividend drop-off study completed by SFG.<sup>974</sup>

The AER received a submission from the MEU and Consumers Roundtable (MEU) which discussed the AER's proposed position on the gamma parameter. In particular, the MEU raises an issue with the AER's benchmark assumption:

...it is assumed that all electricity transport is owned privately and that the ability of the owners of electricity transport to access imputation credits is the same as the market as a whole... Accepting that the value of gamma assessed by the AER (0.65) is correct, then adjusting this to reflect actual ownership (where 2/3rds is government ownership where gamma would be unity) results in a "weighted gamma" of nearly 0.9.<sup>975</sup>

The AER also received a separate submission from the NSW Treasury which questions the conclusions drawn by the AER on gamma:

In order to satisfy the 'persuasive evidence' test, NSW Treasury contends that there should be greater consensus for change between academic experts... NSW Treasury remains unconvinced that the AER's proposed gamma of 0.65 has been determined with any greater certainty relative to the previous value of 0.5.<sup>976</sup>

## 10.5 Issues and AER considerations

The following sections on specific issues are structured as follows:

- Market practice (section 10.5.1)
- Estimating the payout ratio (section 10.5.2)
- Theoretical issues with theta (section 10.5.3)
- The appropriate time period for estimating theta (section 10.5.4)
- Inferring theta from market prices (section 10.5.5)
- Estimating theta from tax statistics (section 10.5.6), and
- Consistency issues (section 10.5.7).

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<sup>974</sup> JIA, *Submission in response*, op. cit., February 2009, pp.151-152.

<sup>975</sup> MEU, *Submission in response*, op. cit., 30 January 2009, p.20.

<sup>976</sup> NSW Treasury, *Submission in response*, op. cit., 28 January 2009, p.8.



### 10.5.1 Market practice

In its explanatory statement the AER noted information suggesting that the standard market practice in Australia is to exclude the value of imputation credits from rate of return analysis. The AER considered that the omission of imputation credits from a valuation analysis was not necessarily indicative of a negligible monetary value of imputation credits. Rather, as pointed out by Handley in his report, the AER considered it possible that for practical reasons market practitioners elect to exclude the value of imputation credits from both the cash flow and discount rate analyses.

Accordingly the AER concluded that recognition of a positive value for imputation credits as part of this review is entirely consistent with market practice, provided that the principle of consistency between cash flows and the discount rate is adhered to.

#### Submissions in response to explanatory statement

In its submission the JIA challenge the AER's views on the relevance of market practice:

The evidence provided by the JIA clearly suggests that the dominant market practice is to set gamma to zero when estimating WACC and performing valuation exercises. The AER's proposed approach is to set gamma to 0.65, and is clearly inconsistent with market practice.<sup>977</sup>

This view is also expressed by Envestra in a separate submission.<sup>978</sup>

The JIA's submission is supported by a report from its consultant SFG, which specifically examines market practice in relation to gamma. SFG's conclusion is that the AER's adoption of a gamma of 0.65 is demonstrably inconsistent with market practice, and results in a cost of equity which is 22 per cent lower than if a gamma of zero is adopted. SFG's key arguments in support of this conclusion are as follows:

- There is substantial evidence that the dominant market practice is to make no adjustment for the value of imputation credits when estimating the cost of capital or in performing a valuation exercise. The three examples of market practice identified include:
  - a. expert valuation reports<sup>979</sup>
  - b. surveys of corporate practice,<sup>980</sup> and
  - c. the Queensland Government's policies in relation to government-owned corporations (GOCs).<sup>981</sup>

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<sup>977</sup> JIA, *Submission in response*, op. cit., February 2009, p.149.

<sup>978</sup> Envestra, *Submission in response*, op. cit., 28 January 2009, pp.8-9.

<sup>979</sup> Lonergan, *The disappearing returns: why imputation has not reduced the cost of capital*, JASSA, Autumn 1, pp.1-17; and KPMG, *The Victorian electricity distribution businesses cost of capital – market practice in relation to imputation credits*, Victorian electricity distribution price review 2006-10, 2005.

<sup>980</sup> Truong, Partington and Peat, *Cost of capital estimation & capital budgeting practice in Australia*, Australian Journal of Management, 33(1), pp.95-121.

- Market professionals make a conscious decision to make no adjustment for imputation credits – it is not based on a lack of awareness of the issue.
- There is no alternative framework being used by market professionals that enables them to avoid estimating gamma at all.
- There is uniform agreement that cash flows and discount rates should be defined in a consistent manner – the issue is about what value of gamma should be used. Market practice is to use of value of zero, whereas the AER has adopted a value of 0.65.<sup>982</sup>

SFG challenges in particular the validity of Handley’s suggestion that there is an alternative framework for estimating the cost of equity that would circumvent the need to directly estimate gamma. SFG considers that, rather than operating under an alternative framework, market practitioners work within known valuation frameworks, consider the issue, and choose to set gamma to zero.

The AER also received a submission from the Financial Investors Group (FIG) which examines market practice in relation to gamma. The FIG states that it does not agree with the AER’s reasons for dismissing market practice:

In our view, the AER has misinterpreted the reasons why market practitioners do not ascribe a value to imputation credits.<sup>983</sup>

The FIG examines the market evidence concerning the value assumed for imputation credits, in particular that from expert valuer Grant Samuel. Based on its analysis the FIG concludes that:

Market practice clearly indicates that independent expert valuers do not consider it is appropriate to assign any value to imputation credits because the evidence in regard to their value is not sufficiently conclusive.<sup>984</sup>

The FIG rejects the AER’s suggestion that market practitioners have chosen not to make any adjustment for imputation credits on the basis that the same company value may be preserved with internal consistency between the cash flows and the discount rate. The FIG states that this cannot logically be the reason, as a higher assumed value for gamma will affect company values.<sup>985</sup>

Overall the FIG argues that the AER has incorrectly dismissed the relevance of market practice in assessing the value of imputation credits, and that:

...By adopting parameter values that are far removed from those used in the market, the AER is effectively requiring that regulated businesses be treated

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<sup>981</sup> Queensland Government Treasury, *Government owned corporations – cost of capital principles*, February 2006, p.7.

<sup>982</sup> SFG, *op. cit.*, 1 February 2009 (b), p.13.

<sup>983</sup> FIG, *Submission in response*, *op. cit.*, 29 January 2009, p.42.

<sup>984</sup> *ibid.*, p.44.

<sup>985</sup> *ibid.*

by the market differently to all other businesses. This is an important concern for the FIG.<sup>986</sup>

### Consultant's review

In a report prepared for the AER, Handley states that:

There is no disagreement concerning what experts do. There is, however, disagreement concerning why they do it – in particular whether this practice indicates that experts generally believe imputation credits to have zero value.<sup>987</sup>

After examining the studies referenced by SFG, Handley points out that there are a wide variety of reasons cited by market practitioners for making no adjustment for imputation credits, including:

- uncertainties and difficulties with estimation and methodology
- methodological precedent
- acquirers may not pay extra for surplus imputation credits, and
- imputation credits have no value to the marginal price-setting investor.<sup>988</sup>

Handley argues that this casts doubt on the validity of SFG's that market practitioners assume that imputation credits have zero value. Based on statements from Grant Samuel and KPMG, Handley cites conservatism, uncertainty and complexity as some of the common reasons given for not adjusting for imputation credits.

Handley reiterates from his earlier report prepared for the AER that:

... a possible alternative explanation of market practice is that (at least some) Australian firms and independent expert valuation practitioners recognise that, the conventional approach to valuation – meaning there is no explicit recognition of the value of imputation credits in either the cash flows or in the discount rate – remains valid under the imputation tax system (subject to certain implicit assumptions).

In other words, imputation credits are not assumed to have zero value but rather they are simply not explicitly taken into account.<sup>989</sup>

Handley explains, with respect to the Officer (1994) WACC framework, that this alternative framework can be described as an “after-company-after-some-personal-tax approach to valuation”, since both the cash flows and the discount rate do not include an adjustment for imputation credits. Further, Handley states that:

The conventional measure of the cost of equity  $k^*_E$  may be estimated using the Sharpe CAPM in the normal way using returns based on dividends and capital gains only.<sup>990</sup>

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<sup>986</sup> *ibid.*, p.47.

<sup>987</sup> J. C. Handley, *op. cit.*, 15 April 2009, p.35.

<sup>988</sup> *ibid.*, pp.36-37.

<sup>989</sup> *ibid.*, p.38.

Overall, on the relevance of market practice, Handley concludes as follows:

In my opinion, market practice does not imply that experts generally assume imputation credits have zero value and accordingly the AER's recognition of a positive gamma is not inconsistent with market practice.<sup>991</sup>

### Issues and AER considerations

The NER require the AER to estimate gamma in calculating the tax building block (i.e. the 'assumed utilisation of imputation credits').<sup>992</sup> Therefore the relevant issue when observing the evidence on market practice is whether market practitioners apply a particular value for credits, not whether credits should be recognised in the analysis.

The AER agrees that the clear evidence is that the majority of market practitioners do not make any adjustment for the value of imputation credits. As Handley points out, the relevant issue concerns how one should interpret this evidence, and in particular the reasons given by experts for why no adjustment is made.

SFG interprets the evidence as suggesting that market practitioners assign a zero value for imputation credits. For example, SFG states that:

...the dominant market practice in Australia is to set gamma to zero when estimating the cost of capital and when conducting valuation exercises.<sup>993</sup>

However the AER considers that the evidence does not support this assertion – there appears to be many reasons provided by market practitioners for not making an adjustment for imputation credits. The evidence cited in submissions suggests many market practitioners consider that imputation credits are indeed valuable to investors, but that estimating their value involves considerable complexity and uncertainty. For example, as contained in the FIG's submission, expert valuer Grant Samuel expresses the following views:

There is no generally accepted method of allowing for dividend imputation. In fact, there is considerable debate within the academic community as to the appropriate adjustment or even whether any adjustment is required at all...

...There is undoubtedly merit in the proposition that dividend imputation affects value... In Grant Samuel's view, however, the evidence gathered to date as to the value the market attributes to imputation credits is insufficient to rely on for valuation purposes. More importantly, Grant Samuel does not believe that such adjustments are widely used by acquirers of assets at present...

...Accordingly it is Grant Samuel's opinion that it is not appropriate to make any such adjustments in the valuation methodology. This is a conservative approach.<sup>994</sup>

Similar views are expressed by Deloitte:

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<sup>990</sup> *ibid.*, p.40.

<sup>991</sup> *ibid.*, p.41.

<sup>992</sup> NER, cls. 6A.6.4(a) and 6.5.3.

<sup>993</sup> SFG, *op. cit.*, 1 February 2009 (b), p.4.

<sup>994</sup> FIG, *Submission in response*, *op. cit.*, 29 January 2009, p.45.

We have not adjusted the cost of capital or the projected cash flows for the impact of dividend imputation due to the diverse views as to the value of imputation credits and the appropriate method that should be employed to calculate this value.<sup>995</sup>

Likewise, Handley cites KPMG on the reasons given by experts for not making any adjustment for imputation credits:

The range of reasons offered for not adjusting for imputation credits is similar to that found in Lonergan (2001). The common theme that emerges from most expert reports is that whilst imputation credits are valuable to investors, including such value in company valuations or the cost of capital involves more complex considerations.<sup>996</sup>

After examining all the available evidence, Handley states that:

So, whilst some experts no doubt assume/believe that imputation credits have zero value, the evidence does not support the assertion that standard practice is the blanket assumption that credits have no value.<sup>997</sup>

In the AER's view, this is an appropriate and balanced interpretation of the evidence concerning market practice. Moreover, the AER does not consider the evidence supports the notion that market practitioners believe imputation credits have zero value. On the contrary, the evidence suggests that imputation credits are considered valuable, however they are omitted from consideration due to the complexity and uncertainty in estimating their value.

Given that the NER require the AER to estimate gamma in calculating the tax building block (i.e. the 'assumed utilisation of imputation credits'), the option to omit imputation credits from the analysis is not available as part of this review.<sup>998</sup> Further, while acknowledging the many complexities alluded to by market practitioners, the AER considers that it is indeed possible to arrive at a reasonable estimate of the value of imputation credits taking into account all the available evidence.

On the alternative framework, the AER reiterates its view from the issues paper that the omission of imputation credits from a valuation analysis is not necessarily indicative of negligible monetary value. As the AER noted in its explanatory statement:

As the JIA's consultants NERA and Wheatley note, the value for gamma will not affect company values as long as it is included (excluded) consistently in the firm's cash flows as well as the discount rate.<sup>999</sup>

There appears to be considerable debate on this point. On the one hand SFG argues that there is not an alternative valuation framework which would circumvent the need to directly estimate gamma:

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<sup>995</sup> *ibid.*, p.44.

<sup>996</sup> J. C. Handley, *op. cit.*, 15 April 2009, p.37.

<sup>997</sup> *ibid.*, p.38.

<sup>998</sup> NER, cls. 6A.6.4(a) and 6.5.3.

<sup>999</sup> AER, *Explanatory statement*, *op. cit.*, December 2008, p.298.

This requires a direct estimate of the return that would be required by shareholders, net of that component of the return that is assumed to come in the form of franking credits. But there is no way of doing this. There is no model or framework for directly estimating the return that shareholders require net of the assumed value of franking credits.<sup>1000</sup>

On the other hand, Handley argues that there is such a framework – it is equivalent to the ‘conventional’ or ‘classical’ approach to valuation, in which the cost of equity is measured based on dividends and capital gains only. Handley states that this may be described as an ‘after-company-after-some-personal-tax’ approach to valuation.

The AER considers that these arguments from Handley make logical sense, and the conclusions are in accordance with the Officer WACC framework. Intuitively, any assumed value for imputation credits (i.e. between zero and one) should not affect company values provided it is incorporated consistently in the firm’s cash flows as well as the discount rate. The AER’s approach under the NER is to adopt an ‘after-company-before-personal-tax’ approach to valuation, in which an explicit estimate of gamma is required.

On this basis the AER considers it is clear that there is a valid valuation framework (i.e. the classical approach) that would avoid the need to directly estimate gamma.<sup>1001</sup> It is quite possible and plausible that market practitioners are consciously choosing to adopt this simpler approach to estimating the cost of equity. To reiterate, as the NER require the AER to estimate gamma in calculating the tax building block (i.e. the ‘assumed utilisation of imputation credits’), the classical valuation approach is not available.<sup>1002</sup>

### **AER conclusion**

The AER’s conclusions on the relevance of market practice in the estimation of gamma are as follows:

- The evidence does not support the notion that market practitioners unequivocally believe that imputation credits have zero value – there appears to be many reasons provided by market practitioners for not making an adjustment for imputation credits.
- The evidence suggests that imputation credits are considered valuable. However, it appears they are omitted from consideration due to reasons such as complexity and uncertainty in estimating their value.
- There does appear to be a valid valuation framework (i.e. the classical approach) that would avoid the need to directly estimate gamma. It is quite possible and plausible that market practitioners are consciously choosing to adopt this simpler approach to estimating the cost of equity.

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<sup>1000</sup> SFG, op. cit., 1 February 2009 (b), p.10 – Market practice in relation to franking credits

<sup>1001</sup> It is noted however, that if the MRP is estimated from historical stock market returns (and not grossed-up for the value of distributed credits) it will likely contain a positive value for retained credits, which is embedded in share prices.

<sup>1002</sup> NER, cls. 6A.6.4(a) and 6.5.3.

On this basis the AER reiterates its views from the explanatory statement that the adoption of a positive value for imputation credits is not inconsistent with market practice. Further, while acknowledging the many complexities alluded to by market practitioners, the AER considers that it is indeed possible to arrive at a reasonable empirical estimate of the value of imputation credits taking into account all the available evidence.

### **10.5.2 Estimating the payout ratio**

As stated in the issues paper, the generally accepted regulatory approach in Australia has been to define the value of imputation credits in accordance with the Monkhouse definition. Under this approach, ‘gamma’ ( $\gamma$ ) is defined as a product of the ‘imputation credit payout ratio’ and the ‘utilisation rate’.

In its explanatory statement the AER considered that a positive value for retained imputation credits should be recognised in the analysis of gamma. Based on Handley’s advice regarding the distribution of free cash flows under the standard approach to valuation and the Officer WACC framework, the AER proposed to adopt a payout ratio of 1.0. This proposal represented a departure from the standard Monkhouse approach.

The AER stressed that the adoption of a payout ratio of 1.0 does not imply an expectation that all credits will be paid out in each period. Rather as Handley advised, the full distribution of free cash flows is the standard assumption for valuation purposes, therefore for consistency, a 100 per cent payout of imputation credits is appropriate.<sup>1003</sup>

### **Submissions in response to explanatory statement**

The JIA states in its submission that:

Recognising that any retained credits have little or no value to shareholders, gamma must continue to be defined as the product of an expected payout ratio (F) and the market value of imputation credits distributed as a portion of their face value ( $\theta$ ).<sup>1004</sup>

On this basis the JIA maintains its position that the market average payout ratio of 0.71 from the Hathaway and Officer study should be adopted in the estimation of gamma.

The JIA’s submission is supported by a report from its consultant NERA, which argues that the adoption of a payout ratio of 1.0 will lead to an overstated value of gamma. NERA states that Handley’s approach is incorrect under an imputation tax regime, because:

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<sup>1003</sup> The AER also noted that while the value of retained credits may be affected by time value considerations, the effect is not expected to be material such that an estimate of 1.0 is unreasonable.

<sup>1004</sup> JIA, *Submission in response*, op. cit., February 2009, p.142.

- a firm's use of retained earnings to finance new investment leads to a build-up of imputation credits that may not be paid out for many years and therefore have little or no value to investors, and
- retained imputation credits cannot be reinvested by the firm and so must have less value to investors than those credits which are immediately distributed.<sup>1005</sup>

On this second point, NERA states that since imputation credits only have actual value once they are distributed, their present value will depend on the following two factors:

- the appropriate rate at which to discount retained credits, and
- the period over which credits are likely to be retained by a TNSP or a DNSP.

On the first point, NERA argues that:

Since franking credits must be attached to dividends to be paid out, the appropriate rate at which to discount retained imputation tax credits is at the required return to equity.<sup>1006</sup>

NERA illustrates the value of retained credits under a range of scenarios, as presented in table 10.5.

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<sup>1005</sup> NERA, op. cit., 30 January 2009, p.i.

<sup>1006</sup> *ibid.*, p.6.



**Table 10.5: NERA – the value of retained imputation credits**

Period retained	Return on equity		
	10.2% <sup>a</sup>	11.4% <sup>b</sup>	10.1% <sup>c</sup>
5 years	61.5%	58.3%	61.8%
10 years	37.9%	34.0%	38.2%
15 years	23.3%	19.8%	23.6%
25 years	8.8%	6.7%	9.0%

Source: NERA<sup>1007</sup>

- (a) Return on equity based on equity beta of 0.8 and a risk-free rate as recorded between 25 August 2008 and 25 November 2008 (i.e. 5.4 per cent).
- (b) Return on equity based on equity beta of 1.0 and a risk-free rate as recorded between 25 August 2008 and 25 November 2008 (i.e. 5.4 per cent).
- (c) Return on equity based on equity beta of 0.8 and a risk-free rate as recorded in the 20 days to 27 January 2009 (i.e. 4.1 per cent).

As NERA points out from table 10.5, discounting by the return on equity will quickly diminish the value of retained credits, with the ultimate value dependent on the number of years the credits are held before distribution. For example, NERA calculates that for an imputation credit retained for five years and discounted at a return on equity of 10.2 per cent, the present value will be 61.5 per cent of its face value.

NERA suggests that there are only two scenarios in which a firm could distribute retained imputation credits, as follows:

- where it has paid insufficient Australian income tax to fully frank the dividends paid in that year (therefore retained credits could be paid with a normal declared dividend), and
- where a special dividend or off-market share buyback is used by the firm.

NERA argues that as a stand alone regulated Australian electricity transmission or distribution business does not have any foreign sourced income, the first option for distributing retained credits is not available. On the second option, NERA states that by paying a special dividend (i.e. a dividend paid out of retained earnings) or undertaking an off market share buyback, the firm is effectively reducing its equity. However, NERA states that:

...regulated firms are, to a large extent, constrained in their ability to reduce the level of equity in the regulated business since they are assumed to maintain the regulatory gearing level.<sup>1008</sup>

<sup>1007</sup> *ibid.*, p.6.

<sup>1008</sup> *ibid.*, p.7.

Since the regulatory asset bases (RABs) of electricity NSPs have been growing and continue to grow, NERA argues that such a reduction in equity is implausible with a constant regulatory gearing level.

On this basis NERA states that:

Since the appropriate discount rate is the return on equity and there is no foreseeable point when the RAB of electricity transmission and distribution network service providers will begin to fall, retained imputation credits have little or no value.<sup>1009</sup>

As in its earlier report, NERA recommends that the most appropriate payout ratio is the market average of 0.71 provided by Hathaway and Officer.<sup>1010</sup>

In its submission the FIG argues that the AER's proposed payout ratio of 1.0 does not reflect market practice, as in the current market capital is highly constrained. The FIG also considers that the AER has not presented any evidence to support the view that the impact of the time value of money on the assumed payout ratio is immaterial. The FIG argues there are additional time delays that must be taken into account in the analysis of the payout ratio, including:

- the time between when the credits are generated and paid out, and
- the time between when an investor receives a credit and when it is actually redeemed.<sup>1011</sup>

In a separate report prepared for the JIA, Synergies also comments on the AER's proposed payout ratio of 1.0 from the explanatory statement. Synergies argues that as gamma is an adjustment to the company tax building block in a particular year, it logically follows that it must reflect that portion of company tax which is a prepayment of personal tax in that year.<sup>1012</sup> In other words, Synergies appears to argue that the payout ratio adopted should reflect the actual annual payout ratio.

### **Consultant's review**

In recent advice prepared for the AER, Handley reiterates views from his earlier report regarding the appropriate payout ratio. Handley states that the traditional approach (based largely on a paper by Monkhouse), implicitly assumes that retained imputation credits have zero value, therefore the point of debate concerns not only the payout ratio but also the value of a retained credit.<sup>1013</sup>

Regarding NERA's illustrative calculations on the time value loss associated with the retention of credits, Handley argues that:

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<sup>1009</sup> *ibid.*, p.7.

<sup>1010</sup> NERA also raises the issue of consistency between the imputation credit payout ratio and the dividend payout ratio assumed for the purposes of calculating equity raising costs.

<sup>1011</sup> FIG, *Submission in response*, op. cit., 29 January 2009, pp.46-47. These arguments from the FIG are related to the value of imputation credits once distributed – see section 10.5.6 for a discussion.

<sup>1012</sup> Synergies, op. cit., January 2009, pp.31-32.

<sup>1013</sup> J. C. Handley, op. cit., 15 April 2009, p.5.

...it is not obvious that the cost of equity is the appropriate discount rate – for retained credits are available for immediate distribution from a firm’s franking account balance whereas (expected) future imputation credits need to be generated from (expected) future profits – and that the estimation of an appropriate retention period is likely to be particularly challenging.<sup>1014</sup>

Handley suggests that the appropriate discount rate to apply to retained imputation credits would likely be between the risk-free rate and the cost of equity.

Handley reiterates from his earlier report that a key assumption underlying the Officer (1994) framework is that all cash flows (including the associated imputation credits) are perpetuities which are fully distributed each period. Handley states that the ‘traditional’ approach to estimating gamma adopted by regulators:

...appears to have originated with Monkhouse (1996) who relaxes the perpetuity assumption of Officer (1994)... In particular, he allows for less than a 100% payout of credits in a period and the time value loss associated with the retained credits (if any)...<sup>1015</sup>

Handley points out that Monkhouse then makes the critical assumption that retained credits are never paid out and so have zero value. On this point, Handley states that:

In my view this is an unreasonable assumption. Not only is it inconsistent with the general valuation principle of full distribution implicit in the Miller and Modigliani (1961), Miles and Ezzell (1980) and Officer (1994) frameworks, but it implies that a stock of potentially valuable imputation credits accumulates over time within the firm, never to be released.

It is unreasonable to assume that such a build up of credits would not (eventually) attract the attention of investors, investment bankers and or potential corporate raiders.<sup>1016</sup>

According to Handley, relaxing Monkhouse’s assumption that retained credits have zero value means that the traditional approach effectively defines gamma ( $\gamma$ ) as follows:

$$\gamma = F \times \theta + (1 - F) \times \psi$$

Where:

- $F$  is the proportion of credits generated in a period that are paid in the period,
- $\theta$  (theta) is the per dollar value of a distributed credit,
- $\psi$  (psi) is the per dollar value of a retained imputation credit ( $\psi > 0$ ), which is a function of the appropriate discount rate, say  $\delta$  (delta), and the expected retention period, say  $\tau$  (tau).<sup>1017</sup>

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<sup>1014</sup> *ibid.*, pp.5-6.

<sup>1015</sup> *ibid.*, p.6.

<sup>1016</sup> *ibid.*, pp.7-8.

<sup>1017</sup> *ibid.*, pp.7-8.

Assuming an estimated market average payout ratio of around 0.7 per annum, Handley states that a reasonable estimate of the value of a retained credit (as a proportion of the value of a distributed credit) is within the range 0.7 to 1.0. However Handley argues that:

By allowing for less than a full distribution of imputation credits each period, the traditional approach arguably injects more realism into the modelling of imputation credits. But this clearly comes at a cost – the need to estimate a further three parameters:  $F$ ,  $\delta$  and  $\tau$ .

In my view, there is sufficient uncertainty surrounding the estimation of these additional parameters to seriously question whether the additional realism, compared to Officer's (1994) simple approach of assuming full payout each period, actually produces a better estimate of gamma.<sup>1018</sup>

Accordingly, Handley recommends that the simpler Officer (1994) framework should be adopted whereby a payout ratio of 1.0 is applied for valuation purposes. Under this approach, gamma is defined as the value of a distributed imputation credit (i.e.  $\gamma = \theta$ ).

### **Issues and AER considerations**

The AER notes that there appears to be broad agreement that the issue under consideration concerns two separate but inter-related matters, as follows:

- 1) the proportion of imputation credits generated each year that are distributed in that same year (the 'annual payout ratio'), and
- 2) the value of imputation credits that are not immediately distributed, but rather retained within the firm for a period of time (the 'value of retained credits').

As stated in its explanatory statement, the AER considers that a reasonable estimate of the annual payout ratio is the market average of 0.71 provided by Hathaway and Officer.<sup>1019</sup> In the absence of any more reasonable alternatives, this position also appears to have broad support among the experts. In effect, this means that 71 per cent of all imputation credits created in a given year are assumed to be distributed to shareholders in that same year. Once distributed, shareholders are assumed to value these credits at between 0 and 100 per cent of their face value, which represents a best estimate of 'theta'.

The key issue of debate concerns the value of retained imputation credits, which are the credits created in a given year but not distributed in that year. This is clearly a significant issue, as these retained imputation credits are estimated to represent 29 per cent of all credits created each year (i.e. following Hathaway and Officer). The AER accepts Handley's advice that the 'traditional approach' to estimating gamma, which assumes a zero value for retained credits, is intuitively unrealistic. However it is

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<sup>1018</sup> J. C. Handley, *ibid.*, p.8

<sup>1019</sup> Hathaway and Officer, *op. cit.*, November 2004.

accepted that time value considerations may be relevant to the extent that all credits are not immediately distributed in a given year.<sup>1020</sup>

The AER has considered the specific argument raised by Synergies on behalf of the JIA regarding the definition of gamma and consistency with the PTRM. Essentially it appears that Synergies is arguing that a zero value for retained credits should be assumed. As discussed above the AER accepts the advice of Handley that such an assumption appears unreasonable. The AER notes that in the regulatory setting, gamma represents the value of imputation credits created by the payment of company tax, therefore the adjustment to the tax building block represents that portion of the tax paid which is received by investors by way of a tax rebate. On this basis the AER considers it is necessary to recognise the value of all credits generated in the analysis.<sup>1021</sup>

The AER notes the recommendation from Handley on the issue of the value of retained credits. That is, after considering all the arguments put forward by NERA and others concerning the value of retained credits, Handley considers that:

...in my view the best approach is to follow the simpler Officer (1994) framework and define gamma as the value of a distributed imputation credit,  $\gamma = \theta$ .<sup>1022</sup>

The AER acknowledges the merit in the arguments put forward by Handley, in particular with respect to the costs associated with estimating a further three parameters. Further, theoretical arguments that a 100 per cent payout assumption is appropriate for valuation purposes and consistent with the Officer WACC framework remain persuasive. It is also consistent with the modelling assumptions adopted in the PTRM, which implicitly assume a full distribution of free cash flows.

Notwithstanding, the AER has examined whether there is likely to be a material reduction in time value for retained credits. In this context, the AER accepts the views in NERA's report that the value of retained credits depends upon the following two factors:

- the appropriate rate at which to discount retained imputation credits (i.e. the 'discount rate'), and
- the period over which imputation credits are likely to be retained (i.e. the 'retention period').

The AER notes the difference of views between NERA and Handley on the appropriate rate to apply in discounting the value of retained credits. NERA argues that since imputation credits must be attached to dividends in order to be paid out, the appropriate discount rate is the cost of equity. On the other hand, Handley argues that

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<sup>1020</sup> In its explanatory statement the AER recognised that while the value of retained credits may be affected by time value considerations, the effect is not expected to be material such that an estimate of 1.0 is unreasonable [AER, *Explanatory statement*, op. cit., December 2008, p.298].

<sup>1021</sup> The AER also notes that the PTRM implicitly assumes a full distribution of free cash flows.

<sup>1022</sup> J. C. Handley, op. cit., 15 April 2009, p.9.

the appropriate discount rate is somewhere between the risk-free rate and the cost of equity, given his view that:

...retained credits are available for immediate distribution from a firm's franking account balance whereas (expected) future imputation credits need to be generated from (expected) future profits...<sup>1023</sup>

The relevant discount rate should reflect the degree of risk faced by an investor that credits generated are never distributed. Consistent with Handley's views, the AER does not consider that the cost of equity is necessarily the appropriate rate with which to discount the value of retained credits. Firstly, although credits need to be attached to cash flows to be paid out, retained credits need not be attached to future dividends in order to be paid out – they may be distributed via alternative methods (see below).

Secondly as Handley suggests, it could be argued that since retained imputation credits have already been generated from the profits of the firm, the appropriate discount rate is the risk-free rate. Use of a risk-free rate would reflect certainty that credits generated would be distributed to investors eventually. The residual risk appears to arise in the case of bankruptcy (for example), in which case there may be no cash flows with which to distribute retained credits.

Based on the advice and submissions received, the AER considers that the risk faced by an investor with respect to retained credits is likely to be low, as once credits are generated the Australian Tax Office (ATO) stands ready to offer a tax rebate. However given that there still remains a low inherent risk of bankruptcy it is not entirely clear that the risk-free rate is unambiguously the most appropriate discount rate. On this basis the AER considers it is reasonable to apply a discount rate at a level somewhere in between the risk-free rate and the cost of equity.

The AER notes the views from NERA regarding the retention period. Essentially, NERA argues that it is implausible that electricity NSPs would ever distribute retained credits, since:

- the distribution of retained imputation credits can only occur with a reduction in equity, and
- the RABs of electricity NSPs have been and continue to grow.

The FIG makes a similar argument in the context of the current capital market:

In the current environment where capital is highly constrained, businesses are having to conserve capital... Whilst utilities may have been able to maintain high distribution rates in the past, their ability to do so in the future is likely to be much more limited.<sup>1024</sup>

Firstly, for consistency with the annual payout ratio (and the AER's estimate of theta) the AER considers that the relevant retention period is that of the average firm in the market, rather than a period which is industry-specific. On this basis the extent of

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<sup>1023</sup> *ibid.*, pp.5-6.

<sup>1024</sup> FIG, *Submission in response*, op. cit., 29 January 2009, p.46.

change in the RABs of electricity NSPs is not relevant to the specification of a retention period for retained credits. Further, the AER's gearing ratio is a benchmark assumption against which incentives are created for regulated electricity NSPs – there is no requirement to maintain the regulatory gearing level.

Secondly, it does not necessarily follow that the distribution of retained credits is associated with a reduction in the equity of the firm, or that this would result in a permanent change to the equity structure of the firm. For example, a dividend reinvestment plan (DRP) allows for an increase in equity while still releasing imputation credits to shareholders. Moreover, as Handley points out, NERA's suggestion implies that a stock of potentially valuable imputation credits builds up within the firm, never to be released to shareholders. In the AER's view, this suggestion is implausible, as a rational shareholder base would demand that the retained credits be paid out.<sup>1025</sup> As Handley argues:

...when assessing the likelihood of eventual distribution of retained imputation credits, one should not restrict their thinking to existing mechanisms, schemes, structures and securities, for history has shown that financial markets are highly innovative when the incentives are large.<sup>1026</sup>

Third, as the distribution of credits can conceivably be associated with an increase in equity (e.g. via a dividend reinvestment plan, or DRP), the relevance of the business cycle appears limited. In fact, given the opportunity to undertake a DRP, it could be argued that firms may in fact increase their dividend payments (which would then be reinvested) in the current market – as it achieves the twin objectives of raising new equity as well as distributing imputation credits to shareholders.<sup>1027</sup> To the extent that credits are retained for a longer than average period in the current market due to uncertainty over future funding and cash flows, this is only expected to be a short term issue.

On these grounds the AER rejects the argument that retained imputation credits are unlikely ever to be paid out. However the AER is not aware of any empirical analysis that specifically explores this issue. In the absence of such analysis the AER considers it reasonable to assume a retention period of between one and five years. This assumption reflects the AER's view that the average firm in the Australian market will rationally seek to distribute its retained credits as quickly as possible through whatever means are available, so as to meet shareholder demands.

Based on the discussion above, the AER has examined the value of retained credits under the following assumptions:

- the proportion of credits generated in each year that are not immediately distributed is 29 per cent on average,

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<sup>1025</sup> That is, assuming that the shareholder base of the average firm in the domestic market reflects the residency status of the 'representative investor'. See section 10.5.3 for a discussion.

<sup>1026</sup> J. C. Handley, op. cit., 15 April 2009, p.8.

<sup>1027</sup> While there is no guarantee that an offer of a DRP to shareholders will be fully taken up, a firm may employ an underwriter to ensure that the desired level of equity is raised.

- the appropriate rate with which to discount the value of retained credits is between the risk-free rate and the cost of equity,
- the cost of equity is based on an equity beta of 0.8, an MRP of 6.5 per cent, and a risk-free rate (10 year CGS) measured over 40 days, 90 days and 5 years, and
- the retention period for credits is likely to be short, between one and five years.

The AER's findings are contained in table 10.6 below, for a range of assumed averaging periods (i.e. between 40 days and 5 years).

**Table 10.6: Payout ratio for valuation purposes**

Discount rate	Averaging period	Discount rate applied	Retention period	
			5 years	1 year
Risk-free rate	40 days <sup>a</sup>	4.33%	0.94	0.99
Cost of equity		9.53%	0.89	0.97
Risk-free rate	90 days <sup>b</sup>	4.28%	0.95	0.99
Cost of equity		9.48%	0.89	0.97
Risk-free rate	5 years <sup>c</sup>	5.84%	0.93	0.98
Cost of equity		11.04%	0.88	0.97
Average		Risk-free rate	0.94	0.99
		Cost of equity	0.89	0.97
<b>Average</b>			<b>0.91</b>	<b>0.98</b>

Source: AER analysis

Notes:

- Risk-free rate based on 10 year nominal CGS yields as recorded over the 40 business days to 1 April 2009 (i.e. 4.33 per cent).
- Risk-free rate based on 10 year nominal CGS yields as recorded over the 90 business days to 1 April 2009 (i.e. 4.28 per cent).
- Risk-free rate based on 10 year nominal CGS yields as recorded over the five years to 1 April 2009 (i.e. 5.84 per cent).

Based on the findings in table 10.6, the AER considers that a reasonable estimate of the payout ratio using the analysis suggested by NERA is between 0.91 and 0.98. Put another way, once the value of retained imputation credits is taken into account in the analysis of gamma, the payout ratio increases from 0.71 to around 0.95 depending upon the assumptions taken in accounting for time value considerations.

The AER has also considered the arguments raised by the FIG on the additional time value losses associated with imputation credits, and concludes as follows:



- as imputation credits generated are immediately available for distribution it is appropriate to assume zero loss of time value between generation and distribution of credits, and
- any potential time value loss between the time that credits are distributed and redeemed is an issue with the estimate of theta, not the payout ratio.

On this basis of all these considerations the AER concludes that the issue of time value loss associated with the value of retained credits is not material such that the adoption of an estimate for the payout ratio of 1.0 is unreasonable. Further, following Handley's advice, the AER considers that the adoption of an assumed payout ratio of 1.0 has significant advantages, as follows:

- it is consistent with the Officer (1994) WACC framework which assumes a full distribution of free cash flows, as well as the general valuation framework under a classical tax system,
- it is consistent with the AER's post-tax revenue model (PTRM), which explicitly assumes a full distribution of free cash flows, and
- it avoids any further costly debate on the estimation of the additional parameters that would be required to establish the 'true' time value adjustment to retained credits, which the AER has demonstrated to be immaterial under a set of reasonable assumptions.

#### **AER's conclusion**

Based on detailed consideration of all the available information, the AER's conclusions on the payout ratio are as follows:

- a reasonable estimate of the annual payout ratio is the market average of 0.71 provided by Hathaway and Officer,
- there is clear merit in the recommendation put forward by Handley to adopt a payout ratio of 1.0, in particular with respect to simplicity in the framework, and the strong theoretical grounds that a full distribution is appropriate for valuation purposes and consistent with the Officer WACC framework,
- notwithstanding, the AER has examined whether there is likely to be a material reduction in time value for retained credits, in accordance with the framework proposed by NERA,
- based on a reasonable set of assumptions the AER considers that a reasonable estimate of the payout ratio using the analysis suggested by NERA is between 0.91 and 0.98,

On the basis of all these considerations the AER concludes that there is not a significant issue of time value loss associated with the value of retained credits, such that the adoption of an estimate for the payout ratio of 1.0 is unreasonable. The adoption of a payout ratio of 1.0 is also consistent with the influential Officer WACC framework and the modelling assumptions in the AER's PTRM.

Accordingly the AER considers there is persuasive evidence to depart from the ‘traditional approach’ to estimating gamma which assumes that retained credits have zero value. Under this new approach, the AER concludes that the most appropriate estimate of the payout ratio is 1.0 for valuation purposes.

### 10.5.3 Theoretical issues with theta

As part of this review the AER has focused on a number of conceptual issues that have been prominent in the previous regulatory debate on the value of imputation credits (‘theta’), including:

- the recognition of foreign investors in the domestic capital market, and
- the identity of the relevant investor (i.e. average / marginal).

In its explanatory statement, after considering advice from Handley, the AER proposed to adopt a conceptual framework that defines ‘the market’ as the domestic Australian capital market with foreign investors recognised to the extent they invest in that market. In turn, the value of imputation credits is best considered a weighted average valuation of all investors (both domestic and foreign investors) in the defined market. The AER considered that this conceptual framework appropriately recognises the presence of foreign investors in a domestic CAPM framework, consistent with the estimation of other WACC parameters.

Importantly, the AER considered that this theoretical position does not preclude the consideration of any of the available empirical methodologies to estimate theta (i.e. dividend drop-off or tax statistics).

### Submissions in response to explanatory statement

The JIA submit that the AER’s proposed market definition – a domestic capital market with foreign investors recognised to the extent they invest in that market – is theoretically incorrect. The JIA’s submission is supported by a report from NERA which examines the conceptual arguments put forward by the AER in its explanatory statement. NERA states that:

The use of domestic data implicitly accepts that a domestic form of the CAPM should be used, but with foreign investors recognised to the *extent they influence* the Australian market...

...The influence of foreign investors on these WACC parameters is not limited, though, by the extent to which they currently invest in the Australian equities market. Rather, the potential for foreign investors to enter the Australian equities market means that this group can exert a large influence on prices in the market even if their current holdings of Australian equities are low.<sup>1028</sup>

To illustrate this, NERA provides a hypothetical example in which there are two countries (domestic and foreign) with one investor and one risky asset in each

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<sup>1028</sup> NERA, op. cit., 30 January 2009, pp.12-13

country.<sup>1029</sup> As the foreign investor holds the majority of ‘global’ wealth it also holds the majority of assets in both the domestic and foreign markets in equilibrium (pre-imputation). However if there is an imputation credit attached to the domestic asset which can only be accessed by the domestic investor, the foreign investor will exit the domestic market altogether. The reduction in the required return on the domestic asset following the introduction of imputation is assumed to represent the market value of the imputation credit. In this example the market value of the imputation credit is much less than the value the credit actually delivers to the domestic investor, because the foreign investor’s influence on prices is so large (i.e. commensurate with its wealth holdings).

NERA argues that:

This example illustrates the fact that, even in a world where no domestic shares are held by the foreign investor, the potential of the foreign investor to enter the market can have a significant impact on domestic prices. In particular, the potential of the foreign investor to enter the market can have a substantial impact on the market value of the franking credits the domestic asset delivers.<sup>1030</sup>

According to NERA the implication is that, in determining the value of an imputation credit, the ‘representative investor’ will most closely resemble a foreign investor as foreign investors have substantially more wealth. It follows that the value of imputation credits in equilibrium is negligible, as the representative investor (i.e. the foreign investor) cannot access them.

Further, NERA argues that Handley’s approach to determining the characteristics of the representative investor – to ignore the holdings of foreign assets by foreign investors (and equally the holdings of foreign assets by domestic investors) in determining the weights to apply to each investor – is inconsistent with the finance literature concerning the impact of differential taxation.<sup>1031</sup> NERA states that if one treats imputation credits as a negative personal tax on dividends, the literature indicates that:

...the benefit associated with franking credits will depend on a wealth-weighted average of tax rates across all investors, not a holdings-weighted average across investors holding shares that deliver franking credits.<sup>1032</sup>

NERA argues that by discounting the foreign assets held by foreign investors, Handley is effectively assuming there are barriers in place which limit foreign investment in Australia. NERA states that this assumption does not match what is observed in practice, as investors are largely free to shift wealth between domestic equities and foreign equities.

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<sup>1029</sup> NERA states that the example is based on a simple general equilibrium version of Wood’s model (Wood, *A simple model for pricing imputation tax credits under Australia’s dividend imputation tax system*, Pacific-Basin Finance Journal 5, 1997, pp.465-480). The detailed description of the model appears in Appendix A of the NERA report.

<sup>1030</sup> NERA, op. cit., 30 January 2009, p.13

<sup>1031</sup> NERA, *ibid.*, p.15. In particular, NERA cites the following papers: Brennan (1970); and Guenther and Sansing (2007).

<sup>1032</sup> NERA, *ibid.*, p.15

The JIA's consultant Synergies Economic Consulting ('Synergies') also provides views on the appropriate conceptual framework of analysis for theta. In short, Synergies argues that a zero value for imputation credits is appropriate because foreign investors (who derive no value from imputation credits) are likely to be the marginal price-setting investor.<sup>1033</sup> It is noted however that these conceptual arguments from Synergies contradict the views from the JIA in its main submission, which focus on the characteristics of the 'representative investor'.

Overall, based on the advice of its consultant NERA, the JIA conclude that a zero value for theta is reasonable, because:

...it is consistent with the recognised theoretical framework that suggests that the value of gamma depends on the impact of imputation credits to the representative investor. Where the representative investor is a weighted average of the characteristics of all investors – with the weights determined by investors' wealth not holdings...<sup>1034</sup>

### Consultant's review

In a November 2008 report prepared for the AER, Handley stated that the equilibrium value of imputation credits is determined by a weighted average of all investors in the market (i.e. the 'representative investor'). Further under a domestic CAPM framework, foreign investors should be recognised only to the extent that they invest domestically. For example, in responding to NERA's claim from its earlier report that the weights to apply to individual investors should be based on global levels of wealth, Handley stated that:

...once you choose the market portfolio, you define the set of assets that are relevant for pricing purposes and define the set of investors that are relevant for pricing purposes...

...So whilst it is true that the aggregate wealth of domestic investors compared to the aggregate wealth of foreign investors is small on a global scale, the choice of a domestic market portfolio means that the weighting should be based only on the wealth invested in the domestic market portfolio

i.e. the equilibrium value of franking credits should reflect a weighted average of the value of franking credits across all investors in the domestic market, including foreign investors but only to the extent that they invest domestically.<sup>1035</sup>

In a follow-up report prepared for the AER, Handley addresses each of the key arguments put forward by NERA concerning the characterisation of the representative investor. Handley's conclusions largely reiterate those from his earlier report.

Firstly, in relation to NERA's suggestion that the AER's market definition implies there are barriers to international capital flows, Handley states that:

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<sup>1033</sup> Synergies, op. cit., January 2009, p.36.

<sup>1034</sup> JIA, *Submission in response*, op. cit., February 2009, p.150.

<sup>1035</sup> J. C. Handley, *A note on the valuation of imputation credits*, Report prepared for the AER, 12 November 2008(d), pp.20-21.

The problem with this argument is that the whole issue of barriers to investment between markets is irrelevant given that a domestic version of the CAPM is being used under the National Electricity Rules (NER)...

...In the current setting, considerations concerning assets in other markets and capital flows between markets are outside the model and therefore play no role.<sup>1036</sup>

In essence, Handley argues that NERA's suggested characterisation of the representative investor is only relevant in the context of an international version of the CAPM.

Secondly, regarding NERA's argument that the AER's market definition is inconsistent with the finance literature concerning the impact of differential taxation, Handley states that, to the contrary:

...the AER characterization is perfectly consistent with the Brennan (1970) and Guenther and Sansing (2007) analysis.<sup>1037</sup>

Handley explains that the starting point for the Sharpe CAPM (and all subsequent versions of the CAPM) is to assume a given set of assets (' $n$ ' risky assets and a risk free asset) and a given set of investors (' $m$ ') who collectively determine the prices of those assets. The utility of each investor is based on the expected return and risk of his/her end of period wealth, which in turn is a function of the  $n$  risky assets (and the risk-free rate) as defined. Handley states that:

In other words, any assets which may be held by any of the investors in other markets – and the corresponding wealth of those holdings – are not included in the model and therefore play no role in the pricing of  $n$  risky assets in the market...

...This is why the most critical choice to be made when using the CAPM in practice concerns the proxy for the market portfolio... So in the current context, the use of a domestic stock index as the proxy for the market portfolio means that only domestic assets (i.e. supply) and domestic wealth (i.e. demand) are relevant.<sup>1038</sup>

Handley states that this framework underpins both the Sharpe CAPM and all subsequent versions of the CAPM, including the alternative (tax-adjusted) models put forward by NERA. On this basis Handley argues that the AER's selection of the domestic equities market as the proxy for the market portfolio, and consequent exclusion of assets outside the domestic market, is conceptually sound.

Third, Handley examines NERA's argument that the influence of foreign investors is not limited by the extent to which they invest domestically, and in particular the numerical example provided. Handley states that:

Wood (1997) is an international CAPM – it deals with the pricing of both domestic and foreign assets, and so by definition, takes into account global rather than domestic levels of wealth. It is not the Sharpe CAPM. It is not a

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<sup>1036</sup> J. C. Handley, op. cit., 15 April 2009, pp.12-13.

<sup>1037</sup> *ibid.*, p.13.

<sup>1038</sup> *ibid.*, p.14.

domestic CAPM. Accordingly, NERA's conclusions and illustrations based on Wood (1997) are irrelevant.<sup>1039</sup>

Overall, under the assumption that a domestic version of the CAPM will be retained, Handley concludes that:

In my opinion, the AER's characterisation of the representative investor remains sound. Accordingly, for the purposes of estimating gamma, foreign investors should be recognised but only to the extent that they invest in the domestic market i.e. the weighting given to foreign investors should be based on their domestic level of wealth and not on their global level of wealth.<sup>1040</sup>

### **Issues and AER considerations**

As stated in the explanatory statement, the AER considers there are a number of common positions that have emerged regarding the conceptual framework for estimating theta, including on:

- market definition – domestic capital market with foreign investors recognised implicitly in the use of domestic market data.
- average / marginal investor – all investors are marginal investors, therefore the task is to determine the valuation of the 'representative investor', which is the weighted average valuation of all investors in the market.

On the second of these issues, the AER notes the conceptual arguments put forward by Synergies concerning the identity of the marginal investor. These arguments are not explicitly referenced by the JIA in its main submission. Further, such arguments are inconsistent with the views from other experts that the focus should be on the characteristics of the 'representative investor' rather than any single investor.<sup>1041</sup> In the AER's view, there is nothing in the material provided in response to the explanatory statement that would cause it to depart from this theoretically sound and generally accepted conceptual approach.

There still appears to be quite significant debate concerning the appropriate market definition. NERA maintains that in determining the value of an imputation credit, the 'representative investor' will most closely resemble a foreign investor as foreign investors have substantially more wealth. It follows that the value of imputation credits in equilibrium is negligible, as the representative investor (i.e. foreign investor) cannot access them. On the other hand, Handley maintains his earlier position that NERA's suggested characterisation of the representative investor is only relevant in the context of an international version of the CAPM. That is, under a domestic CAPM framework foreign investors should be recognised but only to the extent they invest domestically.

As stated in its explanatory statement, based on Handley's advice the AER has adopted a conceptual framework that defines 'the market' as the domestic Australian

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<sup>1039</sup> *ibid.*, pp.16-17.

<sup>1040</sup> J. C. Handley, *op. cit.*, 15 April 2009, p.17.

<sup>1041</sup> For example, see: NERA, *The value of imputation credits*, A report for the ENA, Grid Australia and APIA, 11 September 2008, p.11; and J. C. Handley, *op. cit.*, , 12 November 2008(d), pp.6-7.

capital market with foreign investors recognised to the extent they invest in that market. In turn, the value of imputation credits is best considered a weighted average valuation of all investors (both domestic and foreign investors) in the defined market. The AER considered that this conceptual framework appropriately recognises the presence of foreign investors in a domestic CAPM framework, consistent with the estimation of other WACC parameters.

In the AER's view there is not any new information contained in the JIA's submission that would cause the AER to depart from its position in the explanatory statement on this issue.

NERA suggests that the recognition of foreign investors should be based on potential influence, rather than based on actual current ownership. Following NERA's logic this implies that in those countries that do not have an imputation tax system the majority of assets would be held by foreign investors. This is not what is observed in practice. It unrealistically assumes perfect global capital markets (i.e. perfect information, zero transactions costs), and ignores the commonly accepted notion of 'home country bias'.

As Handley points out, it is the choice of the proxy for the market portfolio that defines the set of assets and the set of investors that are relevant for pricing purposes. NERA's suggestion is only applicable in an international CAPM framework, which is not the framework within which the AER is conducting its review. As the AER has selected a domestic market portfolio to estimate all WACC parameters subject to review (i.e. MRP, equity beta), the AER considers its position with respect to the representative investor to be conceptually sound.

#### **AER's conclusion**

The AER maintains its position from the explanatory statement with respect to the market definition. Under a domestic CAPM framework, foreign investors in the Australian market will be recognised in defining the representative investor, but only to the extent they invest in the domestic capital market.

#### **10.5.4 The appropriate time period for estimating theta**

In its explanatory statement the AER considered there to be persuasive evidence to reject pre-2000 data from consideration in estimating theta. In this respect there is a clear conceptual case to focus on data from the post-2000 period only, given the tax changes in July 2000 which allowed a full cash rebate to resident investors for unused imputation credits. Further, the AER considered that the JIA have not presented any compelling evidence to include pre-2000 data in the estimates of theta, nor had it established that a longer data set will improve the reliability of the final estimates.

Accordingly for the purposes of this review the AER has estimated theta based on post-2000 data only.

## Submissions in response to explanatory statement

In its submission the JIA argues that the AER was wrong in its explanatory statement to reject pre-2000 data from consideration in estimating theta.<sup>1042</sup> The JIA's submission is supported by NERA, which argues that the AER's reasoning is flawed for a number of reasons.

Firstly, NERA argues that there is no conceptual basis to believe that the July 2000 tax changes would have changed the value of imputation credits:

The representative investor will most likely resemble a foreign investor because foreign investors have an aggregate wealth that exceeds the aggregate wealth of domestic investors by orders of magnitude. For this reason, the July 2000 tax changes would be expected to have had, at most, a minimal impact on the value of theta.<sup>1043</sup>

Secondly, NERA argues that the AER's reliance on the results of the Handley and Maheswaran (2008) study of tax statistics as support for the conceptual arguments is also inappropriate. In NERA's view, redemption / utilisation rates such as is provided in this study do not provide a reliable estimate of the market value of imputation credits.

Finally, NERA argues that the Beggs and Skeels test for a structural break between the years 2000 and 2001-04 is questionable due to the anomalous results estimated for the year 2000. NERA also notes that:

...if one disregards the year 2000 estimates, the increase in the value of theta in the 2001-2004 period is not statistically significant. Consequently, the Beggs and Skeels study provides little evidence that pre-2001 data should be excluded.<sup>1044</sup>

Based on advice from SFG in particular, the JIA concludes that:

Since there is no valid reason for eliminating the pre-2000 data, it should be included in the analysis...

...if a longer time period including pre-2000 data is used, the estimate of theta will be more reliable and it will be lower than the 0.57 estimate relied upon by the AER.<sup>1045</sup>

## Issues and AER considerations

Given the NER require that gamma be estimated on a forward-looking basis, it is important that the data upon which it is estimated is representative of the current imputation tax regime.<sup>1046</sup>

In its explanatory statement the AER considered that there is a clear conceptual argument that the value of imputation credits to the 'representative' investor in the

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<sup>1042</sup> JIA, *Submission in response*, op. cit., February 2009, p.148.

<sup>1043</sup> NERA, op. cit., 30 January 2009, p.19.

<sup>1044</sup> NERA, *ibid.*, p.20.

<sup>1045</sup> JIA, *Submission in response*, op. cit., February 2009, pp.148-149.

<sup>1046</sup> NER, cls. 6A.6.2(j)(1) and 6.5.4(e)(1).



Australian capital market will have increased following the July 2000 tax changes. Prior to the tax changes, the key drivers for the value of imputation credits for an individual investor were:

- residency status (i.e. domestic and foreign investors place differential valuation on imputation credits), and
- marginal tax rates (i.e. imputation credits received in excess of personal income tax liabilities were not able to be utilised).

Foreign investors were not directly affected by the July 2000 tax changes. However for domestic investors (both individuals and funds), the tax changes effectively removed the impact of marginal tax rates, as a full cash rebate was allowed for credits received in excess of income tax liabilities. For these reasons, given that the AER defined theta as a weighted average valuation across all investors in the Australian capital market, one would expect it to increase as a result of the 2000 tax changes.<sup>1047</sup>

The AER notes the recent arguments from NERA regarding the characteristics of the representative investor. As discussed at section 10.5.3, the AER maintains its position from the explanatory statement with respect to the market definition. Under a domestic CAPM framework, foreign investors in the Australian market will be recognised in defining the representative investor, but only to the extent they invest in the domestic capital market. Under this framework the arguments from NERA regarding the characteristics of the representative investor are not valid. On this basis the AER maintains its view from the explanatory statement that there are strong conceptual grounds for a structural break in theta estimates after the July 2000 tax changes.

The AER reiterates that the case for a structural break as a result of the July 2000 tax changes has a sound conceptual basis, and is supported by the most reliable and verifiable empirical evidence.<sup>1048</sup>

The AER notes NERA's argument that the results of the 2008 Handley and Maheswaran study of tax statistics are irrelevant with respect to whether the value of credits increased after the tax changes in July 2000. As discussed at section 10.5.6, the AER disagrees with NERA on the relevance of utilisation rates to the estimate of theta. Under a domestic CAPM framework, utilisation / redemption rates can provide useful information on the value of credits to the representative investor – as by definition they reflect a weighted average of the valuation of all investors in the domestic market. Accordingly the AER reiterates its view that the Handley and Maheswaran study of tax statistics supports to the conceptual arguments for an increase in theta following the July 2000 tax changes.

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<sup>1047</sup> That is, assuming that the proportion of foreign / domestic investors in the Australian capital market has remained stable over the pre and post 2000 periods.

<sup>1048</sup> The AER notes that the conceptual case for a structural break in 2000 was commented on by Judge Tilmouth as part of the final ruling on Envestra's appeal of ESCOSA's 2006 final gas distribution decision. See: District Court of South Australia, *Envestra Limited v Essential Services Commission of South Australia*, 2007, para. 86, "No doubt there was some influence on the value of gamma brought about by the tax law changes coming into effect during 2000, although the precise impact remains somewhat of a mystery."

NERA argues that the Beggs and Skeels (2006) study does not provide any evidence of a structural break following the July 2000 tax changes. This is also supported by SFG and Synergies. The key reason for this assertion is the view that the Beggs and Skeels estimates from the year 2000 are affected by anomalies, as evidenced by a cash dividend drop off ratio of \$1.168. The AER notes that similar arguments were made by SFG in its earlier report prepared for the JIA in response to the issues paper. In its explanatory statement the AER acknowledged arguments put forward by the JIA, however the views of the authors themselves on the case for a structural break were considered highly influential. Beggs and Skeels are clear in the interpretation of their results, concluding that:

...it appears that this tax change had a permanent impact on the value of franking credits. This result is confirmed by a test for structural breaks whereby the interval 1998-2000 is compared to 2001-2004. The test shows that the franking credit drop-off ratio was significantly higher in 2001-2004.<sup>1049</sup>

The AER also noted that Beggs and Skeels' separate estimates of theta for each individual year provide further support for an increase in theta in the post July 2000 period, and that the value of cash dividends remained relatively stable at around 0.80. These results are reproduced in table 10.7.

**Table 10.7: Theta and the value of cash dividends – 2000-2004**

Year ended 30 June	Cash dividends	SE	Theta	SE
2000	0.843	0.113	0.242	0.187
2001	0.817	0.131	0.506	0.233
2002	0.769	0.128	0.732 <sup>(a)</sup>	0.284
2003	0.728	0.093	0.678 <sup>(a)</sup>	0.193
2004	0.811	0.108	0.631 <sup>(a)</sup>	0.229

Source: Beggs and Skeels<sup>1050</sup>

Notes:

(a) Indicates significantly greater than zero at the 5 per cent level

In summary, the AER maintains that the Beggs and Skeels study sets out a series of carefully considered and highly influential views. Therefore while there are competing views, the AER remains persuaded by the authors of this published study that theta indeed increased following the July 2000 tax changes.

Finally, the AER notes the argument from SFG (and others) that a longer term data set should be preferred as it improves the reliability of the results. This relies upon the argument that there is no evidence of a structural break following the July 2000 tax changes, however as discussed above the AER considers there is such evidence. Further, SFG has not presented evidence that the reliability of theta estimates from

<sup>1049</sup> Beggs and Skeels, op. cit., 2006, p.248.

<sup>1050</sup> ibid., table 3, p.246.

dividend drop off studies actually improves with a longer term data set – as discussed below in section 10.5.5, in fact the Beggs and Skeels theta point estimates over the period 2001-04 appear more reliable than the SFG theta point estimates over the longer period 2001-06. While sample size is no doubt a relevant factor, the reliability of the results appears to be more impacted by methodology, data set and sampling techniques.

### **AER's conclusion**

The AER maintains its view that there is persuasive evidence to reject pre- July 2000 data from consideration in estimating theta. Accordingly for the purposes of this final decision the AER has estimated theta based on post- July 2000 data only.

### **10.5.5 Inferring theta from market prices**

In its explanatory statement the AER considered that the results generated by studies that attempt to infer theta from market prices should be treated with caution, given the inherent noise and anomalies in estimation. Notwithstanding these concerns, the AER considered that inferential studies (in particular dividend drop-off studies) can still provide some useful information on the value of imputation credits in the Australian economy.

Based on the empirical evidence available, the AER considered that the 2006 Beggs and Skeels study provides the most comprehensive, reliable and robust estimate of theta inferred from market prices in the post- July 2000 period. Accordingly, the AER placed significant weight on the 2001-2004 estimate of theta from this study, of 0.57.

Despite the advantage of providing more up-to-date estimates (i.e. to 2006), the reliability of the estimates provided by SFG in its 2008 dividend drop-off study could not be verified. Therefore the results of this study were not given any weight for the purposes of the explanatory statement.

### **Submissions in response to explanatory statement**

In its submission, the JIA state that in reaching the conclusion that the best estimate of theta inferred from market prices was 0.57, the AER has dismissed or placed little weight on all market studies and exclusively relied on a small sub-set of the results of the 2006 Beggs and Skeels study. The JIA submit that there is “overwhelming evidence” that the lower bound estimate of theta should be set to zero, based on the following studies:

- the 2004 Cannavan, Finn and Gray study of simultaneous security prices over the period 1994 to 1999, which found theta to have a zero value,
- the 2006 ACG dividend drop-off study which found that after data set corrections are made the estimated value of theta is insignificantly different from zero in all but one year since 1997,
- the 2007 Ickiewicz study of the impact on share prices of the introduction of the Australian dividend imputation system, which found no evidence of a positive value for theta,

- the 2009 study by Lajbcygier and Wheatley of the cross-sectional relationship between returns and imputation credit yields, and
- the results of all dividend drop-off studies if one dollar of cash dividends is valued at one dollar, in accordance with the empirical evidence provided by the 1994 study by Boyd and Jagannathan.<sup>1051</sup>

The JIA engaged NERA to explore theoretical issues raised by Handley with respect to the interpretation of the results from dividend drop-off studies. NERA states that:

Handley cautions against drawing conclusions from dividend drop-off studies. He cites a study by Michaely and Vila (1995), that Allen and Michael (2003) reference, and notes that the study suggests that the drop-off should reflect not just the impact of differential taxes but also the risk involved in trading around the ex-dividend date...

...subsequent studies by Michaely et al. not cited by Handley confirms that while risk will play a role in determining the ex-dividend day behaviour of stock prices its impact is negligible compared with the average dividend payment.<sup>1052</sup>

According to NERA, a proper interpretation of the literature indicates that an estimate of theta derived from dividend drop-off studies will provide an accurate estimate of the value of imputation credits to investors.

In relation to SFG's dividend drop-off study, the JIA state that:

The JIA submitted to the AER the results of a dividend drop-off study more comprehensive than Beggs and Skeels, and using an extended data set that includes more recent observations in September 2008.<sup>1053</sup>

In response to the explanatory statement the JIA state that it requested SFG to provide an additional report that explicitly considers the AER's concerns with the 2008 study. Specifically, SFG was asked by the JIA to:

- apply the Beggs and Skeels (2006) methodology to the Beggs and Skeels sub-sample of data post- July 2000, and confirm that this process replicates the parameter estimates reported by Beggs and Skeels.
- extend the sample to incorporate more recent data, but replicate the Beggs and Skeels methodology in other respects, and report the relevant parameter estimates.<sup>1054</sup>

In its report SFG states its view that the Beggs and Skeels methodology applied to a short sub-sample of data does not provide the most reliable estimate of theta, because:

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<sup>1051</sup> JIA, *Submission in response*, op. cit., February 2009, p.150-151.

<sup>1052</sup> NERA, op. cit., 30 January 2009, p.21.

<sup>1053</sup> JIA, *Submission in response*, op. cit., February 2009, p.145.

<sup>1054</sup> SFG, op. cit., 1 February 2009 (e), p.2.

- the estimates are very sensitive to the effect of a very small number of highly influential observations, and
- the estimates from all dividend drop-off studies are affected by noise such that reliable estimates can only be obtained using larger data sets.

Given these considerations, SFG states that:

...in this report I have examined the Beggs and Skeels methodology applied to the post July 2000 period not because I believe this provides the most reliable estimate, but only as a way of illustrating the approach favoured in the Explanatory Statement as it applies to more recent data.<sup>1055</sup>

SFG has produced a comparison of the results from the Beggs and Skeels study with its own study over the post- July 2000 period. SFG states that it attempted to match the sample employed by Beggs and Skeels, however in doing so it is noted that:

Beggs and Skeels (2006) do not list the observations for which they were unable to obtain all of the required data items, so it is impossible to know exactly what sample they use. Having used the same size filter and the same time period, I have matched their sample data as closely as is possible.<sup>1056</sup>

The results of SFG's comparative analysis are summarised in table 10.8 below.

**Table 10.8: SFG – comparison of results from Beggs and Skeels (2006) with SFG (2008) over the post July 2000 period**

Period	Beggs and Skeels (2006)			SFG (2008)		
	Cash <sup>(a)</sup>	FC <sup>(b)</sup>	N <sup>(c)</sup>	Cash	FC	N*
1 July 2000 – 10 May 2004	0.800 (0.052)	0.572 (0.121)	1,310	0.895 (0.227)	0.526 (0.541)	1,389
1 July 2000 – 31 Dec 2006				0.913 (0.168)	0.369 (0.388)	2,182

Source: SFG, table 1 (extract).<sup>1057</sup>

Notes:

(a) Cash: Regression coefficient for the cash dividend drop-off

(b) FC: Regression coefficient for the franking credit drop-off

(c) N: Number of observations in sample

Numbers in parenthesis are standard errors

As table 10.8 indicates, SFG estimates the value of imputation credits at 0.526 compared with the estimate of 0.572 from Beggs and Skeels, over the same time period. SFG concludes that:

<sup>1055</sup> *ibid.*, p.3.

<sup>1056</sup> *ibid.*, p.9.

<sup>1057</sup> *ibid.*, p.8.

In my view, these two sets of estimates are very close in the circumstances.<sup>1058</sup>

Further, continuing to apply the Beggs and Skeels methodology, but extending the sample period to 2006, SFG estimates the value of imputation credits at 0.367.

In its report SFG also examines the reliability of the estimates produced by its study and the dividend drop-off methodology more generally. SFG states that:

...in addition to screening out small firms, the reliability of the estimates can be improved by taking a longer data period (increasing the number of observations) and by directly eliminating influential outliers that have undue influence on the results...

...Consequently, I also examine an approach that involves directly identifying and excluding the 1% of observations that are most influential to the analysis.<sup>1059</sup>

As in its previous report, SFG applies the 'Cook D-statistic' to remove the most influential 1 per cent of observations.<sup>1060</sup> The results are shown in table 10.9.

**Table 10.9: SFG – results from SFG (2008) after removal of outliers / influential observations**

Period	SFG (2008)			SFG (2008) excl. influential 1%		
	Cash <sup>(a)</sup>	FC <sup>(b)</sup>	N <sup>(c)</sup>	Cash	FC	N*
1 July 2000 – 10 May 2004	0.895 (0.227)	0.526 (0.541)	1,389	0.945 (0.059)	0.190 (0.136)	1,378
1 July 2000 – 31 Dec 2006	0.913 (0.168)	0.369 (0.388)	2,182	0.916 (0.049)	0.235 (0.111)	2,166

Source: SFG, table 1 (extract).<sup>1061</sup>

Notes:

(a) Cash: Regression coefficient for the cash dividend drop-off

(b) FC: Regression coefficient for the franking credit drop-off

(c) N: Number of observations in sample

Numbers in parenthesis are standard errors

As table 10.9 indicates, SFG estimates that once the 1 per cent most influential observations are removed, the estimate of the value of imputation credits is 0.190 for the period 2001-04 and 0.235 for the period 2001-06. SFG also reports that by

<sup>1058</sup> *ibid.*, p.9.

<sup>1059</sup> *ibid.*, pp.11-12.

<sup>1060</sup> SFG describes Cook's D-statistic as 'a commonly used estimate of the influence that a specific observation has on the coefficient estimates in the context of ordinary least squares regression.' [SFG, *op. cit.*, 1 February 2009(e), p.7]

<sup>1061</sup> SFG, *op. cit.*, 1 February 2009(e), p.8.

applying Cook's D-statistic, the R-squared statistic increases from 3.5 to 31.1 per cent for the period 2001-2006.<sup>1062</sup> On this basis, SFG concludes that:

...I consider this set of results to be the most robust and reliable.<sup>1063</sup>

The JIA engaged Synergies Economic Consulting (Synergies) to independently review SFG's dividend drop-off analysis. After reviewing SFG's data set, source code and output, Synergies conclude that:

We have reviewed the work of SFG Consulting. We agree with the propositions made by them and we confirm the results that they found. We analysed the empirical work and found it to be a robust analysis. We confirm the accuracy of the results reported.<sup>1064</sup>

Synergies states that studies which use the dividend drop-off methodology to estimate theta need to be treated with caution due to the collinearity between dividends and imputation credits. Synergies argue that all previous dividend drop off studies (including studies from Hathaway and Officer, Beggs and Skeels, and SFG) suffer from the problem of 'multicollinearity' – the issue of separating the value of cash dividends and imputation credits.<sup>1065</sup>

In an attempt to overcome the statistical issues associated with previous studies, Synergies has undertaken two additional studies for the JIA – a dividend drop-off study and a diagnostic study. Synergies separately estimate the 'drop-off due to one dollar of distributed franking credits' at -0.469 over the period 1990-2008, and on this basis concludes from its dividend drop off study that:

...Synergies find, as does Bellamy and Gray (2004), Cannavan et al (2004) and SFG (2008) that theta value both prior to and post 2000 is unchanged and has a value that is not statistically different from zero.<sup>1066</sup>

Synergies also conducted a basic diagnostic test which aimed to determine whether or not the average share price change from the distribution of a franked dividend is different from that for an unfranked dividend. Synergies conclude from this study that there is evidence that the market responds equally to fully franked and unfranked dividends, implying that the market places zero value on imputation credits.<sup>1067</sup>

In its submission the JIA also provides some more detailed analysis regarding the 2007 Ickiewicz study, which found that there was no change in Australian share prices that could be explained by the introduction of dividend imputation in 1987. The JIA states that, contrary to the AER's views in its explanatory statement:

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<sup>1062</sup> SFG describes the R-squared statistic as measuring 'the proportion of the dependent variable that is explained by variation in the independent variable. It is a measure of how well the proposed model fits the data... An R-squared statistic of 20%, for example, would indicate that 20% of the variation in prices is explained by the dividend and franking credit and 80% of the variation is due to other factors.' [SFG, op. cit., 1 February 2009(e), p.11]

<sup>1063</sup> *ibid.*, p.12.

<sup>1064</sup> Synergies, op. cit., January 2009, p.3

<sup>1065</sup> *ibid.*, pp.3, 18, 22.

<sup>1066</sup> *ibid.*, p.26

<sup>1067</sup> *ibid.*, pp.27-28.

- The study by Ickiewicz does in fact examine the most relevant time period, as it covers the period leading up to the introduction of imputation (i.e. prior to 1 July 1987). It is during this period that all the relevant government announcements were announced, and hence when a stock market reaction would be expected.
- The analysis produced consistent results for a time period covering the current imputation tax regime. That is, it also examined the impact on share prices of the introduction of the cash rebate for unused imputation credits on 1 July 2000, and found no monthly abnormal return observations significantly different from those available in the unaffected sample.
- The results of the Ickiewicz (2007) study should be strongly preferred to the Hancock (2005) finding that share prices increased significantly following the introduction of dividend imputation (i.e. between July and September 1987), because Ickiewicz controls for many other variables that may impact share prices.
- The result of the Ickiewicz study is entirely consistent with the result of dividend drop off studies, conditional on a dollar of cash dividends being valued at one dollar.<sup>1068</sup>

In summary, the JIA submits that the results of Ickiewicz (2007) constitute relevant evidence that assist in the interpretation of dividend drop off analyses.

Overall, the JIA's submission on gamma is that a reasonable range for theta is 0 to 0.24, based on the following:

...there is compelling evidence to suggest that the value of theta may be zero and so the lower bound of any reasonable range for theta should be zero...

...if the Beggs and Skeels approach is applied to 2001-2006 data, including a small number of highly influential observations, the estimate of theta is 0.37. If those few unduly influential outliers are removed from the data set, the estimate of theta is 0.24. The SFG and Synergies reports both set out reasons why the latter estimate is statistically more reliable.<sup>1069</sup>

### **Consultant's review**

In earlier advice prepared for the AER, Handley explained the appropriate interpretation of the results from dividend drop-off studies:

In an ideal economy characterized by no transactions costs or differential taxes, no information asymmetries, competitive price-taking and rational behaviour, the share price is expected to drop on the ex-dividend date by the amount of the dividend.<sup>1070</sup>

In a further report Handley responds specifically to NERA's statements regarding the literature on the interpretation of the results from dividend drop-off studies. Handley states that the views in his earlier report prepared for the AER – that caution should be

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<sup>1068</sup> JIA, *Submission in response*, op. cit., February 2009, pp.153-156.

<sup>1069</sup> *ibid.*, pp.151, 147.

<sup>1070</sup> J. C. Handley, op. cit., 12 November(d), p.9.



taken in interpreting the results from dividend drop-off studies due to the risk involved in trading around the ex-dividend date – were based on both theoretical and empirical considerations:

Theoretical justification for an equilibrium framework principally comes from Heath and Jarrow (1998) who show that arbitrage considerations alone are insufficient to explain the drop-off in the underlying stock price in terms of dividend... Empirical support for the impact of differential taxes and risk on ex-dividend day pricing comes from Elton and Gruber (1970), Michaely and Vila (1995), Graham, Michaely and Roberts (2003) and Rantapuska (2008).

The key implication is that one needs to be careful in interpreting the regression coefficient from dividend drop off studies...<sup>1071</sup>

Specifically, Handley argues that the conclusion to be drawn from the regression coefficient on the before personal tax value of the distribution is largely determined by what one assumes about differential personal taxes and the risk of trading around the ex-dividend date.

In summary, based on a review of the literature (including the studies cited by NERA) Handley concludes that there is no disagreement among experts on the role of dividend drop off studies in estimating theta, however caution should be exercised given that multiple interpretations of the coefficients are possible.<sup>1072</sup>

### **Issues and AER considerations**

This section is structured as follows:

- Interpretation of dividend drop off studies
- The SFG dividend drop off study
- The Synergies report
- The Beggs and Skeels dividend drop off study
- The Ickiewicz study
- Other evidence.

The issue of consistency between the value of cash dividends inferred from dividend drop-off studies and the assumptions in the CAPM is discussed at section 10.5.7, which includes specific discussion of the findings from the Lajbcygier and Wheatley (2009) and the Boyd and Jagganathan (1994) studies.

#### ***Interpretation of dividend drop off studies***

As stated in the explanatory statement, the AER considers that the results generated by dividend drop-off studies must be treated with caution. The results are subject to

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<sup>1071</sup> J. C. Handley, op. cit., 15 April 2009, p.27.

<sup>1072</sup> *ibid.*, p.28.

inherent noise and anomalies, and there are a number of critical assumptions required for interpretation.

Based on a review of the finance literature, NERA appears to dismiss these issues and argues instead that dividend drop-off studies will provide an accurate estimate of theta. In response, Handley again reviewed the finance literature (including that examined by NERA), and reiterates from his earlier report that:

...multiple interpretations of the value of franking credits are possible depending on what is assumed about differential personal taxes and risk.<sup>1073</sup>

Having regard to the arguments put forward by NERA, Handley concludes that:

...there is no disagreement concerning whether dividend drop-off studies have a role in the estimation of gamma. But again it is noted that caution needs to be exercised due to the possibility of multiple interpretations.<sup>1074</sup>

The AER accepts that there may be multiple interpretations of the literature regarding the impact of differential personal taxes and risk on ex-dividend day pricing. However, intuitively it is clear that the results from the dividend drop off methodology can reflect a myriad of influences, such that caution in interpretation is warranted.

Further, as highlighted in a number of consultants' reports (and discussed below), there is the second issue of conclusively separating the value of cash dividends from the value of imputation credits (i.e. multicollinearity). The AER considers that this is likely to add to the underlying issues associated with the dividend drop off methodology.

That is, the AER considers that:

- it is reasonable to exercise caution in interpreting the results of dividend drop off studies, due to the inherent noise in the estimates, the often anomalous results, and the assumptions required for interpretation (e.g. perfect arbitrage, risk, etc.), and
- on this basis, taking into account the issues of multi-collinearity when estimating the 'franking credit drop off ratio', an even greater degree of caution should be exercised in estimating theta from dividend drop off studies.

In summary, once the significant issue of multi-collinearity is taken into account, the AER considers it questionable whether dividend drop off studies can provide sufficiently reliable and/or useful information on the value of imputation credits.

Notwithstanding, the AER acknowledges the prominence of the dividend drop off methodology in the finance literature (albeit not always specifically in relation to the value of imputation credits). On this basis the AER considers that it remains reasonable to place some weight by exercising an appropriate degree of caution on the results of such studies for the purposes of this final decision.

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<sup>1073</sup> *ibid.*, pp.9-11.

<sup>1074</sup> *ibid.*, p.28.

### *The SFG dividend drop off study*

In its explanatory statement the AER noted the marked unexplained differences between the results of the SFG dividend drop off study and the results from earlier studies, despite the statements from SFG that it had examined data over the same time period and using the same methodology. Further, the AER noted that (unlike the 2006 Beggs and Skeels study for example), the 2008 SFG dividend drop-off study did not provide statistical analysis examining the reliability of the estimates, and that reasons were not provided as to why this vital information had been omitted from the report submitted to the AER. The AER considered that in the absence of such statistical tests the reliability of SFG's dividend drop-off results could not be verified, and therefore that the results could not be relied upon for the purposes of estimating theta.

The AER notes the following statement from the JIA in its submission to the explanatory statement on the issue of the reliability of SFG's results:

The AER requested additional data from SFG Consulting so that a statistical analysis examining the reliability of the estimates in the 2008 study can be carried out. This information was provided to the AER on 14 and 22 December 2008.<sup>1075</sup>

The AER made a number of requests to the JIA for information verifying the reliability of the results of the SFG dividend drop-off study, both prior to and after the explanatory statement. Specifically, on 15 October 2008 the AER sought the following information pertaining to the SFG study from the Energy Networks Association (ENA):

- the underlying data set used in the SFG study
- the program codes written for the SFG dividend drop off study, and
- the corresponding results.<sup>1076</sup>

On 5 November 2008, the AER received the raw data as requested from the ENA, and on 14 November 2008 the AER received more detailed information on SFG's outputs. However while this further information was considered important it did not allow the AER to verify the accuracy or reliability of SFG's results for the purposes of the explanatory statement – because the program codes had not been provided.

The ENA provided the program codes from the SFG dividend drop off study to the AER on 28 January 2009.<sup>1077</sup>

Based on the information received on the inputs, programs, and outputs the AER undertook to verify the results from the SFG study.<sup>1078</sup> The AER's findings with respect to the SFG study overall are as follows:

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<sup>1075</sup> JIA, *Submission in response*, op. cit., February 2009, p.146.

<sup>1076</sup> AER, Email to the ENA, *Data request SFG 2007 study*, 15 October 2008. The 'program codes' were requested so that the application of SFG's transformation of inputs to outputs could be observed.

<sup>1077</sup> ENA, Email to the AER, *Letter to the AER attaching Gray data*, 28 January 2009.

- SFG's outputs (i.e. regression coefficients) as presented in its report to the AER (and including the p-values submitted later) were found to be replicable.
- Under all three methods employed by SFG (i.e. Beggs and Skeels, Hathaway and Officer, and ACG), the estimate of theta is highly sensitive to the sample selected.
- In studying the program codes written by SFG, the AER identified a number of issues which may detract from the reliability of the results. For example:
  - It is common in the literature for the market return variable to be included as a control variable in assessing the dividend drop off ratio. Whilst the Beggs and Skeels study adjusted the daily observed ex-dividend share price for the aggregate movement in the market to account for the noise in the data associated with general market movements, it appears the SFG study did not make such adjustments.
  - The company tax rates applied by SFG over time do not appear to correspond with the official period over which the various tax rates apply (i.e. as reported by the ATO).
- SFG's dividend drop off study is prone to the common problem of multi-collinearity in the regression model. However, consistent with the methodologies adopted in its study, it has attempted to deal with some of these issues – in particular through its use of the Beggs and Skeels methodology.

The AER also examined the results (and derivation thereof) reported by SFG in its latest report prepared for the JIA. Specifically the AER has explored the differences (if any) between the results from the SFG (2008) study and the Beggs and Skeels (2006) study. Table 10.10 presents the comparison of results as presented in the SFG's report for the JIA.

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<sup>1078</sup> AER, *Review of SFG Consulting's work on theta*, Internal document, 4 March 2009

**Table 10.10: SFG – comparison of results from Beggs and Skeels (2006) with SFG (2008) over the post July 2000 period**

Period	Beggs and Skeels (2006)			SFG (2008)		
	Cash <sup>(a)</sup>	FC <sup>(b)</sup>	N <sup>(c)</sup>	Cash	FC	N*
1 July 2000 – 10 May 2004	0.800 (0.052)	0.572 (0.121)	1,310	0.895 (0.227)	0.526 (0.541)	1,389
1 July 2000 – 31 Dec 2006				0.913 (0.168)	0.369 (0.388)	2,182

Source: SFG, table 1 (extract).<sup>1079</sup>

Notes:

(a) Cash: Regression coefficient for the cash dividend drop-off

(b) FC: Regression coefficient for the franking credit drop-off

(c) N: Number of observations in sample

Numbers in parenthesis are standard errors

The AER notes from table 10.10 that while theta estimates over the period 2001-04 are relatively close across the two studies (i.e. 0.572 and 0.526), the standard errors are markedly different (i.e. 0.121 and 0.541). On this basis the AER has explored the differences between these two studies, and found the following:

- The Beggs and Skeels study has a smaller sample for most years in the sampling period,
- For each sampling year, the results from the Beggs and Skeels study generally have a lower standard deviation on the key variables (i.e. including dividends, imputation credits, cum-dividend price, ex-dividend price),
- SFG does not report the adoption of data filters which are reported by Beggs and Skeels as having been adopted in their study (e.g. the removal of special dividend events).

On this basis, due to the differences in the data used and the sampling / filtering process undertaken across the two studies, the AER considers that the results from the two studies cannot be directly compared. Accordingly, the AER will continue to treat the SFG study and the Beggs and Skeels study as two separate and distinct studies.

In order to examine the underlying reliability of the SFG results further (i.e. higher relative standard errors), the AER compared the SFG data set to data independently obtained from Bloomberg. Based on this analysis the AER notes a number of potential underlying shortcomings with the data used by SFG, including:

- Stock price and dividend series are not consistent in terms of the company-specific basis of quotation, which is potentially a significant issue in cases when

<sup>1079</sup> SFG, op. cit., 1 February 2009 (e), p.8.

the total number of shares outstanding changes (e.g. stock split, bonus share issues),<sup>1080</sup>

- It appears that firm-specific announcements made around the ex-dividend date (other than the dividend announcement itself) have not been appropriately controlled for in some cases,
- Certain dividend-paying observations are excluded from the SFG data, without explanation.

For these reasons the AER is less confident about the reliability of SFG's results due to the identified data problems (e.g. noise) and the sensitivity of its results to the sample selected. In a relative sense, the AER considers that higher confidence may be placed upon the Beggs and Skeels study, due to the reported data filters and the reported lower standard deviations of key variables compared with the SFG study.

The AER has also considered SFG's use of the Cook's D-statistic to exclude certain observations considered influential. While the AER considers the Cook's D-statistic can be useful to identify specific observations which have an undue influence on the estimation and fitting process, arbitrary exclusion of any observation that is diagnosed as being influential without examination of the underlying reasons is not justified. In addition, SFG's exclusion of the 'most influential 1 per cent' of observations appears arbitrary, and in fact none of the observations identified in the study seem to have a sufficiently high value for the Cook's D-statistic such as to even justify a conclusion that it is indeed influential. On these grounds the AER does not consider that SFG's application of the Cook's D-statistic is appropriate. Accordingly, the AER considers theta estimates generated using this approach are not sufficiently reliable.

In summary, based on its detailed analysis, the AER has concerns over the quality of the market data used in the SFG study, and the robustness of its regression results. The AER's concerns in this regard also relate to the methodology employed, the sampling selection and the filtering process undertaken by SFG. Moreover, while the AER has not re-run its own dividend drop-off study completely, in the process of correcting some of the identified deficiencies in the SFG study, the AER notes the re-estimated values of theta are highly variable.<sup>1081</sup>

Given these concerns, and the likely material impact on the results, the AER does not consider that the SFG study provides persuasive evidence regarding the value of imputation credits. Accordingly, while the AER has given full consideration to the SFG study, it has placed limited weight on theta estimates generated by the SFG study for the purposes of this final decision.

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<sup>1080</sup> For example, firms using share splits or bonus share issues in the past report artificially high share prices and high dividends quoted on the basis of smaller number of shares outstanding. These observations often have an excessive influence in a least squares regression, under which observations are weighted by their deviation from the sample mean.

<sup>1081</sup> In particular, once some of the identified discrepancies in the SFG study are corrected by the AER, the point estimate for theta ranges from -0.23 to 0.47.

### *The Synergies report*

In its report prepared for the JIA, Synergies describes its role as follows:

In this peer review we analyse the research performed by both Beggs and Skeels and SFG Consulting and we assess the claims made and conclusions drawn by the authors. We express an opinion in this report about the robustness and validity of the assertions made.<sup>1082</sup>

The AER acknowledges that whilst the Synergies report provides for a reasonable discussion of some of the relevant issues, for the most part it appears to repeat the assertions and claims made by SFG in its report, without providing reasons for doing so.

For example, Synergies indicates that its approach to the peer review involved the following steps:

- A review of the original 2008 SFG report submitted to the AER,
- A meeting with representative from SFG to confirm Synergies' understanding of the underlying methodology applied in the study,
- The full SFG data set was obtained and reviewed (though not replicated), and
- A detailed analysis of the program codes used by SFG was undertaken.<sup>1083</sup>

As part of the terms of reference, the JIA instructed Synergies to respond to the following question as part of its review:

Was the write-up of the work by Professor Gray in his original report that the JIA presented to the AER transparent and amenable to replication and verification by a practitioner who is similarly qualified to Professor Gray?<sup>1084</sup>

In its report Synergies responds simply “Yes”, without providing any supporting explanation or analysis. However it is not clear how Synergies reached this conclusion, given that the process it claims to have followed in reviewing SFG's work involved the provision of significant supporting information in addition to the SFG report itself. Importantly, the AER notes the full data set and program codes were provided to Synergies to assist in its review. Without this additional information the AER was not able to replicate or verify the accuracy or reliability of SFG's results.

The Synergies report focuses in particular on the ‘anomalous’ results from the Beggs and Skeels study for the year 2000:

SFG suggest, and Synergies believes, that the Beggs and Skeels (2006) conclusion of a structural break from regime 6 to regime 7 is due to sampling error in regime 6.<sup>1085</sup>

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<sup>1082</sup> Synergies, op. cit., January 2009, p.6.

<sup>1083</sup> *ibid.*, p.10.

<sup>1084</sup> *ibid.*

<sup>1085</sup> *ibid.*, p.18.

Synergies then endorse SFG's approach of using the Cook's D-statistic to dealing with the apparent sampling error:

SFG, in our view appropriately, remove some noise from the data set by the removal of outliers. As discussed earlier, the removal of a small number of observations that are extreme relative to the remainder of a sample is a common and is a valid approach to reduce the noise in the data set.<sup>1086</sup>

As discussed above, the AER considers the Cook's D-statistic can be useful to identify specific observations which have an undue influence on the estimation and fitting process. However the AER does not consider that arbitrarily excluding observations diagnosed as being influential without examination of the underlying reasons is justified. For this reason and based on its detailed analysis, the AER is not satisfied it is able to rely on SFG's application of the Cook's D-statistic. While Synergies' endorsement of SFG's approach in this regard may simply reflect a technical difference of opinion with the AER, its peer review should analyse and scrutinise the underlying reasons employed by SFG for removing certain observations. In the AER's view the Synergies study does not demonstrate this. Accordingly, whilst the AER has fully considered the Synergies study, it has not placed any weight on it in this final decision.

The AER notes that Synergies interprets the results of its own dividend drop off study as implying a zero value for imputation credits. However, the AER also notes that at the same time the Synergies study provides a point estimate for the value of one dollar of imputation credits of -\$0.469 over the period 1990-2008, which implies that investors actually perceive a significant penalty from the receipt of an imputation credit. In the AER's view this outcome appears implausible, particularly given that in the post-July 2000 period resident investors have become entitled to a cash rebate for imputation credits received in excess of their personal income tax liabilities. It is also at odds with the results of other dividend drop off studies that attempt to infer the value of imputation credits from market prices, including that from SFG.

Further, Synergies heavily criticises the Beggs and Skeels model in particular due to multi-collinearity between the two explanatory variables. Indeed, Synergies states that its own study attempts to deal directly with these issues:

The major difference between the Beggs and Skeels (2006) study and the Synergies study is that Synergies remove the collinearity so that the value of the franking credit can be validly assessed.<sup>1087</sup>

However, the AER considers that the Synergies model is itself prone to multi-collinearity issues.<sup>1088</sup> For example, the results presented in table 3 of its report show that the regression coefficients (except for the intercept term) are insignificant but that

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<sup>1086</sup> *ibid.*, p.19.

<sup>1087</sup> *ibid.*, p.26.

<sup>1088</sup> It is unclear to the AER how the scaling of the model by the dividend could eliminate the multicollinearity problem. If dividends (D) and franking credits (FC) are highly correlated, then the scaling of FC by D will produce a new variable of limited variability and thus highly correlated with the constant intercept term.



the adjusted R-squared is close to one. This result is symptomatic of a multi-collinearity problem.

The second study conducted by Synergies is a diagnostic study that examines whether the average share price change from a dividend payment (announcement) is different between fully franked dividends and unfranked dividends. Among the issues identified, the AER notes that the study is similar to the ACG (2006) approach, and is likely to be subject to the same shortcomings for which the ACG approach has been criticised.

In summary, the AER has considered the Synergies study and for the reasons discussed, it has not placed any weight on the review of the SFG study conducted by Synergies.

#### ***The Beggs and Skeels dividend drop off study***

In its explanatory statement the AER observed that the 2006 Beggs and Skeels study is the most recent comprehensive dividend drop-off study to appear in the Australian finance literature.<sup>1089</sup>

In the paper the authors perform detailed diagnostics on their results, and conclude from a number of perspectives that theta has increased significantly in the post- July 2000 period. The key theta estimate of 0.57 from the 2001-2004 period has been determined as significantly different from theta estimate from the year 2000 (i.e. immediately prior to the recent tax changes).

The AER states in its explanatory statement that:

...there are material differences between the results of the SFG (2008) and the Beggs and Skeels (2006) over the same timer periods which have not been explained by SFG in its report... Accordingly, these three studies will be considered as separate and distinct pieces of empirical evidence.<sup>1090</sup>

The latest SFG report responds to the explanatory statement on this issue by attempting to demonstrate that its application of the Beggs and Skeels methodology over the same time period (2001-04) produces very similar results. However the AER notes from the analysis produced by SFG that while theta estimates over the period 2001-04 are relatively close across the two studies, the standard errors are markedly different. On this basis the AER has explored the differences between these two studies, and found the following:

- The Beggs and Skeels study has a smaller sample for most years in the sampling period,
- For each sampling year, the results from the Beggs and Skeels study generally have a lower standard deviation on the key variables (i.e. including dividends, imputation credits, cum-dividend price, ex-dividend price),

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<sup>1089</sup> Beggs and Skeels, op. cit., 2006.

<sup>1090</sup> AER, *Explanatory statement*, op. cit., 11 December 2008, p.322.

- SFG does not report the adoption of data filters which are reported by Beggs and Skeels as having been adopted in their study (e.g. the removal of special dividend events).

On this basis, due to the differences in the data used and sampling / filtering process undertaken across the two studies, the AER considers that the results from the two studies are not directly comparable. Accordingly the AER will continue to treat the SFG study and the Beggs and Skeels study as two separate and distinct studies.

The AER acknowledges that it is not possible to conclusively identify whether the Beggs and Skeels study is subject to the same or similar data issues as those identified in the SFG study. However given that the study is published in an academic journal and has been subject to the scrutiny of an academic refereeing process, the AER considers it reasonable to assume that these issues are likely to have been addressed or to be less prevalent.

In a relative sense therefore, the AER considers that higher confidence may be placed upon the Beggs and Skeels results, due to the reported data filters and the reported lower standard deviations of key variables compared with the results from the SFG study.

The AER acknowledges that the results from the Beggs and Skeels study need to be treated with caution given the issues associated with inherent noise in the estimates from the dividend drop off methodology, as well as the potential problems of multi-collinearity. One of the key advantages of the Beggs and Skeels study is that the authors attempt to address the difficulties with assigning value to the two components of the total dividend (i.e. the cash and imputation credit components). Beggs and Skeels argue that the results of their study do not suffer from such problems:

...where the dataset incorporates information such as unfranked and partially franked dividends, observations at different company tax rates, observations where untaxed income is distributed (such as from listed property trusts), and observations where foreign-sourced company income does not attract a tax credit, the effects of multicollinearity should be mitigated.<sup>1091</sup>

The AER considers that although this may only mitigate (rather than remove) the issues associated with multi-collinearity, it appears to be a reasonable approach to dealing with the inherent problem.

In summary, the AER has placed weight on the 2001-2004 result from the 2006 Beggs and Skeels study, as it is considered:

- directly relevant to the current imputation tax regime
- verifiably reliable based on the statistical tests undertaken and presented in the paper and
- an independent published study that has been through the academic refereeing process.

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<sup>1091</sup> Beggs and Skeels, op. cit., 2006, p.243.

Accordingly, in coming to a view on an appropriate estimate of theta inferred from market prices, the AER has placed significant weight on the 2001-04 theta estimate of 0.57 from this study.

#### ***The Ickiewicz study***

The AER notes the responses from the JIA regarding the 2007 Ickiewicz study, which found that there was no change in Australian share prices that could be explained by the introduction of dividend imputation in 1987. It is noted that this study has not been provided to the AER as part of this review, nor is the study publicly available. Notwithstanding, the AER has considered the information provided by the JIA in its submission regarding this study, and concludes as follows:

- As stated in the explanatory statement, taking the results of Ickiewicz (2007) and Hancock (2005) together, there appears to be a significant difference in views regarding the impact on share prices around the time of the introduction of dividend imputation.
- While it is accepted that the time period leading up to 1 July 1987 may indeed provide relevant information on the extent to which investors priced the impact of the introduction of dividend imputation, it is still of limited relevance to estimates of the value of credits under the current imputation tax regime (i.e. post- July 2000).
- The finding from Ickiewicz (2007) that there was no abnormal share price movements (relative to the unspecified ‘unaffected in-sample population’) around the time of the introduction of the rebate provision in July 2000 does not imply that imputation credits are not valued by investors.
- The JIA’s interpretation of the results from the Ickiewicz study – that imputation credits are not valued at all by investors – is inconsistent with the empirical results from dividend drop off studies, including that provided by SFG. The issue of consistency in the value of cash dividends raised by the JIA does not change the fact that a positive value for theta has been empirically estimated by the studies relied upon by the JIA.

In summary, the AER does not consider that the information provided by the JIA with respect to the Ickiewicz (2007) study provides persuasive evidence that imputation credits have zero value. On this basis the AER has placed limited weight upon the results of the Ickiewicz (2007) study in informing its estimate of theta for the purposes of this final decision.

#### ***Other evidence***

The AER notes that the JIA maintains its position that the following two studies remain relevant to the estimation of theta:

- The ACG (2006) study, and
- The Cannavan, Finn and Gray (2004) study

The JIA submits that the ACG study supports a theta value insignificantly different from zero for all but one of the years in the sample since 1997, after data corrections

are made. As stated in its explanatory statement, the AER does not intend to consider the results contained in the 2006 ACG dividend drop-off study prepared for ESCOSA. To the AER's knowledge the ACG study has not been made public and therefore cannot be properly scrutinised. The need for scrutiny is magnified by the admission from the ACG that there were errors in the underlying data set upon which theta estimates were based.<sup>1092</sup> Although ACG states that the data errors were corrected, these corrections cannot be transparently observed as the study is not publicly available.

In its explanatory statement the AER concluded that given the 2004 Cannavan et al study covers a period prior to the current imputation tax regime, the results are not considered relevant to a forward-looking estimate of theta. In any case the results from this study did not appear consistent with other market-based evidence, possibly due to clientele effects. The JIA have not addressed the AER's concerns in their submission to the explanatory statement.

In summary, the AER has not received any further evidence from the JIA that would cause it to depart from the position in the explanatory statement with respect to these two studies. On this basis, whilst the AER has fully considered these two studies, it did not place weight on the results of these two studies in the estimation of theta for the purposes of this final decision.

### **AER's conclusion**

The AER has considered all of the material before it on the empirical estimates of theta inferred from market prices, and concludes as follows:

- It is questionable whether dividend drop off studies can provide sufficiently reliable and/or useful information on the value of imputation credits. Notwithstanding, the AER considers that it remains reasonable to place weight on the results of such studies for the purposes of this final decision, however an appropriate degree of caution will be exercised in doing so.
- Despite the advantage of providing more up-to-date estimates (i.e. to 2006), the AER has concerns regarding the reliability of the SFG study, and considers that correction of identified deficiencies would likely have a material impact on the results.<sup>1093</sup> Accordingly while the AER has given full consideration to the SFG study, limited weight has been placed upon theta estimates generated by the SFG study for the purposes of this final decision.
- The AER does not place any weight on the review of the SFG study conducted by Synergies as it does not provide any supporting information in addition to the SFG report to demonstrate an appropriate level of critical analysis and scrutiny required in an independent peer review.

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<sup>1092</sup> ACG, *Preliminary response to SFG report on the value of distributed imputation credits*, Report to ESCOSA, 14 September 2006.

<sup>1093</sup> In particular, once some of the identified discrepancies in the SFG study are corrected by the AER, the point estimate for theta ranges from -0.23 to 0.47.

- Given the AER’s concerns in relation to the results and the issues identified with respect to the methodology employed, the AER is not satisfied that the two studies completed by Synergies are sufficiently credible and robust to justify the AER placing any weight upon the results for the purposes of this final decision.
- Based on the empirical evidence available, the AER considers that the 2006 Beggs and Skeels study provides the most comprehensive, reliable and robust estimate of theta inferred from market prices in the post-2000 period. It is also an independent published study that has been through the academic refereeing process. Accordingly the AER has placed significant weight on the 2001-2004 estimate of theta from this study of 0.57.
- The AER does not consider that the information provided by the JIA with respect to the Ickiewicz (2007) study provides persuasive evidence that imputation credits have zero value. On this basis the AER has placed limited weight upon the results of the Ickiewicz (2007) study in informing its estimate of theta for the purposes of this final decision.

In summary the AER considers that a reasonable and reliable estimate of theta inferred from market prices is 0.57, taken from the published Beggs and Skeels (2006) study.

#### **10.5.6 Estimating theta from tax statistics**

In its explanatory statement the AER considered that the methodology provided by the 2008 Handley and Maheswaran study provides a relevant and reliable estimate of theta in the post-2000 period. Based on Handley’s advice, the AER considered that the results of this study provide a reasonable upper-bound estimate of theta.

Accordingly, the AER considered that a reasonable range of theta estimated from tax statistics is 0.67 to 0.81 for the post-2000 period, giving a point estimate for theta from tax statistics of 0.74.

#### **Submissions in response to explanatory statement**

The JIA submits that the AER is mistaken in relying on tax statistics to estimate theta:

Based on the evidence provided from experts to date it is clear that the rate at which imputation credits are redeemed has nothing to do with the market value of theta...<sup>1094</sup>

The JIA’s submission on this point is supported by consultant’s reports from NERA, SFG and Synergies.

In its report NERA reiterates its earlier view that redemption rates cannot provide a reasonable estimate of theta, for two reasons:

- 1) redemption rates will over-estimate theta because a disproportionate weight is placed on domestic shareholders, and

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<sup>1094</sup> JIA, *Submission in response*, op. cit., February 2009, p.145

- 2) redemption rates do not take into account the costs to investors of accessing high levels of imputation credits.<sup>1095</sup>

On the first point, NERA states that a redemption rate can be defined as a simple weighted average across investors, with the weights determined by the proportion of imputation credits received. However NERA considers that, consistent with its views on the market definition (see section 10.5.3), individual investors should be weighted according to their wealth rather than their asset holdings in determining the value of credits to the ‘representative investor’. On this basis NERA argues that:

If a wealth-weighted average were constructed rather than a “simple average”, the resulting estimate would be much lower because the wealth of foreign investors is substantially greater than that for domestic investors.<sup>1096</sup>

On the second point, NERA maintains its view that the costs of lost diversification need to be taken into account if redemption rates are to be used in assessing the value of imputation credits:

The cost that domestic investors incur from holding a portfolio heavily weighted with high-credit-yield domestic equities is that they must bear more risk than they would otherwise bear if they were to diversify internationally.<sup>1097</sup>

NERA goes on to argue that the AER’s reliance on redemption / utilisation rates to estimate theta unrealistically assumes that the Australian equity market is segmented from international equity markets.

In a separate report prepared for the JIA, SFG states that:

My earlier report provided a counterfactual example to show that if redemption rates are used to estimate theta, an artificial reduction in the amount of foreign capital available to Australian firms... would lead to an increased estimate of theta and a proportional decrease in the estimated cost of capital. In my views it makes no sense to conclude that steps to reduce the amount of foreign capital available to Australian firms can somehow reduce their cost of funds...<sup>1098</sup>

SFG responds to the AER’s views from the explanatory statement on this point, on four key issues:

- 1) Market definition,

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<sup>1095</sup> NERA, op. cit., 30 January 2009, p.18

<sup>1096</sup> *ibid.*, pp.16-17.

<sup>1097</sup> *ibid.*

<sup>1098</sup> SFG, op. cit., 1 February 2009 (c), p.2 – Redemption rates. The counterfactual analysis provided in its earlier report assumed that there are two Australian companies identical in all respects except that one firm operates under foreign ownership restrictions. For the restricted firm, all imputation credits distributed would by definition go to resident investors, implying a redemption rate of 100 per cent for this firm. If this were used to estimate theta for the restricted firm, its cost of equity could be substantially reduced relative to the unrestricted firm. However SFG states that the exact reverse is true – less foreign investment means a lower supply of capital and consequently an increase in its cost.

- 2) Role of gamma in the cost of equity,
- 3) AER's definition of theta, and
- 4) Effect on other parameters.

First, SFG argues that the implications of its counterfactual analysis apply even in the context of the AER's proposed market definition (a domestic capital market with foreign investors recognised to the extent they invest in that market). To illustrate, SFG states that:

...suppose that a law is passed allowing a maximum of 20% foreign investment in the Australian equity market. Redemption rates would mechanically increase... The new estimate of theta would be 0.8 and this would again reflect the domestic capital market and the extent of foreign investment in it.<sup>1099</sup>

That is, SFG argues that if redemption rates are used a reduction in foreign capital would increase theta and decrease the cost of equity (which is the opposite effect that one would expect), and that this is true even under the AER's proposed market definition.

Second SFG argues that, contrary to the AER's views, the counterfactual example provided can reveal information about the specific relevance of redemption rates to the estimate of theta:

If redemption rates are used to estimate theta, a reduction in foreign investment has a one-for-one impact on the estimate of theta... The same does not apply to other methods for estimating theta – methods that seek to estimate the *market value* of franking credits rather than counting how many of them are used.<sup>1100</sup>

Third SFG argues that the implications of its counterfactual analysis apply even if theta is defined as a market-average rather than a firm-specific estimate. That is, SFG states that when using a market-average theta estimate, a decrease in foreign ownership of any firm (for whatever reason) will increase theta and consequently reduce the cost of equity for all firms – an illogical result in its view.

Finally in response to the AER's suggestion that the imposition of foreign ownership restrictions may impact on other WACC parameters (e.g. nominal risk-free rate, MRP, equity beta) such that the final impact on the cost of equity is unclear, SFG argues that:

- Rather than accepting an error or illogicality in the estimate of theta (i.e. as derived from tax statistics), it is better not to have the error in any parameter estimate. Methods other than redemption rates do not have the illogical result that a reduction in foreign investment proportionately decreases the cost of equity.

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<sup>1099</sup> SFG, op. cit., 1 February 2009 (c), p.5.

<sup>1100</sup> *ibid.*, p.6.

- Even if other WACC parameters did change with foreign ownership restrictions, we should preserve the effect of those changes (i.e. increased cost of equity) rather than have them offset by changes in the estimate of theta (i.e. decreased cost of equity).
- It is not clear that other WACC parameters, as estimated by the AER, would change as a response to a decline in foreign investment in Australian equities.<sup>1101</sup>

In summary, SFG maintains its position that redemption rates are not relevant to the estimate of theta as they produce illogical results with respect to the cost of equity. The AER notes that this is also consistent with SFG's earlier views following discussion of this issue at the AER's WACC review expert's roundtable discussion:

My view is that redemption rates have little relevance to the estimate of theta. Assoc. Prof. Handley expressed the view that they can be considered to provide an upper bound for theta, but that one should also consider the results from other techniques. Whether one concludes that redemption rates are irrelevant or an upper bound, the implications for the regulator are the same – some other technique must be used to estimate the value for theta.<sup>1102</sup>

In its report reviewing the work undertaken by SFG, Synergies supports the rejection of redemption / utilisation rates to estimate theta. Synergies argue that redemption rates do not take account of the risks to investors of share ownership, whereas other methods (i.e. dividend drop-off studies) do account for these risks.<sup>1103</sup>

Overall, the JIA summarises its submission regarding redemption rates as follows:

...three expert reports have reached the same conclusion on this point – that Associate Professor Handley is mistaken to suggest that redemption rates provide point estimates or even “upper bounds” for theta and that the AER was wrong to rely on that advice.<sup>1104</sup>

### **Consultant's review**

In a follow-up report prepared for the AER, Handley reiterates his view that the utilisation rates estimated by Handley and Maheswaran (2008) are indeed relevant to the analysis of gamma:

...Handley and Maheswaran (2008) report an average utilisation rate across all investors of around 70-80%. Notwithstanding this represents a simple average of utilisation rates across investors rather than a (complex) weighted average and assuming the set of investors is indicative of the set of investors in the domestic market portfolio, this estimate may be interpreted as a reasonable upper bound on the value of gamma.<sup>1105</sup>

Handley provides advice on the arguments put forward by both NERA and SFG on the relevance of redemption / utilisation rates to the estimate of theta.

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<sup>1101</sup> *ibid.*, pp.7-9.

<sup>1102</sup> SFG, *op. cit.*, 28 October 2008, p.4.

<sup>1103</sup> Synergies, *op. cit.*, p.12.

<sup>1104</sup> JIA, *Submission in response*, *op. cit.*, 2 February 2009, p.145.

<sup>1105</sup> J. C. Handley, *op. cit.*, 15 April 2009, p.19.



Handley argues that NERA's suggestions regarding the weights to apply to domestic investors and the costs of obtaining credits (i.e. lost diversification) are inconsistent with the use of a domestic CAPM framework:

...within a domestic Sharpe CAPM setting, there is no distinction between the value of investors' holdings and the value of investors' wealth because non market assets and the wealth invested therein are outside the model... So the estimated redemption rates in Handley and Maheswaran (2008) may be interpreted as (reasonable) wealth weighted averages for the purposes of a domestic CAPM and so satisfy the first of NERA's necessary conditions.

Further, since non market assets are irrelevant for pricing purposes then international diversification considerations – NERA's second necessary condition – are similarly irrelevant.<sup>1106</sup>

Regarding SFG's counterfactual example, Handley states that:

- SFG does not assume a decrease in the total available supply of capital, but rather a partial substitution of foreign investment by domestic investment.
- The CAPM is a static model which is based on an assumed set of assets and an assumed set of investors. SFG assumes that a proportion of foreign investors (who generally place no value on imputation credits) is replaced by domestic investors (who generally place full value on imputation credits), which leads to a mechanical increase in the wealth weighted average value of imputation credits. This is exactly what one would expect within a domestic CAPM framework.
- Contrary to statements from SFG, the Officer (1994) framework does not imply that an increase in gamma will result in a proportional decrease in the cost of equity. Rather, under the Officer framework an increase in gamma simply changes the proportions of the total shareholder return which come from dividends, capital gains and the value of imputation credits.
- The question of what impact the introduction of the imputation tax system has had on the cost of equity for Australia can only be answered within a formal equilibrium setting, and ultimately depends on the extent to which the Australian equity market is integrated with global markets.<sup>1107</sup>

Based on all these considerations, Handley concludes that:

In my opinion, the AER's conclusion that redemption / utilisation rates sourced from tax statistics are relevant to estimating gamma remains sound.<sup>1108</sup>

### **Issues and AER considerations**

In its explanatory statement the AER considered that a utilisation / redemption rate as provided by the Handley and Maheswaran (2008) study could provide a reasonable

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<sup>1106</sup> *ibid.*, pp.20-21.

<sup>1107</sup> *ibid.*, pp.21-25.

<sup>1108</sup> *ibid.*, p.25.

upper bound estimate of theta in the post-2000 period. Importantly, the AER considered that the empirical estimate of theta from this study was in accordance with the AER's market definition and its characterisation of the representative investor.

In response, the JIA and its consultants maintain their earlier position that redemption / utilisation rates are not relevant to the estimate of theta. The reasons provided by the JIA's consultants are very similar to those provided in response to the issues paper, and are summarised as follows:

- NERA considers that a redemption / utilisation rate will over-estimate theta as it places excessive weight on domestic investors, and does not take into account the costs of accessing credits (i.e. lost diversification benefits),
- SFG considers that, based on its counterfactual example, the use of redemption / utilisation rates to estimate theta leads to the illogical result that the cost of equity decreases with an artificial reduction in foreign investment, and
- Synergies considers that a redemption / utilisation rate does not provide an estimate of the value of imputation credits to investors, as it does not take into account the risk of investment.

The AER will address each of the arguments in turn.

First the AER notes that NERA's arguments regarding the weightings applied to domestic investors and the costs of accessing credits concern the market definition and the characteristics of the representative investor. As discussed at section 4.3, the AER has adopted a domestic CAPM framework in which foreign investors in the Australian market are recognised in defining the representative investor, but only to the extent they invest in the domestic capital market. This market definition is consistent with the AER's estimation of the other WACC parameters as part of this review (e.g. nominal risk-free rate, MRP, equity beta), which are based on domestic market data. As Handley points out, NERA's position on the use of redemption / utilisation rates in estimating theta would only be appropriate under an international CAPM framework:

In this case, estimates of redemption rates based on investors' holdings would no longer correspond to redemption rates based on investors' wealth and so would overestimate the value of gamma. But it is again stressed that a shift from a domestic to an international CAPM setting would have implications beyond the estimation of gamma and in particular, for the market risk premium, the risk-free rate and the estimation of beta.<sup>1109</sup>

Given that the AER has adopted a domestic CAPM framework (see section 4.3), the arguments from NERA are not considered relevant. To the contrary, the AER considers that a redemption / utilisation rate correctly weights domestic and foreign investors according to their presence in the Australian capital market, thus producing a reliable (upper bound) estimate of theta.

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<sup>1109</sup> *ibid.*, p.21.

The AER has considered SFG's counterfactual example and the implications for the relevance of redemption / utilisation rates to the estimate of theta. As Handley points out, SFG's conclusions rely upon a number of key assumptions, including:

- A substitution of foreign investment for domestic investment in the Australian capital market is assumed to raise the domestic cost of equity,
- Redemption / utilisation rates imply that a reduction in foreign investment has a one-for-one impact on theta, whereas other methods (e.g. dividend drop off studies) do not imply such an impact,
- An increase in theta results in a decrease in the cost of equity, and
- It is not clear that other WACC parameters (e.g. nominal risk-free rate, MRP, equity beta), as estimated by the AER, would increase in response to a decline in foreign investment in Australian equities.

On the first assumption listed above, the AER notes Handley's advice that the case being considered is the partial substitution of foreign investment by domestic investment subject to no change in total supply. Given the assumption of no change in the total supply of funds, it is not clear that the counterfactual example put forward by SFG would actually involve an increase in the domestic cost of equity.

Further in relation to the fourth assumption listed, it is not clear how the domestic cost of equity could increase as a result of foreign ownership restrictions if the key parameters making up the cost of equity (i.e. risk-free rate, MRP, equity beta) are assumed by SFG to remain largely unchanged.

SFG's second point – that redemption / utilisation rates inappropriately imply that theta increases 'one-for-one' with a reduction in foreign investment – appears to contradict the AER's market definition and the implied value of imputation credits in equilibrium. As Handley stated in his earlier report prepared for the AER:

The CAPM is an equilibrium model and so it follows that the appropriate interpretation of  $\gamma$  (gamma) is the value of one dollar of imputation credits in equilibrium... by choosing a domestic market portfolio, the equilibrium of gamma is by definition equal to a weighted average over all investors in the domestic market, including foreign investors but only to the extent they invest domestically.<sup>1110</sup>

Under this framework, a substitution of foreign for domestic investment in the Australian equity market should be expected to increase the equilibrium value of imputation credits. As Handley points out, SFG's counterfactual example implies that the characteristics of the representative investor have changed, with a greater weighting towards domestic investors (who generally place full value on imputation credits). This in turn implies that theta would be expected to increase in equilibrium.

Importantly, this is true under all methodologies for estimating theta (i.e. including dividend drop off studies). Although it is unclear whether the impact on theta from a

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<sup>1110</sup> J. C. Handley, op. cit., 12 November 2008 (d), p.7.

reduction in foreign investment would be one-for-one (e.g. due to the risk of trading around the ex-dividend date), it is clear that under a domestic CAPM framework theta would be expected to increase in equilibrium.<sup>1111</sup>

The third assumption listed above relates to the impact of gamma in the Officer (1994) WACC framework. SFG argues that an increase in theta (and consequently gamma) results in a lower estimate of the firm's cost of capital. The AER notes that Handley has explored in some detail the impact of gamma in the Officer (1994) framework, in particular to examine SFG's claim that an increase in gamma proportionately reduces the cost of equity. Based on this analysis Handley states that:

In general, for a given after-corporate-before-personal-tax cost of equity, the lower cost of capital that SFG describes reflects nothing more than the component of the total return that is due to dividends and capital gains.<sup>1112</sup>

In other words, Handley argues that the reduction in the cost of equity described by SFG merely reflects a reduction in the cost of equity to the *firm*, while the total return to the *shareholder* remains the same irrespective of the value assumed for gamma. The AER considers that Handley's analysis appropriately captures the impact of gamma in the Officer (1994) WACC framework. On this basis the AER considers that the counterfactual analysis put forward by SFG does not necessarily provide for a reduction in the cost of equity, as it merely describes the return to the firm, rather than the total return to shareholders (which is unchanged).

Further, as noted above, the final impact on the firm's cost of equity from an artificial reduction in foreign equity investment is not clear, as the impact of changes in other parameters (e.g. risk-free rate, MRP, equity beta) that offset the impact of an increase in the value of credits needs to be taken into account.

Overall, the AER does not consider that SFG's counterfactual example regarding the imposition of foreign ownership restrictions supports a view that redemption / utilisation rates are not relevant to the estimate of theta.

Finally, the AER has considered the argument from Synergies that a redemption / utilisation rate does not take into account the risk of investment and therefore should not be relied upon in estimating theta. The AER also notes the arguments from the FIG (in the context of the payout ratio – see section 10.5.2) that there are additional time delays that must be taken into account in the analysis, including:

- the time between when the credits are generated and paid out, and
- the time between when an investor receives a credit and when it is actually redeemed.<sup>1113</sup>

The AER acknowledged these issues in its explanatory statement. Based on Handley's advice, the utilisation rate estimate from the Handley and Maheswaran (2008) study

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<sup>1111</sup> In any case, the AER's approach as part of this review is to treat estimates from tax statistics as providing a reasonable upper bound estimate of theta.

<sup>1112</sup> J. C. Handley, op. cit., 15 April 2009, p.24.

<sup>1113</sup> FIG, *Submission in response*, op. cit., 29 January 2009, pp.46-47.

was considered to provide a ‘simple average’ rather than a ‘complex weighted average’, and therefore was interpreted as an upper bound estimate of theta. The AER considers that its interpretation of the results from the Handley and Maheswaran (2008) study appropriately takes account of the concerns raised by Synergies and the FIG.

### **AER’s conclusion**

The AER has considered the arguments put forward by the JIA and its consultants regarding the relevance of redemption / utilisation rates to the estimate of theta, and concludes as follows:

- A redemption / utilisation rate correctly weights domestic and foreign investors according to their presence in the Australian capital market, thus producing a reliable estimate of theta.
- SFG’s counterfactual example regarding the imposition of foreign ownership restrictions does not support its view that redemption / utilisation rates are not relevant to the estimate of theta.
- The utilisation rate estimate from the Handley and Maheswaran (2008) study is interpreted as an upper bound estimate of theta, which appropriately takes into account the concerns raised regarding time value and risk considerations.

Overall, the AER maintains its view from its explanatory statement that the methodology provided by the Handley and Maheswaran (2008) study provides a relevant and reliable estimate of theta in the post- July 2000 period. Based on Handley’s advice, the AER considers that the results of this study provide a reasonable upper-bound estimate of theta.

Accordingly the AER concludes that a reasonable range of theta estimated from tax statistics is 0.67 to 0.81 for the post-2000 period. This gives a point estimate for theta from tax statistics of 0.74. This is a conservative position given that the ‘true’ upper bound estimate of theta for the post-2000 period is 0.81 from this study, reflecting the full refundability of credits in the current imputation tax regime.

### **10.5.7 Consistency issues**

In its explanatory statement the AER acknowledged that consistency between the WACC parameters is important as part of this review. The AER considered two specific consistency issues raised by the JIA and its consultants, as follows:

- Consistency between the gamma and the MRP,
- Consistency in the value of cash dividends across the CAPM.

The AER recognised that consistency between gamma and the MRP is an important consideration as part of this review.

On the second issue the AER acknowledged that the empirical result from dividend drop-off studies that cash dividends are less than fully valued may suggest that the standard CAPM cannot fully explain the reality of differential taxation. However the

AER considered there was no convincing evidence presented that the standard CAPM should be replaced to account for differential taxation.

On this basis the AER considered that it would not impose a theoretical adjustment to the empirical results from dividend drop-off studies for CAPM consistency reasons, nor should the standard (Sharpe) CAPM be replaced.

### **Submissions in response to explanatory statement**

In its submission to the explanatory statement, the JIA focuses on the issue of consistency of estimates of the value of cash dividends. The JIA states that:

This inconsistency is acknowledged by the AER. However, the AER has made no effort to reconcile this inconsistency. The importance of consistency in calculating the rate of return was highlighted by the Australian Competition Tribunal in the GasNet decision.<sup>1114</sup>

The JIA's submission on this issue is supported in a separate submission from United Energy,<sup>1115</sup> and in consultants' reports from SFG and NERA.

SFG maintains its view from its earlier report that the use of inconsistent estimates of the value of cash dividends in two steps of the WACC estimation process is illogical and wrong:

...Handley and the AER have examined two additional pieces of evidence in relation to the value of cash dividends... They then use one piece of evidence to support the value of cash dividends that they assume when estimating the required return on equity (100 cents per dollar) and the other piece of evidence to support the value of cash dividends they assume when estimating theta (75-80 cents per dollar)...

...Even if this were true, the appropriate approach is to properly consider all of the available evidence, select a value for the parameter, and then apply that same value of the parameter consistently throughout the steps involved in estimating the WACC.<sup>1116</sup>

First, regarding the value of cash dividends used to estimate the return on equity, SFG examines the dividend yield studies cited by Handley which compare the average returns of high and low dividend yield companies.<sup>1117</sup> SFG concludes that, consistent with Handley's views, these studies find there is no evidence that investors differentiate between high and low dividend yield firms:

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<sup>1114</sup> JIA, *Submission in response*, op. cit., February 2009, p.149

<sup>1115</sup> United Energy, *United Energy's submission to the AER's review of the weighted average cost of capital parameters*, p.7

<sup>1116</sup> SFG, op. cit., 1 February 2009 (e), p.8.

<sup>1117</sup> As SFG explains, these studies are relevant because 'if dividends really are valued at less than their face value, companies with high dividend yields would have to offer higher returns, other things equal, to attract equity capital.' [SFG, op. cit., 1 February 2009 (e), p.9]

In other words, dividends are valued at 100 cents per dollar... That is, this evidence provides no reason to use a model other than the Sharpe CAPM to estimate required returns.<sup>1118</sup>

Second, SFG examines the evidence from US dividend drop off studies which Handley argued supports a less than full value for cash dividends. SFG states that, contrary to Handley's conclusions, there is evidence from US dividend drop off studies that cash dividends are fully valued. SFG cites the following:

- a. Boyd and Jagannathan (1994) conclude that dividend drop-off analysis, when properly executed (in terms the econometric specification and the sample size) leads to the conclusion that cash dividends are fully valued. In a setting in which there are no franking credits, a one dollar cash dividend results in a drop-off of one dollar.
- b. Graham, Michaely and Roberts (2003) also show that cash dividends are fully valued so that a one dollar cash dividend results in a drop-off of one dollar in cases where the dividend represents a yield of 2% or more.<sup>1119</sup>

SFG also states that these results from US dividend drop off studies are consistent with the result from Australian dividend drop off studies (e.g. Beggs and Skeels) that a \$1.00 fully franked dividend is valued at approximately \$1.00.

In summary, on the evidence from dividend yield and dividend drop off studies, SFG concludes that:

Both types of study support the view that cash dividends are fully valued and are consistent with the use of the CAPM to estimate required returns. Consistency then demands that theta also be estimated on the basis that cash dividends are fully valued...

...if dividend drop-off analysis is used to estimate theta on the basis that cash dividends are fully valued, the resulting estimate of theta is immaterially different from zero.<sup>1120</sup>

NERA argues in its report that the AER's adoption of a positive value for gamma is fundamentally inconsistent with the Sharpe CAPM which assumes no tax penalty on dividends. NERA suggests that if the AER's position is correct, there should be a negative relation between credit yields and equity returns (after controlling for risk):

...if investors place a value on imputation credits they will be willing to accept a lower return for stocks that provide a higher credit yield, because these stocks also provide investors with valuable imputation credits.<sup>1121</sup>

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<sup>1118</sup> SFG, op. cit., 1 February 2009 (e), p.9.

<sup>1119</sup> *ibid.*, p.12.

<sup>1120</sup> *ibid.*, p.16.

<sup>1121</sup> NERA, op. cit., 30 January 2009, p.25. NERA explains that the credit yield measures "the difference between the yield of a stock including imputation credits and the yield of a stock excluding imputation credits."

NERA presents evidence from a study by Lajbcygier and Wheatley (2009) which tests for a negative relation between credit yield and return, controlling for risk. The study actually finds evidence of a positive relation, which leads NERA to conclude that:

...conditional on there being no tax penalty for dividends, the evidence indicates that there is *no support for using a positive value for gamma*.<sup>1122</sup>

Based on the views of its consultants regarding the value of cash dividends, the JIA conclude that:

The evidence presented in this submission demonstrates that the inconsistency is best resolved by adopting a gamma of zero... The reasoning of Associate Professor Handley, as adopted by the AER, has been comprehensively rebutted by our independent experts as invalid.<sup>1123</sup>

### **Consultant's review**

Handley notes that SFG agrees with the AER's interpretation of US dividend yield studies as suggesting there is insufficient evidence justifying the replacement of the standard Sharpe CAPM.

As Handley points out, the key disagreement regarding the AER's position in the explanatory statement is in relation to the results of US dividend drop off studies.

Handley reiterates from his earlier report the empirical evidence cited which supports a less than full valuation for cash dividends, and draws attention in particular to three aspects of the study by Allen and Michaely (2003).<sup>1124</sup> First, Handley points out that the Allen and Michaely (2003) study represents a comprehensive survey of the literature dealing with dividend and payout policy and in particular in dealing with the impact of taxes on security prices. Second, Handley states that the authors are very clear on the appropriate interpretation of evidence concerning US dividend drop off studies – that cash dividends are less than fully valued. Handley quotes Allen and Michaely (2003) as saying:

...differential taxes affect both prices (at least around the ex-dividend day) and investors' trading decisions. In most periods examined, the average price drop is less than the dividend paid, implying a negative effect on value.<sup>1125</sup>

Third, Handley states that Allen and Michaely (2003) are neither oblivious nor overly concerned about the apparent inconsistency between the results from U.S. dividend yield and U.S. drop-off studies. Instead, Handley points out that the authors effectively attribute this puzzle to methodological issues associated with US dividend yield studies:

In light of the above discussion, perhaps it is less surprising that tests of the static models [eg CAPM] have not been successful [i.e. in picking up a tax

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<sup>1122</sup> NERA, *ibid.*, p.26.

<sup>1123</sup> JIA, *Submission in response*, op. cit., February 2009, p.150.

<sup>1124</sup> Allen, F. and Michaely, R., *Payout policy in Handbook of the Economics of Finance*, 2003.

<sup>1125</sup> Allen and Michaely, op. cit., 2003, p.376; in J. C. Handley, op. cit., 15 April 2009, p.31.



effect]. These cannot accommodate dynamic trading strategies, which seem to be important in this context.<sup>1126</sup>

Handley examines the evidence on US dividend drop off studies provided by SFG which support its counter view that cash dividends are in fact fully valued. Handley agrees with SFG that the Boyd and Jagannathan (1994) study is an important study, however it is noted that:

...it is primarily an arbitrage framework... arbitrage considerations alone are insufficient to explain the drop-off in the underlying stock price in terms of dividend.<sup>1127</sup>

As support for this theoretical view on the interpretation of dividend drop off studies, Handley quotes a study from Heath and Jarrow (1988).

Regarding the other piece of evidence quoted by SFG in support of its argument – a sub-set of the results from Graham, Michaely and Roberts (2003) – Handley points out that:

...as shown in Table V of Graham, Michaely and Roberts (2003), the full sample consists of 22, 546 ex-dividend day events but only 1,038 relate to the high yield group. In other words, SFG's suggestion is to focus on the results which cover less than 5% of the entire sample.<sup>1128</sup>

Handley also examines the evidence presented by NERA regarding the Lajbcygier and Wheatley (2009) study of the relationship between credit yields and equity returns. Handley considers that:

- there is insufficient detail presented by NERA to allow one to place much reliance on the results of the study, and
- it is not clear how the stated results of the study should be interpreted.<sup>1129</sup>

On the second point, Handley states that:

...the reported finding is not only that there is no negative relation between returns and credit yields but rather that there is a positive relation between returns and yields. So, conditional on no tax penalty of dividends, this could mean that gamma is negative – but then gamma would be below theoretical lower bound of zero.<sup>1130</sup>

Overall, after reviewing the relevant literature as well as each of the arguments put forward by the JIA's consultants, Handley concludes that:

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<sup>1126</sup> Allen and Michaely, op. cit., p.377; in J. C. Handley, op. cit., 15 April 2009, p.31.

<sup>1127</sup> J. C. Handley, op. cit., 15 April 2009, p.32.

<sup>1128</sup> *ibid.*

<sup>1129</sup> *ibid.*, p.33.

<sup>1130</sup> *ibid.*, p.34.

In my opinion, notwithstanding the complexities involved in interpreting the results of dividend drop off studies, the weight of evidence supports the AER's position.<sup>1131</sup>

### Issues and AER considerations

The AER maintains its view that the issue of consistency between gamma and the MRP is an important consideration as part of this review. This issue is discussed at section 7 (MRP).

On the issue of consistency in the value of cash dividends, for convenience the AER restates its position from its explanatory statement:

...the empirical evidence strongly suggests that differential taxation should be taken into account in interpreting dividend drop-off studies (i.e. the model which estimates the price drop-off on ex-dividend days).

While this would seem to present an apparent inconsistency with the standard CAPM (which assumes no differential taxation), based on Handley's advice there is no conclusive evidence that differential taxes should be incorporated into the CAPM (i.e. the model which estimates returns).<sup>1132</sup>

The AER relied upon empirical evidence from two sources in forming this conclusion in its explanatory statement, as follows:

- US dividend drop off studies – since the US has a classical tax system, the average change in the stock price on the ex-dividend day is interpreted as an estimate of the value of cash dividends (i.e. there are no imputation credits attached to dividends), and
- US dividend yield studies – these studies examine whether there is a tax penalty associated with dividends (i.e. less than full valuation for cash dividends) by comparing the relative equity returns to high yield and low yield companies.

Based on Handley's advice, the AER considered that the evidence from US dividend drop off studies suggests that cash dividends are less than fully valued – that differential taxation (and risk) affects ex-dividend day pricing. In turn, this implies that Australian dividend drop off studies – which indicate that a \$1.00 *fully franked* dividend is valued at \$1.00 – support a positive value for imputation credits. The AER considered that while this result from US drop off studies appears to present an inconsistency with the standard Sharpe CAPM (which assumes no differential taxation), the evidence from US dividend yield studies indicates that cash dividends are fully valued in total equity returns. In turn, this implies that there is no clear evidence to replace the Sharpe CAPM with an alternative tax-adjusted CAPM (e.g. Brennan CAPM), even if this option were available to AER under the NER.

On this basis the AER considered that there is not necessarily an inconsistency between these two results so long as they are viewed in their appropriate context. In other words, the AER concluded that:

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<sup>1131</sup> *ibid.*

<sup>1132</sup> AER, *Explanatory statement*, op. cit., 11 December 2008, p.337.

- the empirical estimates from dividend drop off studies should be accepted without theoretical adjustment, and
- this position with respect to dividend drop off studies does not present an inconsistency with the standard Sharpe CAPM.

The AER notes that the submission from the JIA and its consultants rejects this approach as it implicitly accepts an internal inconsistency in two stages of the WACC estimation process. The JIA refers to the Tribunal's GasNet decision, and makes the following statement:

The JIA believes that this inconsistency again undermines the logic underlying the CAPM and must be resolved so that there is a single value for dividends used to determine the return on equity and to value theta.<sup>1133</sup>

The JIA and its consultants appear to accept the evidence from US dividend yield studies suggesting that there is no clear evidence to replace the standard Sharpe CAPM. The key issue of contention appears to be the interpretation of the results from US dividend drop off studies. SFG relies upon two pieces of evidence from US drop off studies to support its view that cash dividends are fully valued, as follows:

- Boyd and Jagannathan (1994), and
- A sub-set of the results from Graham, Michaely and Roberts (2003).<sup>1134</sup>

SFG quotes the conclusion from the Boyd and Jagannathan (1994) study, as follows:

In reviewing all the empirical results, we note that marginal ex-dividend price drop is almost always one-for-one with dividends (in the cross-section). This result is obtained with a variety of different specifications and over a period of approximately 25 years.<sup>1135</sup>

Handley acknowledges that this study is important in the literature, however considers it to be less persuasive than other studies given that it is based primarily on an arbitrage framework. According to Handley, the most appropriate framework within which to interpret the results from dividend drop off studies is the equilibrium framework due to Michaely and Vila (1995), in which the drop off reflects:

- 1) a complex weighted average of the differential tax rates of all investors in the market (with the weights based on individual levels of risk aversion), and

the variance of the ex-dividend stock price.

Handley states that:

Theoretical justification for an equilibrium framework principally comes from Heath and Jarrow (1988) who show that arbitrage considerations alone are

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<sup>1133</sup> JIA, *Submission in response*, op. cit., February 2009, p.149.

<sup>1134</sup> SFG, op. cit., 1 February 2009 (e), pp.12-13.

<sup>1135</sup> Boyd, J., and R. Jagannathan, *Ex-dividend price behaviour of common stocks*, 1994, *Review of Financial Studies*, v.7, p.716; in SFG, *ibid.*, p.11.

insufficient to explain the drop-off in the underlying stock price in terms of dividend.<sup>1136</sup>

The AER notes that the results from the Boyd and Jagannathan (1994) appear to support the view that cash dividends are indeed fully valued. However as Handley points out, the conclusions drawn by the authors may be influenced to some extent by methodological issues. On this basis, while the AER considers the results from this study to be relevant, it has placed limited weight on these results it given that the methodology used by the authors does not reflect an equilibrium framework.

Regarding the Graham, Michaely and Roberts (2003) study, the AER notes that SFG considers that the only relevant result is that for stocks with a dividend yield greater than 2 per cent, based on its view that:

...the annual dividend yield on the firms in the ASX 200 index is in the order of 5%. Since Australian firms pay dividends twice per year, the yield for each dividend event is, on average, 2.5%. Consequently, the “greater than 2% yield” category is the most appropriate for the average Australian company.<sup>1137</sup>

In turn, SFG points out that for dividends that represent a yield of 2 per cent or more, the drop-off estimated by Graham, Michaely and Roberts (2003) is essentially one-for-one (i.e. cash dividends are fully valued).

The AER notes two issues with SFG’s conclusions on this study.

First, SFG does not present any evidence supporting its claim that the annual dividend yield of Australian firms is 5 per cent as claimed by SFG. In addition, the AER notes from an earlier paper from Gray and Hall (2006) a view that:

The actual dividend yield in the Australian market is relatively stable at approximately 4 per cent...<sup>1138</sup>

On this basis, contrary to SFG’s view the AER does not consider it clear that the ‘greater than 2 per cent yield’ category is most appropriate for the average Australian company. In any case, as noted by Handley, the average dividend yield for stocks in Graham, Michaely and Roberts’ (2003) high yield is not disclosed so we cannot determine how close or otherwise it is to 2.5 per cent (or 2 per cent).

Second, the overall results from the Graham, Michaely and Roberts (2003) study clearly indicate that cash dividends are less than fully valued. As Handley notes:

...Graham, Michaely and Roberts (2003) report the median drop-off (as a proportion of the face value of the dividend) associated with stocks listed on the New York Stock Exchange (NYSE), decreased from 0.89 during early 1997, to 0.83 during mid 1997 to mid 2000, to 0.75 during 2001...<sup>1139</sup>

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<sup>1136</sup> J. C. Handley, op. cit., 15 April 2009, pp.26-27.

<sup>1137</sup> SFG, op. cit., 1 February 2009 (e), p.11.

<sup>1138</sup> Gray and Hall, *Relationship between franking credits and the market risk premium*, Accounting and Finance, v.46, p.418

<sup>1139</sup> J. C. Handley, op. cit., 15 April 2009, p.30.

Given these overall results, the AER considers that SFG's suggestion to focus only on a small sub-set (i.e. only 5 per cent) of the results from this study, without reasons for doing so, is not justified.

Overall, based on the information presented by SFG and Handley, the AER considers that an appropriate interpretation of the results from the Graham, Michaely and Roberts (2003) study is that the median value of cash dividends is between 75 and 98 per cent of their face value, depending on:

- the time period analysed, and
- the dividend yield of the stocks on the sample chosen.

On this basis the AER rejects SFG's suggestion the Graham, Michaely and Roberts (2003) study supports the view that cash dividends are fully valued.

The AER notes that SFG has not addressed the evidence presented by Handley from other prominent studies that examine the impact of differential taxes and risk on ex-dividend day, including most notably that from Allen and Michaely (2003).<sup>1140</sup> As Handley notes, this study represents a comprehensive survey of the US literature on dividend and payout policy. The authors find that in most periods examined the average price drop off is less than the dividend paid, implying that differential taxation does affect ex-dividend day pricing.

Most importantly, as Handley points out, Allen and Michaely (2003) recognise the apparent inconsistency between the results from U.S. dividend yield and U.S. drop-off studies, and consider it not to be a major concern. Instead, the authors attribute the apparent inconsistency to potential methodological issues associated with US dividend yield studies:

In light of the above discussion, perhaps it is less surprising that tests of the static models [eg CAPM] have not been successful [i.e. in picking up a tax effect]. These cannot accommodate dynamic trading strategies, which seem to be important in this context.<sup>1141</sup>

Based on Handley's advice, the AER considers the views expressed by the authors in the Allen and Michaely (2003) study to be persuasive, and directly relevant to the issue under consideration by the AER. The findings from this study provide direct support for the AER's position in its explanatory statement on this issue.

Finally, the AER notes the evidence presented by NERA on the relationship between imputation credit yields and equity returns. Effectively, the material presented by NERA on the Lajbcygier and Wheatley (2009) study is aimed at examining the value of imputation credits by inference from equity returns. NERA describes its test as follows:

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<sup>1140</sup> The AER notes that Handley also refers to a more recent study by Kalay and Lemmon (2009) which finds that cash dividends are less than fully valued [ J. C. Handley, op. cit., 15 April 2009, p.28].

<sup>1141</sup> Allen and Michaely, op. cit., p.377; in J. C. Handley, op. cit., 15 April 2009, p.31.

...if investors place a value on imputation credits they will be willing to accept a lower return for stocks that provide a higher credit yield, because these stocks also provide investors with valuable imputation credits.<sup>1142</sup>

On this basis NERA refers to the Lajbcygier and Wheatley (2009) study, which tests for a negative relation between returns and credits (i.e. a positive value for credits). The study actually finds a positive relation, which suggests that imputation credits should be treated as a penalty rather than a benefit to investors. Based on this finding NERA concludes that there is no support for using a positive value for gamma.

The AER notes two issues with NERA's reliance on this analysis.

First, the Lajbcygier and Wheatley (2009) study has not been provided to the AER, nor has it been made publicly available. On this basis it is difficult to place too much reliance on the results for the purposes of this review.

Second, as Handley points out, the result from the study implies that investors actually perceive a significant penalty from the receipt of an imputation credit. This seems implausible, particularly in the post-2000 period in which resident investors have become entitled to a cash rebate for imputation credits received in excess of their personal income tax liabilities. It is also vastly different to the results from other dividend drop off studies that attempt to infer the value of imputation credits from market prices (including that provided by SFG).

On this basis the AER will not place weight on the results of the Lajbcygier and Wheatley (2009) study as presented in the NERA report for the purposes of this final decision.

### **AER's conclusion**

The AER has considered all of the available evidence concerning the value of cash dividends, and concludes as follows:

- The evidence from US dividend yield studies indicates that cash dividends are fully valued in total equity returns. In turn, this implies that there is no clear evidence to replace the Sharpe CAPM with an alternative tax-adjusted CAPM (e.g. Brennan CAPM), even if this option were available to AER under the NER.
- The weight of evidence from US dividend drop-off studies, however, suggests that cash dividends are less than fully valued – that differential taxation (and risk) affects ex-dividend day pricing. In turn, this implies that Australian dividend drop off studies – which indicate that a \$1.00 *fully franked* dividend is valued at \$1.00 – support a positive value for imputation credits.

Given the above considerations, the AER agrees with Handley that the weight of empirical evidence supports its position to accept the empirical result that imputation

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<sup>1142</sup> NERA, op. cit., 30 January 2009, p.25. NERA explains that the credit yield measures 'the difference between the yield of a stock including imputation credits and the yield of a stock excluding imputation credits.'

credits have a positive value while maintaining the use of the standard Sharpe CAPM to estimate equity returns.

On this basis the AER maintains its position from the explanatory statement that it would be inappropriate to impose a theoretical adjustment to the empirical results from dividend drop-off studies for CAPM consistency reasons.

## **10.6 AER's conclusion**

Based on the analysis above, the AER makes the following conclusions on the gamma parameter:

- The adoption of a positive value for imputation credits is not necessarily inconsistent with market practice. Further, while acknowledging the many complexities alluded to by market practitioners, the AER considers that it is indeed possible to arrive at a reasonable empirical estimate of gamma taking into account all the available evidence.
- The most appropriate estimate of the payout ratio is 1.0, which is consistent with the influential Officer WACC framework and the modelling assumptions in the AER's PTRM. Importantly, the AER considers there is not a significant issue of time value loss associated with the value of retained credits such that the adoption of an estimate for the payout ratio of 1.0 is unreasonable.
- The AER maintains its position from the explanatory statement with respect to the market definition. Under a domestic CAPM framework, foreign investors in the Australian market will be recognised in defining the representative investor, but only to the extent they invest in the domestic capital market.
- The AER maintains its view that there is compelling evidence to reject pre-2000 data from consideration in estimating a forward-looking theta. Accordingly for the purposes of this final decision the AER has based its estimate of theta on post-2000 data only.
- Based on the empirical evidence available, the AER considers that the 2006 Beggs and Skeels study provides the most comprehensive, reliable and robust estimate of theta inferred from market prices in the post-2000 period. Accordingly the AER has placed significant weight on the 2001-2004 estimate of theta from this study of 0.57.
- Despite the advantage of the SFG study providing more up-to-date estimates (i.e. to 2006), after a thorough review the AER has specific concerns regarding the reliability of the SFG study, and considers that correction of identified deficiencies would likely have a material impact on the results. Accordingly, while the AER has given full consideration to the SFG study, little weight has been placed on theta estimates generated by this study for the purposes of this final decision.
- The AER maintains its view that the methodology provided by the Handley and Maheswaran (2008) study provides a relevant and reliable upper bound estimate

of theta in the post- July 2000 period. A reasonable range of theta estimated from tax statistics is 0.67 to 0.81 for the post-2000 period, which gives a point estimate for theta from tax statistics of 0.74.

- The AER considers the weight of empirical evidence supports its position to accept the empirical result that imputation credits have a positive value while maintaining the use of the standard Sharpe CAPM to estimate equity returns.

Where a parameter cannot be determined with certainty, the NER provide that, in addition to the other relevant factors, the AER must have regard to the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it. The AER must also have regard to the need to achieve an outcome that is consistent with the national electricity objective.<sup>1143</sup>

The AER acknowledges the ongoing debate between experts on the value of imputation credits. However, in response to the submission from NSW Treasury, the AER considers that its detailed and thorough analysis above provides sufficient justification to conclude that there is persuasive evidence to depart from the previously adopted 'assumed utilisation of imputation credits' (i.e. gamma) of 0.5.

Based on the evidence considered most relevant, reliable, comprehensive and theoretically appropriate, the AER considers that a reasonable estimate of gamma lies in the range 0.57 and 0.74. For clarity it is noted that:

- A payout ratio of 1.0 has been adopted, consistent with a free cash flow approach to valuation and the Officer WACC framework,
- The lower bound estimate of 0.57 is based on the AER's best estimate of theta inferred from market prices, and
- The upper bound estimate of 0.74 is based upon the AER's best estimate of theta from tax statistics.

The AER notes that both of the two approaches relied upon to determine a reasonable range (i.e. market prices and tax statistics) appear consistent with the conceptual framework established for estimating gamma. That is, both of these approaches attempt to estimate theta (gamma) based on a weighted average valuation of all investors in the domestic capital market recognising the presence of foreign investors, but only to the extent that they invest domestically.

The AER accepts Handley's advice that the estimate of theta based on the Handley and Maheswaran (2008) study of tax statistics is best considered a reasonable upper bound estimate of theta, as it:

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<sup>1143</sup> NER, cls. 6.5.4(e)(4) and 6A.6.2(j)(4).



...represents a simple average of utilisation rates across investors rather than a (complex) weighted average and assuming the set of investors is indicative of the set of investors in the domestic market portfolio...<sup>1144</sup>

By the same token, the results from dividend drop-off studies need to be treated with caution when inferring a theta value, given complexities involved in interpreting the results from these studies. In addition, the inherent noise in the results from dividend drop-off studies and the difficulty in separating the influence of the various components (i.e. cash dividends and imputation credits) dictate that caution should be taken in interpreting the results of these studies.

The question of weighting the various empirical estimates to reach a point estimate for gamma then becomes relevant. In this regard, the AER considers that for the purposes of this final decision it is reasonable to apply equal weight to each of the estimation methodologies, and round to the nearest 0.05 to generate a point estimate. This reflects the AER's view that the results provided by each of the two methodologies are somewhat uncertain in terms of providing a point estimate, but that it is reasonable to regard them as providing bounds on a range for gamma.

Based on the available evidence the AER considers that a reasonable estimate of the 'assumed utilisation of imputation credits' (i.e. gamma) is 0.65.

The AER notes the views from the MEU that an appropriately 'weighted gamma' value should be 0.9 once the prevalence of government ownership among regulated electricity businesses is taken into account. As discussed at section 10.5.3, given that the AER has defined gamma on a market average basis (rather than based on a benchmark efficient firm) the suggestion from the MEU is deemed inappropriate.

In accordance with the NER, the AER considers that a gamma value of 0.65:

- is supported by the most recent available and reliable empirical evidence, which the AER considers is persuasive in support of a change to the existing value, and
- generates a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing prescribed transmission services or standard control services (as the case may be).

In determining the value of imputation credits, the AER has also taken into account the revenue and pricing principles. The AER considers the value of imputation credits of 0.65 for a benchmark efficient NSP:

- together with values, methods and a credit rating for the other parameters, provides a service provider with a reasonable opportunity to recover at least the efficient costs and provides a service provider with effective incentives for efficient investment, and
- is appropriate having regard to the economic costs and risks of the potential framework in under and over investment.

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<sup>1144</sup> J. C. Handley, op. cit., 12 November 2008(d), p.8.

On this basis, the AER considers that its proposed value achieves an outcome that is consistent with and is likely to contribute to the achievement of the NEO.<sup>1145</sup>

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<sup>1145</sup> NER, cls. 6A.6.2(j) and 6.5.4(e).

## **Appendix A: Attachments to this explanatory statement**

- Attachment A:** Associate Professor John C. Handley  
*Further comments on the valuation of imputation credits*, Report prepared for the AER, 15 April 2009
- Attachment B:** Associate Professor John C. Handley  
*Further comments on the historical equity risk premium*, Report prepared for the AER, 14 April 2009
- Attachment C:** Associate Professor Ólan T. Henry  
*Estimating beta*, Report submitted to ACCC, 23 April 2009
- Attachment D:** Associate Professor John C. Handley  
*Further comments on the Sharpe CAPM*, Report prepared for the AER, 16 March 2009

## **Appendix B: Submissions received on explanatory statement**

On 11 December 2008, the AER released the proposed WACC parameters and supporting explanatory statement.

Submissions on the explanatory statement were received from:

- the APA Group, 3 February 2009
- Cheung Kong Infrastructure Holdings (CKI), 26 September 2008
- the Energy Networks Association (ENA)/ the Joint Industry Associations (JIA), 19 March 2009
- Energex, 2 February 2009
- EnergyAustralia, 17 December 2008
- Envestra, 28 January 2009
- Equity Market Participants, 30 January 2009
- Ergon Energy, 2 February 2009
- The Energy Supply Association of Australia (ESAA), 4 February 2009
- ETSA Utilities, Citipower and Powercor, 2 February 2009
- The Financial Investors Group (FIG), 29 January 2009
- Grid Australia, 2 February 2009
- Jemena, 2 February 2009
- the Joint Industry Associations (JIA), 2 February 2009 and 6 March 2009
- the Major Energy Users (MEU) in conjunction with some members of the National Consumers Roundtable on Energy, 30 January 2009
- NSW Treasury, 28 January 2009
- Queensland Government, 30 January 2009
- Queensland Treasury Corporation, 2 February 2009
- RARE Infrastructure Group (RARE), 27 January 2009
- United Energy, 2 February 2009

## Appendix C: Equity beta estimations

**Table C.1: Re-levered equity beta estimates – Australian businesses – Henry’s results (2002 – 2008) - monthly**

	AGL	ENV	APA	GAS	DUE	HDF	SPN	SKI	AAN	Average <sup>(a)</sup>
<b>OLS</b>	<b>0.43</b>	<b>0.29</b>	<b>0.62</b>	<b>0.19</b>	<b>0.41</b>	<b>0.85</b>	<b>0.37</b>	<b>1.11</b>	<b>0.84</b>	<b>0.57</b>
OLS <sub>U</sub>	0.98	0.49	0.99	0.54	0.64	1.44	0.70	1.66	1.54	N/A
OLS <sub>L</sub>	-0.12	0.10	0.25	-0.16	0.17	0.26	0.04	0.56	0.14	N/A
<b>LAD</b>	<b>0.18</b>	<b>0.15</b>	<b>0.70</b>	<b>0.32</b>	<b>0.19</b>	<b>0.65</b>	<b>0.19</b>	<b>0.82</b>	<b>0.87</b>	<b>0.45</b>
LAD <sub>U</sub>	0.74	0.35	1.08	0.67	0.43	1.25	0.54	1.39	1.58	N/A
LAD <sub>L</sub>	-0.37	-0.04	0.33	-0.03	-0.06	0.06	-0.17	0.25	0.16	N/A

Source: Henry<sup>1155</sup>

Notes:

(a) Averages calculated by the AER.

**Table C.2: Re-levered equity beta estimates – Australian businesses – Henry’s results (2002 – 2008) - weekly**

	AGL	Envestra	APA	GasNet	DUET	HDF	SP AusNet	Spark	Alinta	Average <sup>(a)</sup>
<b>OLS</b>	<b>0.72</b>	<b>0.25</b>	<b>0.69</b>	<b>0.32</b>	<b>0.36</b>	<b>1.01</b>	<b>0.28</b>	<b>0.79</b>	<b>0.94</b>	<b>0.59</b>
OLS <sub>U</sub>	1.05	0.36	0.89	0.49	0.49	1.35	0.53	1.38	1.31	N/A
OLS <sub>L</sub>	0.39	0.15	0.49	0.14	0.22	0.67	0.04	0.19	0.57	N/A
<b>LAD</b>	<b>0.53</b>	<b>0.10</b>	<b>0.60</b>	<b>0.23</b>	<b>0.25</b>	<b>0.49</b>	<b>0.24</b>	<b>1.04</b>	<b>0.60</b>	<b>0.45</b>
LAD <sub>U</sub>	0.86	0.21	0.80	0.41	0.39	0.84	0.49	1.63	0.97	N/A
LAD <sub>L</sub>	0.19	0.00	0.40	0.06	0.12	0.14	0.00	0.44	0.23	N/A

Source: Henry.<sup>1156</sup>

Notes:

(a) Averages calculated by the AER.

<sup>1155</sup> O. Henry, op. cit., 23 April 2009, p. 10.

<sup>1156</sup> ibid., p. 11.

**Table C.3: Re-levered equity beta estimates – Australian businesses – Henry’s results (2003 – 2008) - monthly**

	AGL	Envestra	APA	GasNet	DUET	HDF	SP AusNet	Spark	Alinta	Average <sup>(a)</sup>
<b>OLS</b>	<b>0.62</b>	<b>0.39</b>	<b>0.74</b>	<b>0.28</b>	<b>0.41</b>	<b>0.85</b>	<b>0.37</b>	<b>1.11</b>	<b>1.07</b>	<b>0.65</b>
OLS <sub>U</sub>	1.41	0.62	1.18	0.81	0.64	1.44	0.70	1.66	1.96	N/A
OLS <sub>L</sub>	-0.17	0.16	0.30	-0.25	0.17	0.26	0.04	0.56	0.19	N/A
<b>LAD</b>	<b>1.12</b>	<b>0.42</b>	<b>0.92</b>	<b>0.43</b>	<b>0.19</b>	<b>0.65</b>	<b>0.19</b>	<b>0.82</b>	<b>1.00</b>	<b>0.64</b>
LAD <sub>U</sub>	1.94	0.65	1.36	0.96	0.43	1.25	0.54	1.39	1.89	N/A
LAD <sub>L</sub>	0.30	0.19	0.48	-0.10	-0.06	0.06	-0.17	0.25	0.12	N/A

Source: Henry.<sup>1157</sup>

Notes:

(a) Averages calculated by the AER.

**Table C.4: Re-levered equity beta estimates – Australian businesses – Henry’s results (2003 – 2008) - weekly**

	AGL	Envestra	APA	GasNet	DUET	HDF	SP AusNet	Spark	Alinta	Average <sup>(a)</sup>
<b>OLS</b>	<b>1.24</b>	<b>0.30</b>	<b>0.76</b>	<b>0.38</b>	<b>0.36</b>	<b>1.01</b>	<b>0.28</b>	<b>0.79</b>	<b>1.26</b>	<b>0.71</b>
OLS <sub>U</sub>	1.70	0.42	0.99	0.63	0.49	1.35	0.53	1.38	1.71	N/A
OLS <sub>L</sub>	0.79	0.18	0.53	0.13	0.22	0.67	0.04	0.19	0.81	N/A
<b>LAD</b>	<b>1.18</b>	<b>0.16</b>	<b>0.62</b>	<b>0.35</b>	<b>0.25</b>	<b>0.49</b>	<b>0.24</b>	<b>1.04</b>	<b>0.93</b>	<b>0.59</b>
LAD <sub>U</sub>	1.64	0.28	0.86	0.61	0.39	0.84	0.49	1.63	1.38	N/A
LAD <sub>L</sub>	0.73	0.04	0.39	0.10	0.12	0.14	0.00	0.44	0.48	N/A

Source: Henry.<sup>1158</sup>

Notes:

(a) Averages calculated by the AER.

<sup>1157</sup> *ibid.*, p. 14.

<sup>1158</sup> *ibid.*, p. 15.

**Table C.5: Re-levered equity beta estimates – ACG’s results (2003 – 2008)**

	SP AusNet	Envestra	APA	Spark	DUET	HDF	AGL	Alinta	GasNet	Average <sup>(a)</sup>
<b>OLS</b>	<b>0.25</b>	<b>0.51</b>	<b>0.87</b>	<b>0.57</b>	<b>0.51</b>	<b>0.54</b>	<b>0.57</b>	<b>1.29</b>	<b>0.38</b>	<b>0.61</b>
OLS <sub>U</sub>	0.61	0.87	1.33	0.91	1.06	1.17	2.29	2.43	0.65	N/A
OLS <sub>L</sub>	-0.12	0.15	0.42	0.24	-0.04	-0.10	-1.15	0.15	0.12	N/A
<b>Re-OLS</b>	<b>0.23</b>	<b>0.13</b>	<b>0.89</b>	<b>0.56</b>	<b>0.42</b>	<b>0.64</b>	<b>-0.39</b>	<b>1.26</b>	<b>0.30</b>	<b>0.49</b>
Re-OLS <sub>U</sub>	0.57	0.80	1.34	0.89	0.91	1.19	0.81	2.35	0.47	N/A
Re-OLS <sub>L</sub>	-0.11	0.46	0.44	0.23	-0.07	0.10	-1.59	0.16	0.13	N/A
<b>LAD</b>	<b>0.06</b>	<b>0.61</b>	<b>0.85</b>	<b>0.59</b>	<b>0.27</b>	<b>0.80</b>	<b>-1.43</b>	<b>1.29</b>	<b>0.38</b>	<b>0.55</b>
LAD <sub>U</sub>	0.83	1.00	1.34	1.09	0.78	1.46	1.69	2.41	0.73	N/A
LAD <sub>L</sub>	-0.71	0.22	0.35	0.09	-0.23	0.13	0.13	0.16	0.02	N/A

Source: ACG<sup>1159</sup>

Notes:

(a) Averages calculated by the AER.

**Table C.6: Re-levered equity beta estimates – ACG’s results (1990-1998 and 2002-2008)**

	SP AusNet	Envestra	APA	Spark	DUET	HDF	AGL	Alinta	GasNet	Average <sup>(a)</sup>
<b>OLS</b>	<b>0.25</b>	<b>0.36</b>	<b>0.68</b>	<b>0.57</b>	<b>0.51</b>	<b>0.54</b>	<b>0.84</b>	<b>0.81</b>	<b>0.38</b>	<b>0.55</b>
OLS <sub>U</sub>	0.61	0.73	1.14	0.91	1.06	1.17	1.26	1.60	0.77	N/A
OLS <sub>L</sub>	-0.12	0.00	0.22	0.24	-0.04	-0.10	0.43	0.02	0.00	N/A
<b>Re-OLS</b>	<b>0.23</b>	<b>0.33</b>	<b>0.70</b>	<b>0.56</b>	<b>0.42</b>	<b>0.64</b>	<b>0.67</b>	<b>0.90</b>	<b>0.31</b>	<b>0.53</b>
Re-OLS <sub>U</sub>	0.57	0.67	1.15	0.89	0.91	1.19	1.02	1.62	0.64	N/A
Re-OLS <sub>L</sub>	-0.11	-0.01	0.26	0.23	-0.07	0.10	0.32	0.17	-0.02	N/A
<b>LAD</b>	<b>0.06</b>	<b>0.04</b>	<b>0.81</b>	<b>0.59</b>	<b>0.27</b>	<b>0.80</b>	<b>0.84</b>	<b>0.95</b>	<b>0.34</b>	<b>0.52</b>
LAD <sub>U</sub>	0.83	0.40	1.20	1.09	0.78	1.46	1.51	1.68	0.72	N/A
LAD <sub>L</sub>	-0.71	-0.31	0.43	0.09	-0.23	0.13	0.17	0.22	-0.04	N/A

Source: ACG<sup>1160</sup>

Notes:

(a) Averages calculated by the AER.

<sup>1159</sup> ACG, op. cit., 17 September 2008(b), p. 42.<sup>1160</sup> ibid., p. 43.

**Table C.7: Re-levered equity beta estimates – ACG’s updated results (1990-1998 and 2002-2008)**

	SP AusNet	Envestra	APA	Spark	DUET	HDF	AGL	Alinta	GasNet
OLS	0.17	0.32	0.71	0.47	0.50	0.58	0.89	0.83	0.38
Re-OLS	0.14	0.34	0.77	0.37	0.46	0.48	0.74	0.91	0.31
LAD	0.06	0.23	0.81	0.61	0.39	0.67	1.15	0.94	0.34

Source: ACG<sup>1161</sup>

<sup>1161</sup> ACG, op. cit., January 2009(b), p. 22.



**Table C.8: Re-levered equity beta estimates – United States businesses – Henry’s results (2002 – 2008) - monthly**

	<b>CHG</b>	<b>CNP</b>	<b>EAS</b>	<b>NI</b>	<b>NJR</b>	<b>NST</b>	<b>NU</b>	<b>SRP</b>	<b>UIL</b>	<b>POM</b>	<b>Average<sup>(a)</sup></b>
<b>OLS</b>	<b>0.75</b>	<b>0.98</b>	<b>0.42</b>	<b>0.64</b>	<b>0.40</b>	<b>0.62</b>	<b>0.52</b>	<b>1.16</b>	<b>1.65</b>	<b>0.64</b>	<b>0.78</b>
OLS <sub>U</sub>	1.24	1.43	0.76	0.97	0.81	0.95	0.85	1.67	2.23	1.00	N/A
OLS <sub>L</sub>	0.25	0.54	0.08	0.32	0.00	0.28	0.19	0.65	1.07	0.27	N/A
<b>LAD</b>	<b>0.80</b>	<b>0.68</b>	<b>0.07</b>	<b>0.71</b>	<b>0.26</b>	<b>0.75</b>	<b>0.48</b>	<b>0.88</b>	<b>1.49</b>	<b>0.42</b>	<b>0.65</b>
LAD <sub>U</sub>	1.29	1.13	0.41	1.04	0.67	1.09	0.81	1.40	2.09	0.79	N/A
LAD <sub>L</sub>	0.31	0.23	-0.26	0.38	-0.15	0.42	0.15	0.37	0.89	0.05	N/A

Source: Henry<sup>1162</sup>

Notes:

(a) Averages calculated by the AER.

<sup>1162</sup> O. Henry, op. cit., 23 April 2009, p. 42.

**Table C.9: Re-levered equity beta estimates – United States businesses – Henry’s results (2002 – 2008) - weekly**

	<b>CHG</b>	<b>CNP</b>	<b>EAS</b>	<b>NI</b>	<b>NJR</b>	<b>NST</b>	<b>NU</b>	<b>SRP</b>	<b>UIL</b>	<b>POM</b>	<b>Average<sup>(a)</sup></b>
<b>OLS</b>	<b>1.04</b>	<b>0.33</b>	<b>0.54</b>	<b>0.71</b>	<b>0.99</b>	<b>0.60</b>	<b>0.55</b>	<b>0.65</b>	<b>0.73</b>	<b>0.61</b>	<b>0.68</b>
OLS <sub>U</sub>	1.21	0.51	0.67	0.82	1.15	0.73	0.66	0.82	0.93	0.74	N/A
OLS <sub>L</sub>	0.86	0.16	0.42	0.60	0.83	0.48	0.44	0.48	0.53	0.48	N/A
<b>LAD</b>	<b>1.12</b>	<b>0.53</b>	<b>0.56</b>	<b>0.72</b>	<b>1.06</b>	<b>0.71</b>	<b>0.55</b>	<b>0.57</b>	<b>0.94</b>	<b>0.57</b>	<b>0.73</b>
LAD <sub>U</sub>	1.29	0.71	0.69	0.83	1.21	0.83	0.66	0.75	1.14	0.70	N/A
LAD <sub>L</sub>	0.95	0.35	0.43	0.61	0.90	0.59	0.44	0.40	0.74	0.44	N/A

Source: Henry<sup>1163</sup>

Notes:

(a) Averages calculated by the AER.

<sup>1163</sup> O. Henry, op. cit., 23 April 2009, p. 41.

**Table C.10: Re-levered equity beta estimates – United States businesses – Henry’s results (2003 – 2008) - monthly**

	CHG	CNP	EAS	NI	NJR	NST	NU	SRP	UIL	POM	Average <sup>(a)</sup>
<b>OLS</b>	<b>1.47</b>	<b>0.53</b>	<b>0.09</b>	<b>0.22</b>	<b>0.87</b>	<b>0.73</b>	<b>0.63</b>	<b>1.25</b>	<b>1.64</b>	<b>0.71</b>	<b>0.81</b>
OLS <sub>U</sub>	2.11	0.92	0.54	0.63	1.45	1.22	1.13	1.73	2.33	1.17	N/A
OLS <sub>L</sub>	0.84	0.15	-0.36	-0.19	0.28	0.23	0.13	0.77	0.95	0.25	N/A
<b>LAD</b>	<b>1.40</b>	<b>0.69</b>	<b>-0.06</b>	<b>0.08</b>	<b>0.87</b>	<b>0.48</b>	<b>0.77</b>	<b>1.20</b>	<b>1.61</b>	<b>0.52</b>	<b>0.76</b>
LAD <sub>U</sub>	2.04	1.08	0.40	0.51	1.46	0.98	1.28	1.69	2.32	0.98	N/A
LAD <sub>L</sub>	0.77	0.30	-0.51	-0.34	0.29	-0.02	0.27	0.71	0.89	0.05	N/A

Source: Henry<sup>1164</sup>

Notes:

(a) Averages calculated by the AER.

<sup>1164</sup> O. Henry, op. cit., 23 April 2009, p. 44.

**Table C.11: Re-levered equity beta estimates – United States businesses – Henry’s results (2003 – 2008) - weekly**

	<b>CHG</b>	<b>CNP</b>	<b>EAS</b>	<b>NI</b>	<b>NJR</b>	<b>NST</b>	<b>NU</b>	<b>SRP</b>	<b>UIL</b>	<b>POM</b>	<b>Average<sup>(a)</sup></b>
<b>OLS</b>	<b>1.32</b>	<b>0.61</b>	<b>0.48</b>	<b>0.74</b>	<b>1.21</b>	<b>0.75</b>	<b>0.60</b>	<b>0.83</b>	<b>1.06</b>	<b>0.86</b>	<b>0.85</b>
OLS <sub>U</sub>	1.56	0.74	0.67	0.88	1.43	0.92	0.76	1.02	1.34	1.02	N/A
OLS <sub>L</sub>	1.08	0.48	0.28	0.60	1.00	0.59	0.45	0.64	0.78	0.70	N/A
<b>LAD</b>	<b>1.30</b>	<b>0.62</b>	<b>0.50</b>	<b>0.71</b>	<b>1.28</b>	<b>0.80</b>	<b>0.62</b>	<b>0.79</b>	<b>1.12</b>	<b>0.82</b>	<b>0.86</b>
LAD <sub>U</sub>	1.54	0.75	0.69	0.85	1.50	0.96	0.77	0.97	1.40	0.98	N/A
LAD <sub>L</sub>	1.06	0.50	0.31	0.57	1.07	0.63	0.47	0.60	0.84	0.66	N/A

Source: Henry<sup>1165</sup>

Notes:

(a) Averages calculated by the AER.

<sup>1165</sup> O. Henry, op. cit., 23 April 2009, p. 43.

**Table C.12: Re-levered equity beta estimates – United States businesses – Henry’s results (1990 – 1998 and 2002 – 2008) - monthly**

	<b>CHG</b>	<b>CNP</b>	<b>EAS</b>	<b>NI</b>	<b>NJR</b>	<b>NST</b>	<b>NU</b>	<b>SRP</b>	<b>UIL</b>	<b>POM</b>	<b>Average<sup>(a)</sup></b>
<b>OLS</b>	<b>0.62</b>	<b>0.85</b>	<b>0.70</b>	<b>0.63</b>	<b>0.54</b>	<b>0.62</b>	<b>0.42</b>	<b>1.16</b>	<b>0.89</b>	<b>0.64</b>	<b>0.71</b>
OLS <sub>U</sub>	0.89	1.17	0.95	0.85	0.82	0.95	0.67	1.67	1.13	1.00	N/A
OLS <sub>L</sub>	0.35	0.54	0.44	0.40	0.27	0.28	0.17	0.65	0.65	0.27	N/A
<b>LAD</b>	<b>0.72</b>	<b>0.60</b>	<b>0.57</b>	<b>0.53</b>	<b>0.54</b>	<b>0.75</b>	<b>0.26</b>	<b>0.88</b>	<b>0.61</b>	<b>0.42</b>	<b>0.59</b>
LAD <sub>U</sub>	0.99	0.92	0.83	0.76	0.82	1.09	0.51	1.40	0.86	0.79	N/A
LAD <sub>L</sub>	0.45	0.28	0.32	0.31	0.26	0.42	0.01	0.37	0.37	0.05	N/A

Source: Henry<sup>1166</sup>

Notes:

(a) Averages calculated by the AER.

<sup>1166</sup> O. Henry, op. cit., 23 April 2009, p. 46.

**Table C.13: Re-levered equity beta estimates – United States businesses – Henry’s results (1990 – 1998 and 2002 – 2008) - weekly**

	CHG	CNP	EAS	NI	NJR	NST	NU	SRP	UIL	POM	Average <sup>(a)</sup>
<b>OLS</b>	<b>0.75</b>	<b>0.48</b>	<b>0.57</b>	<b>0.70</b>	<b>0.68</b>	<b>0.60</b>	<b>0.46</b>	<b>0.65</b>	<b>0.48</b>	<b>0.61</b>	<b>0.60</b>
OLS <sub>U</sub>	0.85	0.61	0.67	0.79	0.79	0.73	0.55	0.82	0.56	0.74	N/A
OLS <sub>L</sub>	0.65	0.34	0.47	0.61	0.56	0.48	0.37	0.48	0.39	0.48	N/A
<b>LAD</b>	<b>0.66</b>	<b>0.58</b>	<b>0.54</b>	<b>0.66</b>	<b>0.69</b>	<b>0.71</b>	<b>0.45</b>	<b>0.57</b>	<b>0.47</b>	<b>0.57</b>	<b>0.59</b>
LAD <sub>U</sub>	0.76	0.71	0.64	0.75	0.80	0.84	0.55	0.75	0.55	0.70	N/A
LAD <sub>L</sub>	0.56	0.44	0.43	0.57	0.57	0.59	0.36	0.40	0.38	0.44	N/A

Source: Henry<sup>1167</sup>

Notes:

(a) Averages calculated by the AER.

<sup>1167</sup> O. Henry, op. cit., 23 April 2009, p. 45.

## Glossary

\$	dollars
\$AU	Australian dollars
ACG	Allen Consulting Group
ACCC	Australian Competition and Consumer Commission
ACT	Australian Capital Territory
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
AGL	Australian Gas Light
AGSM-RMS	Australian Graduate Management School – Risk Measurement Service
APA	APA Group (Australian Pipeline Trust and APT Investment Trust)
APIA	Australian Pipeline Industry Association
ATO	Australian Tax Office
B	billion
BBSW	bank bill swap rate
$\beta$	beta
bps	basis points
capex	capital expenditure
CAPM	capital asset pricing model
CDS	credit default swap
CEG	Competition Economics Group
CGS	Commonwealth Government Security
CKI	Cheung Kong Infrastructure Holdings
cl.	clause

cls.	clauses
COB	close of business
CPI-X	CPI minus X
CPRS	Carbon Pollution Reduction Scheme
CSFB	Credit Suisse First Boston
D	value of debt
DBNGP	Dampier to Bunbury Natural Gas Pipeline
DNSP	distribution network service provider
DRP	debt risk premium
DGM	dividend growth model
DUET	Diversified Utility and Energy Trust
E	value of equity
EA	EnergyAustralia
ENA	Energy Networks Association
EPS	earnings per share
ESC	Essential Services Commission of Victoria
ESCOSA	Essential Services Commission of South Australia
ETNOF	Electricity Transmission Network Owners Forum
EUAA	Energy Users Association of Australia
F	imputation credit payout ratio
FFO	funds from operations
FIG	Financial Investor Group
G	gearing
<i>g</i>	dividend growth in perpetuity
Gamma	$\gamma$ – value of imputation credits
GDP	gross domestic product
HDF	Hastings Diversified Utilities Fund



ICRC	Independent Competition and Regulatory Commission
IPART	Independent Pricing and Regulatory Tribunal
JIA	Joint Industry Associations
$k_e$	return on equity or cost of equity
LAD	least absolute deviation
LAV	least absolute variation
M	million
MC	market capitalisation
MEU	Major Energy Users Inc
MRP	market risk premium
NCF	net cash flows
ND	net debt
NEL	National Electricity Law
NEM	national electricity market
NEO	National Electricity Objective
NGL	National Gas Law
NGR	National Gas Rules
NSP	network service provider
NSW	New South Wales
NYSE	New York Stock Exchange
OLS	ordinary least squares
$\omega$	omega
opex	operating expenditure
ORG	Office of the Regulator-General
OTTER	Office of the Tasmanian Energy Regulator
P	price
%	per cent

PER	price earnings ratio
QCA	Queensland Competition Authority
QLD	Queensland
QTC	Queensland Treasury Corporations
<i>R</i>	required return
RAB	regulatory asset base
RBA	Reserve Bank of Australia
<i>r<sub>f</sub></i>	risk-free rate
s.e.	standard error
SA	South Australia
SFG	Strategic Finance Group Consulting
SPI	Singapore Power International
SRI	statement of regulatory intent
SRP	Statement of Regulatory Principles for the Regulation of Electricity Transmission Revenues
<i>T<sub>e</sub></i>	effective tax rate
TD	total debt
TAS	Tasmania
term	term-to-maturity
<i>θ</i>	theta – imputation credit utilisation rate
TNSP	transmission network service provider
TPA	Transmission Pipeline Australia
the Tribunal	the Australian Competition Tribunal
TSLRIC	total service long run incremental cost
UK	United Kingdom
US	United States
V	value of debt and equity

VIC

Victoria

WACC

weighted average cost of capital