



Estimating a WACC for the NT Gas Transmission Pipeline

Key issues in the current environment

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Synergies Economic Consulting Pty Ltd
www.synergies.com.au

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Executive Summary

Synergies Economic Consulting (Synergies) has been engaged by the APA Group (APA), on behalf of NT Gas Pty Limited, to review aspects of the Weighted Average Cost of Capital (WACC) to apply to the Amadeus Gas Pipeline (AGP), as part of its forthcoming review by the Australian Energy Regulator (AER). NT Gas is 96% owned by APA, and is trustee of the Amadeus Gas Trust. NT Gas is also the licensee and operator of the AGP.

As part of this review, we have been asked to address the following questions:

1. The equity beta previously applied to the AGP is 1. Does this remain the best forecast or estimate possible in the circumstances?
2. What is a reasonable basis for estimating the debt risk premium for a benchmark efficient service provider in the circumstances of NT Gas? What would be an appropriate debt risk premium applying that methodology?
3. What is the best estimate of the value of tax imputation credits (γ), having regard to the most recent research in this area?
4. To what extent is the global financial crisis (and the market conditions that have been experienced following the commencement of the crisis) continuing to have an impact on the expected value of the market risk premium?

Our review has had regard to the relevant provisions in the National Gas Law (NGL), the National Gas Rules (NGR), the previous decision for the AGP made by the Australian Competition and Consumer Commission in 2002, relevant AER precedent and other relevant regulatory precedent.

A summary of our conclusions in relation to each question is as follows.

Systematic risk

The AGP's circumstances are unique and accordingly it is difficult to make any direct comparisons with other regulated gas pipelines. The APG's risk profile features the risk of asset stranding, which is not compensated via the cost of equity. Further, NT Gas has no market power.

We have no evidence to suggest that the equity beta for the pipeline should be different from the estimate previously determined by the ACCC, which is one. In the interests of providing sufficient certainty to NT Gas, which is necessary to satisfy the overarching objective of the NGL, we consider that robust evidence is required to support any changes in key parameter values.

The NGR requires that the rate of return is “commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services” and that any estimate is the “best forecast or estimate possible in the circumstances”. Consistent with the conclusions drawn in our recent report concluded for APT Allgas, we find that the paucity of relevant and reliable data has precluded us from being able to draw any robust conclusions regarding NT Gas’ equity beta based on an updated empirical analysis. In the absence of this data the most appropriate starting point for the equity beta estimate is one, which was the value previously applied to NT Gas.

In our opinion, assuming 60% gearing, the most appropriate equity beta to apply to for the AGP is one.

The key issue we have identified is stranding risk, which is not reflected in this beta estimate. At this stage, we are not in a position to assess the materiality of that risk. If it were to be compensated, this should be done by way of a specific cash flow adjustment using a probability-based risk assessment.

Debt risk premium

A recent development in relation to the estimation of the debt risk premium is the cessation of publication of CBA Spectrum’s fair value curves (which were only accessible to CBA customers). The AER’s proposed response to this, as outlined in its most recent decision for the Victorian electricity distribution businesses (who are bound by the *National Electricity Rules*), is to estimate the debt margin by applying a 75% weighting to the estimated Bloomberg ten year yield and 25% to the yield on Australian Pipeline Trust’s ten year bond issue.

The AER’s proposed approach gives rise to a number of concerns. The APT bond was issued to a group of thirteen institutional investors, who we understand were interested in holding the debt for an extended period. Consequently, there has been no secondary market trading in the bond (to the extent that there are trades, they are done on an over the counter basis). The AER’s proposed approach is to provide undue weight to an illiquid APT bond, resulting in a yield that is not reflective of current market conditions.

The AER’s approach is subject to a number of statistical concerns being double counting, small sample size and non-representative sampling. We are therefore of the opinion that reliance should only be placed on the Bloomberg fair value estimates. It is not considered appropriate to rely on a single, illiquid instrument for the sake of being able to cite an ‘alternative’ data source. While the AER has reduced the weighting to 25% the influence of that estimate at this weighting remains material. The inclusion of an illiquid estimate will not meet the requirement of being the “best estimate or

forecast possible in the circumstances” that is “commensurate with prevailing conditions in the market for funds”.

Bloomberg is a respected and independent global data service that has specialist skills and expertise in capital markets. It also has access to sophisticated tools and resources that it would use in analysing market data and trends. The dearth of suitable data is a problem facing all market participants. However, combining Bloomberg’s fair value yield with the yield on the APT bond is not considered an appropriate solution. Indeed, we consider that given the significance of these issues and the potential complexities underpinning them, reliance should continue to be placed on an independent, reputable data provider that has specialist skills and expertise in this area. At the current time, this means placing sole reliance on Bloomberg’s fair value estimates.

We also do not consider it appropriate to use the APA Group’s actual cost of funds to set the benchmark cost of debt for one of its own regulated pipelines (NT Gas is 96% owned by the APA Group).

When compared to the yields on other BBB issues, the yield on the APT bond issue appears low. Apart from the issues raised above regarding liquidity and the impact that this has on the yield, the fact that this deal was recently awarded Finance Asia’s Best Local Deal and the KangaNews Australian Domestic Corporate Market Deal of the Year suggests that the market views this deal as particularly innovative in the difficult market environment that corporate issuers have been facing.

Using this bond to set the benchmark removes any benefit that accrues to the regulated firm from achieving a more efficient financing structure. This in turn materially dilutes any future incentive to achieve a lower cost of funds than the benchmark, which is one of the main objectives of incentive regulation. Dilution of this incentive is not in the long-term interest of consumers.

Further, to the extent that the deal was considered particularly innovative and unique it may be difficult for an Australian corporate to replicate. If this is the case, it is not considered appropriate to use it to inform the estimation of the benchmark cost of debt, not only for the APA Group’s regulated pipelines but for any regulated business. That is, this deal may be more of an outlier than indicative of the benchmark cost of funds. As outlined above, Bloomberg may also view the bond to be an outlier given it hasn’t included it in the sample used to construct its fair value curve. If the benchmark is already seen as difficult to achieve it does not provide any credible incentive for a regulated business to outperform it.

The other issue is the extrapolation of the Bloomberg seven year yield to estimate a ten year yield. Following cessation of publication by Bloomberg of the seven and ten year AAA corporate bond yields earlier this year, the AER has to date still used this data. Our key concern with such an approach is that it will quickly become out of date, unless Bloomberg recommences publishing these yields. We do not consider that extrapolating a current estimate of the seven year yield based on data from a previous time period will result in an estimate that is “commensurate with prevailing conditions in the market for funds”.

In addressing the issue of how to estimate a Bloomberg ten year BBB yield, there is a credible alternative and that is to extrapolate the Bloomberg seven year BBB yield using the term structure or gradient for five to seven years. Testing of this approach indicates that it can accurately predict the ten year BBB yield when it was reported by Bloomberg.

The debt margin has been estimated for NT Gas using Bloomberg data, extrapolating the seven year BBB yield based on the difference between the five and seven year yields (converted to annual effective rates). A twenty day averaging period to 30 November 2010 has been used. The resulting estimate is 546 basis points.

We note that the Bloomberg seven year yield is currently close to the highest it has been since the commencement of the global financial crisis. However, we consider that given the dearth of market data available and the difficult market conditions that have been experienced, reliance on an independent, reputable data provider with expertise in financial markets (such as Bloomberg) continues to be the most appropriate strategy for this purpose of estimating the ‘benchmark’ cost of debt.

Gamma

Gamma has been one of the most contentious issues in relation to WACC in recent times. It has seen a number of appeals to the Australian Competition Tribunal by regulated energy network businesses, including applications by ETSA Utilities, Ergon Energy and ENERGEX. These three applications were recently heard together and an initial decision was issued in October 2010. The process has not yet concluded. We expect that the final outcome will have a significant influence on the gamma that the AER will seek to determine for NT Gas and all other regulated energy network businesses.

The AER has already had regard to that review in its recent decision for the Victorian electricity network businesses, recognising that the outcomes have not been finalised. In that decision, the AER has proposed to depart from its gamma value of 0.65 that applies to electricity network businesses, and determined a gamma of 0.5.

While we agree that this determination is a move in the right direction, we still do not agree with the AER's position on the two key inputs that determine gamma (being the distribution rate and value of franking credits), as set out in the Victorian decision. This is consistent with our position recently submitted in a report prepared for APT Allgas.

First, while the AER acknowledged that it was in error in interpreting the 71% distribution rate cited in Hathaway and Officer, it maintains that some value should be ascribed to retained franking credits. While it is no longer of the view that the distribution rate should be set at 100%, it considers that it should be between 70% and 100%.

The AER has acknowledged that there is some uncertainty regarding the value of retained credits. Particularly given the asymmetric consequences of error, we do not consider that it is appropriate to ascribe a value for something where there is no reliable evidence to support that value. In our opinion, it is more reasonable and plausible to assume that retained credits have no value. This in turn supports an assumption for the distribution rate of 71%.

Second, the Tribunal also found that the AER had made an error in relation to the value of franking credits (theta). It requested preparation of a revised report that addresses tax statistics and dividend drop-off studies, reviewing the latter "from as many sources as possible" and "if possible, provides results from a newly-commissioned dividend drop-off study that is "state of the art"". ¹

In the recent Victorian electricity distribution decision the AER is maintaining that the value of theta is 0.65. It is also proposing to continue to give full weight to the Beggs and Skeels study (as its dividend drop-off study) and no weight to the SFG study.

We do not agree with the AER's position on theta. First, consistent with the Tribunal's conclusions, we consider that a number of market-based studies should be sourced in valuing theta, including Beggs and Skeels and SFG. Of the studies we examined, excluding Beggs and Skeels' 1986-1988 sub-period, the estimate for their post-2000 sub-period is the highest estimate for the value of theta (0.57), which is the estimate that has been adopted by the AER. A number of other studies have concluded that the value of theta is zero. We consider that a range between 0 and 0.57 is reasonable for theta.

We continue to oppose the use of tax statistics to value theta as we do not consider that this methodology arrives at a 'value' for theta, which is what is required here. We consider that reference to a range of reputable published market-based studies (not all

¹ Australian Competition Tribunal (2010) Application by Energex Limited (No 2) [2010] ACompT 7, para.146.

of which use the dividend drop-off methodology), adequately addresses concerns regarding giving consideration to a range of evidence.

Based on a range of 0 and 0.57 for theta and a distribution rate of 71%, the most reasonable range for the value of gamma is between 0 and 0.4. In selecting a point estimate from within this range we would recommend the mid-point, which is 0.2, for NT Gas.

Market risk premium

The value that has been applied by the AER since its WACC Statements for electricity transmission and distribution were finalised in May 2009 is 6.5%. This was an increase from the value of 6% that the AER has most commonly applied in the past in recognition of the effects of the global financial crisis. More recent evidence has emerged to suggest that the medium-term forward-looking market risk premium (MRP) is higher than this value (this was analysis by Officer and Bishop which was submitted to the AER by the Victorian electricity distribution network businesses).

The key theme that remains in the financial markets is one of uncertainty. While both positive and negative sentiments have been expressed regarding the outlook for the global economy, including the possibility of a 'second wave' of the global financial crisis, it is difficult to predict what the most likely scenario will be.

The Officer and Bishop analysis suggests that the value of the forward-looking MRP is most likely to be above 6.5% (and is more likely to be between 7% and 8% over the next five years). The analysis we have undertaken that compares the historical returns on debt and equity also suggests that to the extent that debt margins spiked following the commencement of the crisis and have continued to remain at these levels, the premium that equity investors now require will have similarly increased.

We are therefore of the opinion that currently, 6.5% is likely to be a 'lower bound' estimate of the forward-looking MRP.

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1 Introduction

- 1.1 Synergies Economic Consulting (Synergies) has been engaged by the APA Group (APA), on behalf of NT Gas Pty Limited (NT Gas) to review aspects of the Weighted Average Cost of Capital (WACC) to apply to the Amadeus Gas Pipeline (AGP) as part of its forthcoming review by the Australian Energy Regulator (AER).
- 1.2 ANZ Leasing, a consortium of financial institutions owns the AGP. NT Gas is trustee of the Amadeus Gas Trust, and leases the AGP from ANZ Leasing until 2011 under a leveraged lease arrangement. NT Gas is also the licensee and operator of the AGP, and APA has a 96% interest in NT Gas.
- 1.3 As part of this review, we have been asked to address the following questions:
1. The equity beta previously applied to the AGP is 1. Does this remain the best forecast or estimate possible in the circumstances?
 2. What is a reasonable basis for estimating the debt risk premium for a benchmark efficient service provider in the circumstances of NT Gas? What would be an appropriate debt risk premium applying that methodology?
 3. What is the best estimate of the value of tax imputation credits (γ), having regard to the most recent research in this area?
 4. To what extent is the global financial crisis (and the market conditions that have been experienced following the commencement of the crisis) continuing to have an impact on the expected value of the market risk premium?
- 1.4 In September 2010 we concluded a very similar report for APT Allgas Pty Limited, which is also owned by the APA Group.² Our recommendations in addressing a number of these issues largely remain unchanged, particularly in relation to the issues associated with estimating the cost of debt and equity, the market risk premium and γ . We have represented that analysis here for completeness. Apart from addressing relevant regulatory precedent since the date this report was completed (being the AER's decision in relation to the Victorian distribution network businesses), and the cessation of publication of

² Synergies Economic Consulting (2010). Estimating a WACC for the APT Allgas Distribution Network, Key Issues in the Current Environment, September.

CBA Spectrum data, our analysis and recommendations are in the main, the same as the analysis and recommendations contained in that report.

1.5 This report is structured as follows:

- section 2 sets out the context for determining WACC
- section 3 examines systematic risk (or beta)
- section 4 examines issues in estimating the cost of debt
- section 5 compares the cost of debt and equity in the current environment
- section 6 considers the market risk premium
- section 7 examines gamma
- section 8 concludes with a 'reasonableness check' of the key WACC parameters.

2 Background

2.1 In undertaking this review we have had regard to the following:

- the relevant provisions in the National Gas Rules;
- the Australian Competition and Consumer Commission's (ACCC's) previous determination for the AGP;
- relevant AER precedent; and
- the asymmetric consequences of error.

2.2 National Gas Law and Rules

2.2 The Objective of the National Gas Law (NGL) is as follows:

The objective of this Law is to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.

2.3 The revenue and pricing principles include that:

- the service provider should be able to recover the efficient costs of providing the Reference Services (Rule 24(2));
- the service provider should be provided with sufficient incentives in order to promote economic efficiency with respect to the Reference Services, including incentives to invest (Rule 24(3)); and

A reference tariff should allow for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates. (Rule 24(5))

2.4 The National Gas Rules (NGR) contains the following provisions in relation to the rate of return (Rule 87).

- 1) The rate of return on capital is to be commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services.
- 2) In determining a rate of return on capital:
 - (a) it will be assumed that the service provider:
 - (i) meets benchmark levels of efficiency; and

- (ii) uses a financing structure that meets benchmark standards as to gearing and other financial parameters for a going concern and reflects in other respects best practice; and
 - (b) a well accepted approach that incorporates the cost of equity and debt, such as the Weighted Average Cost of Capital, is to be used; and a well accepted financial model, such as the Capital Asset Pricing Model, is to be used.
- 2.5 The NGR also provides that any forecasts or estimates are arrived at on a reasonable basis and must represent “the best forecast or estimate possible in the circumstances” (Rule 74(2)).

2.3 The asymmetric consequences of error

2.6 It has been recognised that regulatory error tends to have asymmetric consequences. The Productivity Commission stated:³

- Over-compensation may sometimes result in inefficiencies in timing of new investment in essential infrastructure (with flow-ons to investment in related markets), and occasionally lead to inefficient investment to by-pass parts of the network. However, it will never preclude socially worthwhile investments from proceeding.
- On the other hand, if the truncation of balancing upside profits is expected to be substantial, major investments of considerable benefit to the community could be forgone, again with flow-on effects for investment in related markets.

In the Commission’s view, the latter is likely to be a worse outcome.

- 2.7 In other words, the consequences of setting WACC too low, and discouraging efficient investment in essential infrastructure, are considered worse than setting it too high. This in turn risks compromising the Objective of the NGL, as well as being inconsistent with a number of the relevant revenue and pricing principles.
- 2.8 The estimation of WACC is inherently imprecise and hence the probability of specifying a WACC other than the ‘true’ value is high. For key parameters such as beta, gamma and the market risk premium, there is likely to be a range of reasonable estimates rather than a precise value. The Australian

³ Productivity Commission (2001). Review of the National Access Regime, Report no. 17, AusInfo, Canberra, p.83.

Competition Tribunal ('the Tribunal') recognised the range of reasonable outcomes within which a Reference Tariff determination could fall:⁴

...there is no single correct figure involved in determining the values of the parameters to be applied in developing an applicable Reference Tariff. The application of the Reference Tariff Principles involves issues of judgement and degree. Different minds, acting reasonably, can be expected to make different choices within a range of possible choices which nonetheless remain consistent with the Reference Tariff Principles.

- 2.9 Typically, based on our 'best' estimate for WACC we would expect the balance of consequences to be approximately equal (that is, if the consequences of too high a WACC are the same as the consequences of too low a WACC, and the probability of either consequence is the same, the expected value will be zero). However, if the consequences are asymmetric (in this case, the consequence of an under-estimate is worse than the consequences of an over-estimate), then if the probability of either outcome was equal, the expected value will be negative. We therefore need to adjust the probabilities in order to achieve an expected value of zero, which necessitates ensuring that the probability of the worse outcome is lower.
- 2.10 Given the asymmetric consequences of regulatory error, it is therefore important to lower the risk that the true value is higher than the estimated value as this is considered to have more severe social and economic implications.
- 2.11 One possible approach that has been applied to deal with this issue is to specify parameters such as beta, gamma and the market risk premium in terms of a range and then select a point estimate from the upper bound of this range in recognition of the asymmetric consequences of regulatory error. Lally states:⁵

Given that there is some uncertainty as to the correct parameter estimates, and that the consequences of judging excess profits to exist when they do not is more severe than the contrary error, my view is that one should choose a WACC value from the higher end of the distribution...

⁴ Application by GasNet (Australia) Operations Pty Ltd [2003] AcompT 6, para 29.

⁵ M. Lally (2004). The Weighted Average Cost of Capital for Gas Pipeline Businesses, Report Prepared for the New Zealand Commerce Commission, University of Wellington.

- 2.12 This range can be set with reference to empirical evidence. Alternatively, a probability distribution of estimates can be determined. This involves assigning a standard deviation to the estimate and then selecting a value from a specified percentile of the distribution. For example, if a value from the 75th percentile is selected, this implies that there is only a 25% probability that the true WACC is higher than this selected value.
- 2.13 This approach has been applied by the New Zealand Commerce Commission in the regulation of gas.⁶ It has also been applied by IPART in its determination in relation to the Hunter Valley coal network, where a range was estimated for beta (based on ranges for the key underlying parameters) and a point estimate selected above the mid-point in this range.⁷
- 2.14 Another means of specifying the probability distribution is by using a technique such as Monte Carlo analysis. This technique can also be used as a 'reasonableness check' against specified ranges, which has been done by both the ACCC and the Queensland Competition Authority (although this technique still requires a degree of judgment to be applied in determining the inputs to be used).
- 2.15 In conclusion, it is important to give due regard to the imprecise nature of WACC estimation and the more severe consequences which can arise if the regulated WACC underestimates the true value. This in turn risks compromising the Objective of the NGL as well as being inconsistent with a number of the relevant revenue and pricing principles.

⁶ Commerce Commission (2004). Gas Control Inquiry Final Report; Commerce Commission (2008). Authorisation for the Control of Supply of Natural Gas Distribution Services by Powerco Ltd and Vector Ltd, Decisions Paper, 30 October.

⁷ Independent Pricing and Regulatory Tribunal (2009). New South Wales Rail Access Undertaking – Review of the Rate of Return and Remaining Mine Life from 1 July 2009, Rail Access – Final Report and Decision, August.

3 Systematic risk (beta)

3.1 Introduction

3.1 The question we have been asked to address is as follows:

The equity beta previously applied to the AGP is 1. Does this remain the best forecast or estimate possible in the circumstances?

3.2 As outlined previously, the NGR requires that the rate of return is “commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services.” Any forecasts or estimates must be arrived at on a reasonable basis and represent “the best forecast or estimate possible in the circumstances”.

3.3 We have also noted the overarching objective of the NGL, which is to “promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.” The achievement of an appropriate degree of regulatory certainty is considered of fundamental importance in ensuring that this objective is achieved, particularly given the long investment horizon associated with infrastructure assets of this nature.

3.4 For electricity distribution, the National Electricity Rules explicitly recognise the need for an appropriate degree of certainty and stability by applying a ‘persuasive evidence’ test before the regulator can approve a departure from a parameter value or method.⁸ In the case of electricity transmission, these values and methods have been set for a five year period and departures are not permitted.

3.5 While not explicitly provided for under the NGL or the NGR, the need for persuasive evidence is considered of no less importance for gas transmission and distribution network businesses, including in relation to parameter estimates such as beta.

⁸ Refer Rule 6.5.4(g), National Electricity Rules.

3.2 Systematic risk characteristics

3.2.1 Overview of the Amadeus Gas Pipeline

- 3.6 The 1,658 kilometre AGP links gas in reserves in the Amadeus Basin near Alice Springs to Darwin. There is only one major customer, the Power and Water Corporation (PWC), whose access contract expires in 2011. A new contract is currently being negotiated and the final terms of this contract are not yet known, including the proportion of pipeline capacity that will be contracted.
- 3.7 There are a number of offtake points along the pipeline. However, most of the gas is transported for use in electricity generation in the Darwin/Katherine area - some 74% of gas expected to be transported on the pipeline in 2010/11. At the offtake points between the Amadeus Basin and Darwin gas is primarily supplied for local electricity generation. It is also supplied to mining developments, some of which went into care and maintenance mode in the last access arrangement period. Delivery points south of Mataranka (at the northern tip of the pipeline) are understood to account for only around 25% of total demand.⁹ It is understood that there are no significant alternative sources of demand envisaged for the AGP, at least in the medium-term.
- 3.8 Over the course of the last access arrangement period (and the original contract period with PWC), the reserves in the Amadeus Basin were deemed inadequate to meet PWC's demand for the term of this original contract period. In 2006 it therefore switched the majority of its source of supply to the Blacktip field, which enters the pipeline just south of Darwin (around 5 TJ per day will still be sourced from Palm Valley until January 2012). Alternative (emergency) reserves have also been sourced that also enter the pipeline at delivery points at its very northern end (close to the sources of underlying demand), including the Bayu Undan fields in the Timor Sea.

3.2.2 Systematic risk drivers

- 3.9 It is difficult to directly compare the AGP with other regulated gas pipelines. This is for a number of reasons.
- 3.10 First, one of the key risks for the pipeline is asset stranding. This risk is not compensated via the cost of equity. This is because the Capital Asset Pricing Model (CAPM), which is used to derive the cost of equity, assumes that returns

⁹ This was advised by the APA Group.

are normally distributed. Stranding risk, on the other hand, has an asymmetric profile (that is, unlimited downside with limited or no upside).

- 3.11 Second, NT Gas has virtually no market power (market power is generally assumed to have a dampening effect on beta). The AGP currently services only one major customer with significant countervailing power. This customer no longer sources the bulk of its supply from the Amadeus Basin and instead is sourcing gas from reserves located near the northern tip of the pipeline, requiring access to only a relatively short section of the pipeline. The commercial arrangements with this customer are currently under review and the future contracting arrangements are unknown.

3.3 Review of the data

- 3.12 As part of our recent report prepared for APT Allgas we also undertook a comparable companies analysis. Given that analysis was only completed recently, it has not been updated. We have reproduced that analysis here for completeness.

3.3.2 Estimation error

- 3.13 We examined current betas for a sample of Australian and US gas distribution firms. One of the key issues with examining beta estimates for comparable companies is estimation error.
- 3.14 It is not possible to directly observe a firm's true beta. Instead, estimates are obtained by regressing the historical returns of a firm's shares against the historical returns for a market index, over the same time period. As with any statistical estimate, it is measured with uncertainty. This uncertainty is likely to be more pronounced for individual firms. As a consequence, the resulting data estimates can be of limited reliability and caution should be exercised in applying these estimates in a forward-looking analysis.
- 3.15 It is also believed that betas are mean reverting. In other words, over time, the betas of all firms will gradually move towards the equity beta of the market, which is one. This means that future estimates of beta are likely to be closer to one than current estimates.

3.16 There are a number of ways to address measurement error. As a starting point, any beta estimates with poor statistical properties¹⁰ should be discarded (this is discussed further below). There are a number of other ways to deal with the uncertainty surrounding the estimation of beta, including:

- adjusting for thin trading, which is a common cause of measurement error, using techniques such as the Scholes-Williams technique¹¹;
- adjusting for mean reversion using the Blume adjustment¹²; and
- the formation of portfolios. Portfolio betas have substantially lower standard errors and yield more precise estimates of beta. While there are benefits in using this approach via reductions in the standard error, as more firms are used caution should still be exercised to ensure that they are relevant comparators.

3.17 A report by Gray et al provides a useful summary of the various methods of estimating beta, as well as their performance.¹³ The study uses historical data to compare the predicted beta estimate in accordance with CAPM, with the actual equity return for the relevant forecast period. The closer the predicted estimate to the actual equity return, the better the estimation technique. A summary of the findings of the report are:

- it is preferable to use data periods of longer than four years;
- monthly observations are preferred to weekly observations;
- Blume-adjusted estimates that account for mean reversion provide better estimates;

¹⁰ The **R²**, or coefficient of determination, measures the explanatory power of the regression equation (that is, how much of the variability in Y can be explained by X). It takes a value of between 0 and one. For example, an R-squared of 0.7 would suggest that 70% of the variability in the individual share's returns is explained by variability in the returns on the market. The **standard error** measures the sampling variability or precision of an estimate. That is, as the estimate is derived from a sample distribution, it measures the precision of the model parameter. A lower standard error is preferred as it indicates a more precise measure. A third commonly used measure is the **t statistic**. The t statistic is calculated for each coefficient in a regression model (in this case, the beta coefficient) for the purposes of hypothesis testing. It is equal to the estimated beta coefficient divided by the standard error. The tendency is to test the hypothesis that the regression coefficient is significantly different from zero. This is done within a specified confidence interval (for example, 95%). Generally, the t statistic should exceed two to be considered reliable. These measures have been used in this analysis to screen comparator beta estimates.

¹¹ M. Scholes, M. and J. Williams (1977). Estimating Betas from Nonsynchronous Data. *Journal of Financial Economics*, Vol.5, 309-327.

¹² The impact of this adjustment is to 'draw' the value of the estimated beta closer to one. The typical adjustment is simply: Adjusted beta = (1/3 * the market beta of one) + (2/3 * estimated beta). This can be reduced to: Adjusted beta = 0.33 + (0.67 * estimated beta).

¹³ S. Gray, J. Hall, R. Bowman, T. Brailsford, R. Faff, and R. Officer (2005). The Performance of Alternative Techniques for Estimating Equity Betas of Australian Firms, Report Prepared for the Energy Networks Association.

- statistical techniques that eliminate outliers are preferred, provided the outlier is not expected to re-occur; and
- a beta estimate derived from a sample of firms in an industry is preferred to an estimate for an individual firm.

3.18 A further interesting finding was that assuming an equity beta of one for a firm generally outperformed standard regression estimates, and that this may be a more appropriate assumption for beta if data cannot be obtained over a suitably long time period.

3.3.3 Our preferred approach

Procedure

- 3.19 The key approach we apply in undertaking beta analysis is follows. First, we construct a sample of firms that are considered to be of most relevance to our firm of interest, recognising that there are no listed firms existing that will provide a 'like for like' comparison.
- 3.20 Second, we eliminate any estimates from the sample that had a t-statistic of less than two and an R-squared of less than 0.1 (noting that firms with t-statistics of less than two also tend to have very low R-squareds). The reasons for applying these filters are as follows.
- 3.21 Regression analysis is a statistical procedure that is commonly used to estimate beta in the absence of being able to observe the 'true' value of that beta. The explanatory power of the resulting estimate is of fundamental importance. If the resulting estimate has relatively low explanatory power, we cannot be confident that the estimate provides any valuable information regarding the true value of that firm's beta. In other words, the estimate is essentially meaningless.
- 3.22 The t-statistic is used to test statistical significance. It is calculated by dividing the standard error of the estimate by the beta coefficient. The standard error measures the sampling variability or precision of an estimate. That is, as the estimate is derived from a sample distribution, it measures the precision of the model parameter. A high standard error indicates that the underlying distribution is large. A lower standard error is preferred as it indicates a more precise measure. This is done within a specified confidence interval (usually 95%). We have applied a threshold value of two in testing the statistical significance of our estimates.

- 3.23 The R-squared, or coefficient of determination, measures the explanatory power of the regression equation (that is, how much of the variability in the dependent variable can be explained by the independent variable). A low R-squared indicates that little of the variability in the returns on the relevant share can be explained by returns on the market. For a given level of 'noise' in the data, a beta estimate approaching zero will normally be accompanied by a very low R-squared.
- 3.24 We note that a low R-squared could legitimately reflect circumstances where the independent variable explains little of the variability in the dependent variable (that is, the returns of the market have limited bearing on the returns of the firm). We would still maintain that an R-squared of less than 0.1 (or 10%) should still be viewed with caution, as this suggests that less than 10% of the variability in the firm's returns is explained by the returns on the market. However, of the two tests presented here, we view the t-statistic as more important.
- 3.25 We also note Gray et al's recommendations in relation to the formation of portfolios, as portfolio betas tend to have lower standard errors.¹⁴ The benefits of the portfolio approach are only likely to accrue where the starting sample size (before the application of any statistical filters) is large. That is, the 'savings' or improvements in the standard error is a function of the average standard error of the sample and the number of firms in the sample.¹⁵ We are therefore of the opinion that the sample must be of a reasonable size in order for this technique to be able to be applied.
- 3.26 Third, we eliminate any firms that have less than sixty months of data as we agree with Gray et al that monthly observations are preferable to weekly.

Outcome

- 3.27 There are only two listed Australian gas distribution businesses in our sample, being Envestra and APA Group. No Australian firms were eliminated based on our statistical filters. Six US firms remained in our sample (following application of the statistical filters), being: EQT Corporation, Ferrellgas Partners, Delta Natural Gas, Chesapeake Utilities, Northwest Natural Gas Company and South Jersey Industries. However, of these six firms it would appear that only Northwest Natural Gas is primarily engaged in gas

¹⁴ S. Gray, J. Hall, R. Bowman, T. Brailsford, R. Faff, and R. Officer (2005).

¹⁵ F. Choi, ed.(2003). International Finance and Accounting Handbook, Third Edition, John Wiley and Sons, p.23.

distribution. The asset betas for these firms are included in the following table. The descriptions of each firm are provided in Appendix A.

Table 1 Beta estimates

Firm (Jurisdiction)	Asset beta	t-statistic	R-squared	Average D/V	Reasonable comparator?
APA Group (AU)	0.2927	4.2259	0.2354	60.30%	Yes
Envestra (AU)	0.2430	3.3671	0.1635	71.25%	Yes
Chesapeake Utilities (US)	0.2772	2.5838	0.1032	22.85%	No - also involved in propane distribution and IT
Delta Natural Gas (US)	0.2673	4.0291	0.2187	34.80%	No - also involved in production and sales
EQT Corporation (US)	0.5445	4.1967	0.2329	29.15%	No - is an integrated company that is also involved in production and distribution
Ferrellgas Partners (US)	0.1391	4.1512	0.2291	76.67%	No - engaged in activities other than distribution and sells propane
Northwest Natural Gas Company (US)	0.2216	2.5523	0.1010	30.69%	Yes
South Jersey Industries (US)	0.1907	2.4138	0.0913	29.32%	No - provides a range of energy management services

Source: Bloomberg

3.28 We consider that three firms (one of which is a US firm) is an inadequate sample to enable any robust observations to be made regarding betas of gas distribution firms. We therefore concur with ACG that in the absence of more reliable data, there is no persuasive case to depart from an equity beta of one, which we must also emphasise reflects the 'average' or 'benchmark' firm. An equity beta of one is also the value previously determined by the ACCC for the AGP.

3.29 We do not accept that the starting point is 0.8, which was applied by the AER in the Jemena decision for example. This estimate is the same value that the AER has determined that it will apply to electricity transmission and distribution network businesses. Apart from questioning the applicability of this value to a gas transmission business, as outlined in our report prepared for APT Allgas, a number of concerns have been identified with the data the AER has relied upon. Again, we have re-presented that analysis here for completeness.

3.3.4 Other regulatory precedent

3.30 Prior to the Victorian Essential Services Commission's (ESC's) 2008 decision in relation to gas distribution, an equity beta of one was commonly applied to gas

distribution and transmission. In this decision, the ESC determined an equity beta of 0.7.¹⁶

- 3.31 The ESC's decision was based on empirical analysis undertaken by its consultant, the Allen Consulting Group (we note that a first principles analysis was not undertaken).¹⁷ ACG examined both Australian and US firms. The ESC concurred with ACG that more weight should be put on the Australian estimates although some regard should still be given to the US evidence. Based on ACG's results, it concluded that an equity beta range of 0.5 to 0.8 was most appropriate.¹⁸
- 3.32 ACG was subsequently engaged by the Joint Industry Associations (JIA) to consider the issues associated with estimating beta for electricity transmission and distribution businesses as part of the development of the AER's WACC Statements.¹⁹ In this report, ACG highlighted significant problems with the data. In referring back to its analysis undertaken for the ESC in 2007/08, it suggested that the measurement period that was used in informing the ESC's decision was one of unusually low volatility and hence "depressed beta estimates for regulated electricity transmission and distribution businesses relative to other businesses." It states:²⁰

Estimation of betas is subject to a high degree of imprecision, and the Australian data that are available for the estimation of the beta of a regulated electricity transmission or distribution business are depressingly poor. Upper bounds on confidence intervals for estimates of an equity beta value (at a gearing of 60 per cent debt to assets) from the set of portfolios of Australian businesses range from 0.9 to 1.2...

Taking into account the limitations of the data set, the size and incompleteness of statistical error margins around the beta estimates, and evidence of a recent rising trend in beta estimates, we do not consider that current empirical evidence on beta values would provide convincing or persuasive evidence to conclude that the (60 percent

¹⁶ Essential Services Commission (2008). Gas Access Arrangement 2008-2012, Final Decision - Public Version, March.

¹⁷ Allen Consulting Group (2007). Empirical Evidence on Proxy Beta Values for Regulated Gas Distribution Activities, Report to the Essential Services Commission of Victoria, June.

¹⁸ Essential Services Commission (2008). p.476.

¹⁹ The Allen Consulting Group (2008). Beta for Regulated Electricity Transmission and Distribution, Report to Energy Networks Association, Grid Australia and APIA, September.

²⁰ The Allen Consulting Group (2008). p.1.

geared) equity beta for a regulated electricity transmission or distribution business is different from 1.

- 3.33 ACG reiterated these views in a further report produced for the JIA in 2009 in response to the AER's draft decision. ACG was critical of the AER's proposed equity beta range of 0.44 to 0.68, which was based on the advice of Professor Henry. ACG restated its previous conclusions:²¹

The strength of the empirical evidence that is available cannot demonstrate that the true value may not lie materially above (or below) the range of the central estimates. We remain of the view expressed in our previous report that, if the full imprecision of the current beta estimates is taken into account, there is not persuasive evidence for concluding that the equity beta for a benchmark electricity transmission or distribution entity is different to the previously adopted value of 1.

- 3.34 SFG Consulting also examined the AER's sample and was similarly critical:²²

In summary, it is difficult to imagine any set of estimates faring worse on these "key objective criteria." In my view, this indicates that the data that is required to produce reliable estimates simply does not exist. The estimates that have been produced are neither plausible nor economically reasonable and should not be afforded material weight.

- 3.35 Significant concerns have therefore been expressed regarding the quality of the data relied upon by the AER in determining equity beta to apply to electricity transmission and distribution businesses.

3.4 Stranding risk

- 3.36 As outlined previously, one of the most significant issues for NT Gas is stranding risk. While the commercial arrangements that will apply to access are currently being reviewed, it is understood that NT Gas could be exposed to stranding risk, with no current prospects of any substantial sources of alternative demand beyond the existing major customer, and depleting reserves in the Amadeus Basin. However, we are currently not in a position to assess the

²¹ The Allen Consulting Group (2009). 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 Energy Networks Association, Grid Australia and Australian Pipeline Industry Association, January.

²² SFG Consulting (2009), The Reliability of Empirical Beta Estimates: Response to AER Proposed Revision of WACC Parameters, Draft Report Prepared for ENA, APIA and Grid Australia, 28 January.

potential materiality of that risk, which would also need to have regard to the residual value of the pipeline and its expected remaining life from 2011 (accelerated depreciation has been applied to 2011 and the method will revert to straight line from this point).

3.37 Apart from the fact that asymmetric stranding risk is not recognised under the CAPM, to the extent that asset stranding occurs as a consequence of the substitution of alternative gas reserves the risk is not necessarily systematic in nature. For both of these reasons, any compensation should therefore be provided by way of a cash flow adjustment. An approach that could be used to estimate this risk is:

- identify the likely causes of asset stranding;
- if more than one cause is identified, determine if there is any correlation between these causes to avoid overstating the total risk;
- assigning probabilities to each risk; and
- quantifying the impact of each risk. This can be done via stochastic simulation analysis to capture variations in key assumptions.

3.38 We are of the opinion that this is a reasonable and robust approach that could be applied to value the risk to NT Gas (which would also enable an assessment of the materiality of the risk). We have not been requested to undertake such an analysis at this stage.

3.5 Conclusions

3.39 In conclusion, it is difficult to make any direct comparisons between the AGP and other regulated gas pipelines. The APG's risk profile features the risk of asset stranding, which is not compensated via the cost of equity. Further, NT Gas has no market power.

3.40 We have no evidence to suggest that the equity beta for the pipeline should be different from the estimate previously determined by the ACCC, which is one. In the interests of providing sufficient certainty to NT Gas, which is necessary to satisfy the overarching objective of the NGL, we consider that robust evidence is required to support any changes in key parameter values.

3.41 The NGR requires that the rate of return is "commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services" and that any estimate is the "best forecast or estimate

possible in the circumstances". However, the market data available is not considered sufficiently reliable to support a lower or higher value for the equity beta compared with what has been adopted previously for NT Gas. It is also not possible to conclude that the equity beta for NT Gas should be different from other gas transmission pipelines.

- 3.42 In our opinion, assuming 60% gearing, the most appropriate equity beta to apply to the AGP is one.
- 3.43 The key issue we have identified is stranding risk, which is not reflected in this beta estimate. At this stage, we are not in a position to assess the materiality of that risk. If it were to be compensated, this should be done by way of a specific cash flow adjustment using a probability-based risk assessment.

4 Estimating the Debt Margin

4.1 Introduction

4.1 We have been asked to address the following question:

What is a reasonable basis for estimating the debt risk premium for a benchmark efficient service provider in the circumstances of NT Gas?

4.2 The first issue that needs to be considered is the notional credit rating assumption. The AER has assumed a notional credit rating of BBB+ for electricity network businesses and this same assumption was applied in its most recent decision in relation to gas, which was for Jemena Gas Networks.²³

4.3 As noted in our report prepared for APT Allgas, we do have a concern that a BBB+ rating may no longer be compatible with 60% gearing for this business since the commencement of the global financial crisis, particularly for a business facing the unique circumstances of NT Gas. However, we have not been asked to review this assumption in detail at this stage and have therefore assumed that BBB+ will be applied.

4.4 Estimating the ten year debt margin that would apply to the efficient benchmark BBB+ rated firm has been extremely difficult following the commencement of the global financial crisis and has therefore also proven contentious in regulatory decision-making. In the past, the AER has referenced to the two main independent data sources, being CBA Spectrum and Bloomberg (applying one or both based on the outcome of its testing methodology over the relevant averaging period). Assumptions have also had to be made regarding the estimation of a ten year Bloomberg BBB yield²⁴, given the longest maturity for which a yield is now published is seven years.

4.5 The most recent development has been the cessation of publication of CBA Spectrum's fair value curves. The first key decision to be published following this development was in relation to the Victorian Distribution Network Service

²³ Australian Energy Regulator (2010a). Jemena Gas Networks, Access Arrangement Proposal for the NSW Gas Networks, 1 July 2010 – 30 June 2015, June.

²⁴ References to 'BBB' in this section in the context of Bloomberg estimates are therefore assumed to refer to all bonds in this category, including BBB+ and BBB-. We observe that no adjustment is made to Bloomberg's published BBB yield by the AER (or other Australian regulators) when estimating the debt margin for a firm with an assumed BBB+ credit rating.

Providers (DNSPs). Based on this decision the AER is now proposing to combine the Bloomberg estimate with the yield on the ten year BBB+ bond issued by the Australian Pipeline Trust (APT) in July 2010.²⁵ It had originally proposed to apply a 50% weighting to this bond however reduced that weighting to 25% in the Final Decision.

- 4.6 The AER has also had to address the cessation of publication by Bloomberg of its longer term AAA corporate bond yields, which had been used to extrapolate the seven year BBB yields to estimate a ten year BBB yield. It had originally proposed to reference the Commonwealth Government Securities (CGS) curve instead, however has now reverted to relying on the AAA corporate curve prior to the cessation of publication of the necessary yields.
- 4.7 This section examines the impact of these developments and the AER's proposed response, as outlined in its recent Final Determination for the Victorian DNSPs (the Victorian Final Decision).²⁶ This decision is of particular interest for this review as it is expected that the AER will seek to apply this same approach to both gas and electricity network businesses, noting that the requirements in relation to the estimation of a debt margin for the latter are more specific under the National Electricity Rules. We also understand that this decision is currently subject to appeal.
- 4.8 This report will examine the two key issues identified above being:
- the use of the APT bond in the estimation of the DRP to be applied; and
 - the estimation of a ten year BBB yield.

4.2 APT Bond

4.2.1 The AER's proposed approach

- 4.9 In the Victorian Final Decision, the AER considered that the newly issued APT bond had characteristics important enough to place reliance upon it to estimate the DRP. The bond was issued by APT on 15th July 2010. It is a BBB rated bond and it has a maturity date of 22nd July 2020. As a ten year BBB rated bond issued by a gas transmission and distribution network service provider, it was

²⁵ Australian Energy Regulator (2010b). Final Decision - Victorian Electricity Distribution Network Service Providers, Distribution Determination 2011-2015, October.

²⁶ Australian Energy Regulator (2010b).

considered by the AER to have the necessary characteristics to be considered in the estimation of the ten year BBB debt premium based on the provisions specified in the NER.

- 4.10 The observed yield on the APT bond is less than the yields for both the seven year BBB and an extrapolated ten year BBB yield. (The ten year BBB yield can be estimated by either adding the slope or gradient of the seven to ten year yield curve for corporate bonds of a different credit rating to the seven year BBB yield or by using the slope or gradient for the five to seven year BBB yield curve and assuming that this gradient continues from seven to ten years. These approaches will be explained in greater detail in following sections.)
- 4.11 One pillar of finance theory is the risk-return relationship. To be consistent with this established theory, the expectation is that the APT BBB bond should have a yield at least equal to the seven year BBB Bloomberg yield. As yield curves are normally upward sloping reflecting the term structure of interest rates, the expectation is that the APT yield would be greater than the seven year BBB yield.
- 4.12 A possible explanation for this anomalous observation is the lack of liquidity in the APT bond (this is discussed further below). The basic premise underlying the risk-return relationship is that the market is efficient in incorporating information into price or that the price discovery process operates efficiently. Thin trading affects the price discovery process as prices do not reflect all available information.
- 4.13 The AER turns to Merton²⁷ for justification of this observation. The AER states:²⁸

...for high credit quality bonds the spread curve is either upward sloping or hump-shaped, while for low credit quality bonds the spread curve is downward sloping.

- 4.14 The AER has interpreted this to mean:²⁹

As a result, it may be the case that yields on bonds with longer maturities will not necessarily be higher than those with shorter maturities, hence

²⁷ Merton, R. (1974). 'On the pricing of corporate debt: the risk structure of interest rates'. Journal of Finance 29, pp 449 – 470.

²⁸ Australian Energy Regulator (2010b). p.506.

²⁹ Australian Energy Regulator (2010b). p.507.

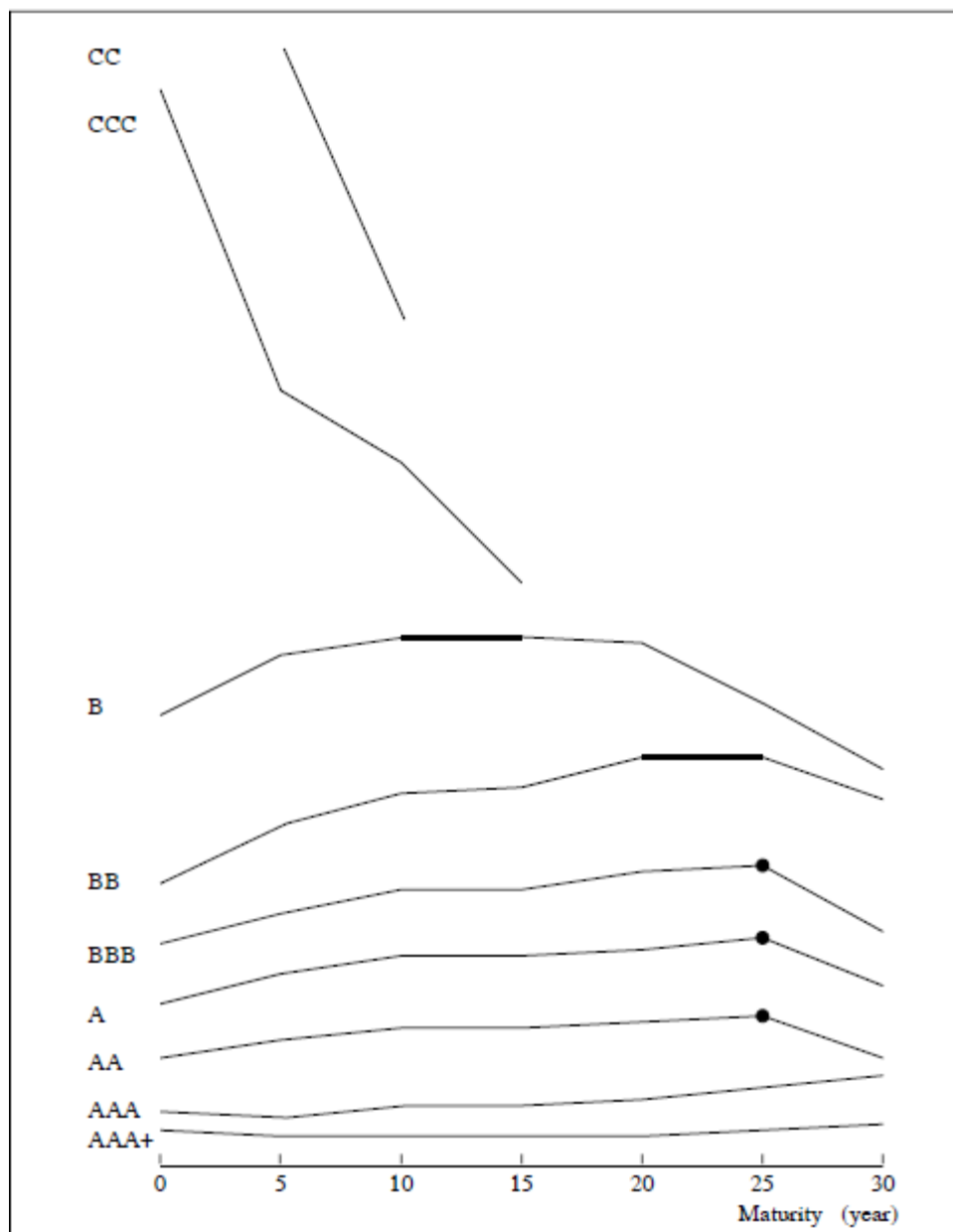
further underlining the importance of considering the actual behavior of longer dated bonds when setting the DRP.

- 4.15 The AER use the observations of both Merton and He³⁰ and conclude that the BBB yield curve may be hump-shaped or downward sloping and therefore the yield on the APT bond may be less than the seven year BBB yield. Additionally this also provides a justification to the AER for considering the APT bond in estimating the DRP.
- 4.16 As the AER used the He study as justification for the observed low APT yield and also as justification for the inclusion of its yield in the DRP, it is important to consider the full findings of the study. He examined 80,322 US bond observations over a period from 1993 to 1997. The bonds were rated from AAA to CCC and had maturities of up to 30 years.
- 4.17 Figure 1 displays the findings of He's analysis. It can be seen that the CCC yield (lower credit rating) was downward sloping. First, the significant downward slope in the CCC curve is contrary to what economic and finance theory would predict. That is, particularly for this credit rating category, we would question why an investor would accept a lower yield on an instrument with a high default risk for a longer maturity.
- 4.18 Second, this observation was not the case for BBB yields. The BBB yield was hump-shaped but importantly it was found to be positive to year twenty five³¹ and then negatively sloped after that time. If the findings of this study are to be used in drawing inferences about the APT bond, ten year BBB rated bonds should have a positive slope to year ten.

³⁰ He, J., Hu, W. and Lang, L. (2000). 'Credit Spread Curves and Credit Rating', Working Paper Series, August.

³¹ The median time to peak was 25.7 years with an average spread at peak of 1.7%

Figure 1 Credit Spread Curves



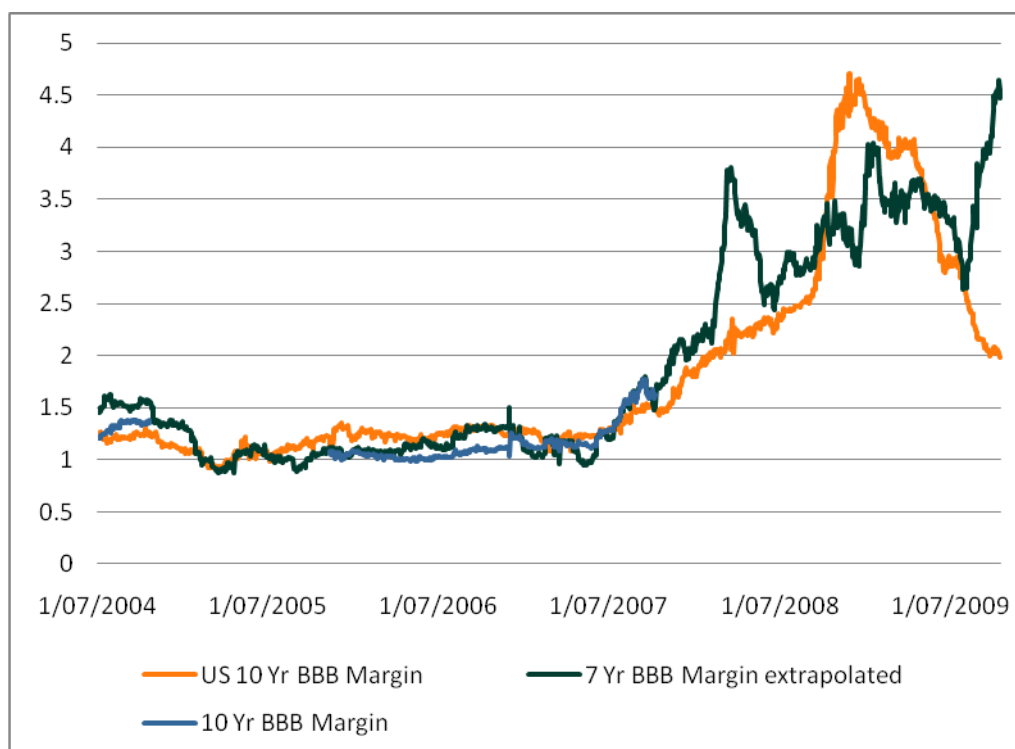
Data source: He, J., Hu, W. and Lang, L. (2000). 'Credit Spread Curves and Credit Rating', Working Paper Series, August.

4.19 While part of the AER's conclusions are true for the whole curve (30 year BBB yield curves are hump shaped), for the relevant section of the curve (up to ten years), the AER is incorrect in assuming that the yield could be expected to be hump shaped. The expectation is that a ten year bond should have a yield greater than a seven year bond and empirical evidence provided by the AER

supports this claim. The expectation from the study is that the APT bond should have a yield greater than the yield for the seven year Bloomberg BBB yield.

- 4.20 There are two other observations we would make about this study. The first is that the timeframe was 1993 to 1997. Apart from the fact that this pre-dates the global financial crisis, it is now well out of date. Significant caution should be exercised in drawing any conclusions from data that was sourced in the 1990s in determining a forward-looking estimate of the debt margin that reflects prevailing market conditions. This is particularly important in the capital markets, which are highly dynamic.
- 4.21 The second is that the data is US data. The US market is a liquid and deep market. Further, the drivers in this market are potentially quite different to the drivers domestically, at least since the global financial crisis. For example, the following figure shows the divergence in Australian and US corporate bond yields that occurred around the time of the commencement of the crisis. (The ten year Bloomberg estimate is based on the seven year BBB yield, extrapolated based on the difference between the five and seven year yields.)

Figure 2 10 year BBB Margins: US and Australia



Data source: Bloomberg and Synergies analysis

4.22 In our opinion, the studies by Merton and He, as quoted by the AER, do not provide justification for the anomalous observation of the yield on the ten year APT BBB rated bond being less than the seven year Bloomberg BBB yield. Additionally, as there is no empirical or theoretical support for the anomalous observation, there is no valid reason for using the APT bond in the setting of the DRP.

4.23 The question is why the yield on the APT bond would be so low compared to the Bloomberg seven year BBB yield. One possible answer to this question is lack of liquidity.

4.2.2 Reporting of the APT Bond

4.24 The APT bond was issued in Australia to thirteen institutional investors on 15th July 2010. The APA Group has advised that this debt has been purchased and held by these investors as part of a long-term 'buy and hold' strategy, presumably as the characteristics of the business meet their specific needs. To the extent that any trades have occurred, they would be on an over-the-counter

basis. APA has informed Synergies that to their knowledge, there has been no subsequent trading in the bond.

4.25 The following table provides price/yield details regarding the bond for the last week in October 2010.

Table 2 APT Bond

Date	Price	Yield
21/10/2010	97.796	8.08%
22/10/2010	97.777	8.08%
25/10/2010	97.508	8.12%
26/10/2010	97.433	8.13%
27/10/2010	97.348	8.14%
28/10/2010	97.633	8.10%
29/10/2010	97.864	8.07%

Source: Bloomberg

- 4.26 These details have been provided by Bloomberg so it is therefore important to understand how Bloomberg reports bond data.
- 4.27 Bloomberg generates Australian Bloomberg Fair Value (BFV) curves for both sovereign and some credit rated sectors of differing maturities. The BFV curves are used to generate Bloomberg Fair Values for bonds in the different sectors. For example, Bloomberg currently derives a BFV seven year BBB curve and this can be used to estimate BFV prices for BBB rated bonds of similar maturity. Similarly the BFV seven year BBB curve indicates the current cost of debt for BBB rated firms seeking funds from the debt market. The sample includes all BBB rated bonds (that is, it includes our assumed notional credit rating of BBB+).
- 4.28 Only selective bonds are included in the estimation of the BFV curve to ensure that the curve is reliable. For the bond to be included in the estimation, the bond must be 'well priced'³². To be well-priced, the bond must be liquid to ensure that the price is reliable.
- 4.29 Prices generally can be either indicative, executable or traded prices³³:
- Indicative prices comprise approximately 90% of all of the bond prices that are available on the Bloomberg bond database. Indicative prices

³² Lee, M. (2007). Fixed Income Specialist, Bloomberg LP, 'Bloomberg Fair Value Market Curves' International Bond Market Conference 2007, Taipei.

³³ Lee, M. (2007).

are provided by bond market participants called market makers. Market makers have no obligation to execute trades at indicative prices so it is therefore not unusual to see indicative prices being very different from actual market/traded prices.

- Executable prices are available only for bonds traded on some electronic trading system. Most bonds are traded over-the-counter (OTC) and in this market counterparties deal directly with each other as opposed to via an exchange in the exchange traded market. As a result of this there is a lack of quality executable prices being reported.
- Traded prices are which trades have been executed and will not include OTC trades.

4.30 In the estimation of the BFV curve, Bloomberg collects various prices, including indicative prices and executable prices for bonds that have a high level of liquidity. Bloomberg excludes those bonds that are considered to be outliers, that is, have prices that are significantly higher or lower than comparable bonds.

4.31 On the 27th October 2010, the longest dated BFV BBB curve was for seven years. In the estimation of this curve, Bloomberg used eleven bonds with varying maturities. Table 3 provides details regarding the bonds that comprised the sample on this date.

Table 3 Bonds included in the seven year BFV curve on 27 October 2010

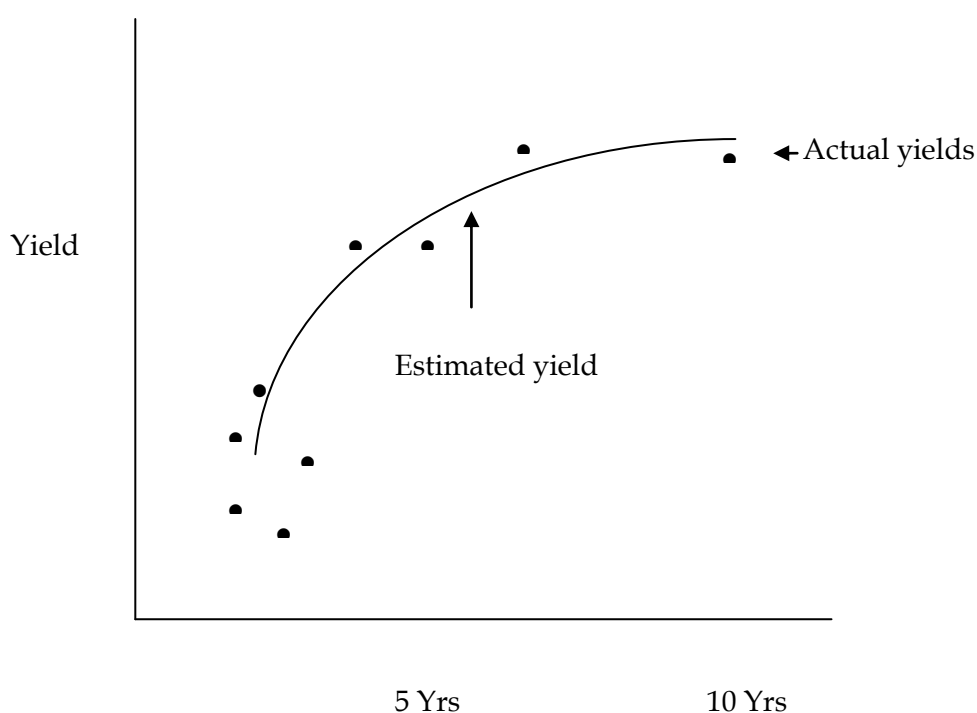
Ticker	Maturity
CWNAU	6/05/2011
TCLAU	15/09/2011
ORGAU	6/10/2011
TAHAU	13/10/2011
HOLNVX	7/08/2010
CHINLP	16/11/2012
GPTAU	22/08/2013
TCLAU	24/03/2014
WESAU	11/09/2014
MAPAU	7/06/2015
DUEAU	29/09/2015

Source: Bloomberg

4.32 Bloomberg considered that only eleven bonds were liquid enough and had prices that were reliable enough to be included in the calculation of the seven year yield estimate. To estimate the representative yield Bloomberg relies on

actual reliable observations for a given rating and for a given time to maturity. For example, if Bloomberg wants to estimate a seven year yield then it would use reliable prices of bonds that mature around this time. As depicted in Figure 3, Bloomberg then fits a line to the data points to estimate the yield. In doing so, Bloomberg's estimation technique minimises the sum of squared deviations between actual observations and estimates of fair yields.³⁴

Figure 3 Estimating yields



4.33 Bloomberg does not currently use the APT bond in its estimation of the yield curve (it has not been possible to confirm whether it has been included in the sample at any point since it was issued, noting that if it had been, the AER's approach would result in double counting). The most likely reason for this is that the price of the APT bond is an indicative price and due to the lack of liquidity in the bond, the price is not considered to be a reliable price.

³⁴ NERA (2005). Critique of Available Estimates of the Credit Spread on Corporate Bonds: A Report for the Energy Networks Association, May.

4.34 The APT bond has not traded, nor is the quoted price an executable price. The quoted price must be an indicative price where the market maker is not bound by the indicative price. The indicative price cannot be taken as a market price due to the lack of liquidity in trading. If markets are illiquid as is the case with the APT bond, it is not logical to expect that the indicative price is a reasonable approximation of a market price. The indicative price is not a reasonable expectation of market prices as the price discovery process is not operating.

4.2.3 Price discovery process

4.35 Price discovery is one of the most important functions of any Exchange (or organised marketplace, such as the bond market). The most reliable prices in any market are derived from those which emerge when the greatest concentration of trading takes place. There is a direct and strong relationship between number of trades and reliable prices. Importantly if there is little concentration of trading, as in a thin market, prices are not reliable as they do not accurately reflect supply and demand at the time. Even though prices are transparent and are known instantaneously, there is little confidence that the resultant price is one that would be negotiated in an open and unrestricted market between knowledgeable, willing and informed buyers and sellers acting at arm's length.

4.36 A necessary prerequisite for an efficient price discovery process is a market which is an efficient mechanism in pricing transactions. The ideal is a market in which prices provide accurate signals for resource allocation, that is, a market in which firms make production and investment decisions and investors choose among the securities that represent ownership of the firms' activities under the assumption that prices at any time "fully reflect" all available information. A market in which prices "fully reflect" all available information is called an "efficient market".³⁵

4.37 An efficient market adjusts extremely quickly to new information so that that information is impounded into price virtually instantaneously in an unbiased manner. The rationale behind market efficiency is the existence of traders in the market who could profit from any slow market adjustment. If the market took a considerable time to adjust to a piece of information, then an opportunity would exist to buy or sell before the market adjustment was completed. If traders decided to take advantage of those opportunities, then their efforts to

³⁵ See Fama, E. (1970). 'Efficient Capital Markets'. Journal of Finance. 25, pp. 383-417.

buy or sell would force prices up or down immediately. This would remove the slow market adjustment. The adjustment would occur as soon as the analysts perceived it to be slow. Thus, market efficiency is a result of competition among buyers and sellers.

- 4.38 If there were few buyers and sellers operating in the market then the market would not be efficient. The resultant price would not reflect all available information.³⁶ It would not be a price that would be negotiated in an open and unrestricted market between knowledgeable, willing and informed buyers and sellers acting at arm's length.
- 4.39 In summary, an efficient price discovery process is required so that prices are reliable and they do accurately reflect supply and demand at the time. Conditions at a point in time are reflected in price. In an efficient market, prices would reflect a change in market conditions. This is not the case in an inefficient market. In an inefficient market, prices do not reflect available information or current conditions. The inefficient prices cannot be validly analysed to examine factors affecting either supply or demand.
- 4.40 Price discovery involves the process of buyers and sellers arriving at a transaction price for a given quality and quantity of a product at a given time and place. It involves several interrelated concepts, among them:
- market structure (number of participants in the market, size of the market, location of the market, and the competitiveness of buyers and sellers in the market);
 - market behaviour (buyer procurement and pricing methods);
 - market information and price reporting (amount, timeliness, and reliability of information); and
 - markets for risk management instruments and alternatives.
- 4.41 The variation in reported prices (week-to-week or daily), both above and below the market price level results from many factors directly affecting price discovery. A major contributing factor is the frequency of trading in the market. In a situation where there is only a small amount of trading as in the case of a thin market³⁷, prices will not be reliable and one should exercise little

³⁶ In the sharemarket the price would be said to be over or under valuing the company.

³⁷ The market for the supply of gas from Santos Limited to Xstrata Queensland Limited would be considered to be a thin market.

confidence in the resultant price. A thinly traded market cannot be an efficient market, nor would prices reflect all available information. The transacted price would not be the same as one that would be negotiated in an open and unrestricted market between a knowledgeable and willing but not anxious buyer and a knowledgeable and willing but not anxious seller acting at arm's length.

- 4.42 There is a plethora of empirical evidence investigating and reporting the effects of thin trading in markets.³⁸ Empirical research has established that a high volume of liquidity facilitates price discovery. Similarly a low volume of liquidity or thin trading generates inefficient price discovery. The thinner the market the greater the chance of an inefficient price as the price discovery process breaks down so that the resultant price does not correctly reflect supply and demand conditions. The price that is observed in a thinly traded market is far more likely to diverge from the "true price" that would be expected to emerge from a deep market.
- 4.43 This relationship between price discovery and trading has been well researched.³⁹ For low volume or thinly traded stocks, the efficiency of the price discovery itself is low. The efficiency of price discovery is positively correlated with trading volume.
- 4.44 The noisiness of prices and the efficiency of price discovery has been estimated in studies, including one by Baias et al.⁴⁰ The ratio of the 'true' return and the observed return was modelled to examine pricing errors. It was found that the efficiency of the price discovery process for a thin market compared to a normal market was between 10% and 50%. This means that the observed price could be as little as 10% of a price that would be observed in an efficient market. For a thinly traded security, the price may change with a new trade but the observed price is likely to be inefficient as it is unlikely to be the 'true' price. More trades need to occur for the observed price to be equal to the 'true' price.
- 4.45 The consequence of this is that an analysis of observed prices to determine a material change in price could result a correct conclusion only by chance. Prices

³⁸ See Banz, R. (1981). 'The Relationship between Return and Market Value of Common Stock', *Journal of Financial Economics*, 19, pp. 41-44; Beedles, W., Dodd, P. and Officer, R. (1988). 'Regularities in Australian Share Returns', *Australian Journal of Management*, pp. 1-29; Reinganum, M. (1981a). 'Misspecification of Capital Asset Pricing: Empirical Anomalies Based on Earnings' Yields and Market Values', *Journal of Financial Economics*, 9, pp. 19-46.

³⁹ Barclay, M., Litzenberger, R. and Warner, J., (1990). 'Private Information, Trading Volume and Stock return Variances'. *Review of Financial Studies*, 3, 233-253.

⁴⁰ Biais, B., Hillion, P. and Spatt, C., (1999). 'Price Discovery and Learning During the Preopening Period in the Paris Bourse'. *Journal of Political Economy*, 107, pp.1218-1248.

in thin markets are distorted and do not reflect all information pertaining to price. The APT bond cannot be validly used as an indicator of the DRP for a ten year BBB yield. In order to provide relevant and current information regarding lenders' expectations of future returns (in this case, the expected cost of debt), there needs to be sufficient turnover. If there is a lack of turnover the information that is reflected in the latest observed yield is likely to be stale and not reflective of current market conditions.

- 4.46 The AER has itself recognised the concerns regarding liquidity (or lack thereof) in the indexed bond market when considering whether it will revert to estimating inflation based on the Commonwealth Government's indexed bonds (for example, in its 2010 decision for the Queensland electricity distribution network businesses it indicated that it was reviewing the 'functionality' of the market for these securities)⁴¹. Thin trading has also been examined in the context of beta estimates.⁴²
- 4.47 As part of the AER's testing methodology (which was used to assess CBA Spectrum and Bloomberg), there is much discussion of the inclusion/exclusion of individual bonds, such as the BBI and DBCT issues. However, at no point does the AER consider applying the same tests to the APT bond. Instead, it appears to be willing to 'take it at face value' and even goes as far to suggest that Bloomberg's seven year fair value yield may be overstated when it is compared to the APT bond.

4.2.4 Sample size

- 4.48 The AER's most recently applied methodology estimates the DRP by weighting the APT bond yield by 25% and the Bloomberg yield by 75%. Effectively the AER is placing a weight of 75% upon a portfolio of eleven bonds that are considered to be liquid and indicative of market yields and a 25% weight upon a bond that is illiquid and not considered to be a reliable price.
- 4.49 There is a basic statistical issue in placing reliance upon a sample size of one. Previously the AER has relied upon independent, credible and accessible data providers and has statistically tested their predicted values. Now the AER will average the Bloomberg yield with the yield on a single bond. There does not appear to be any credible reason for placing a 25% weighting on one untested

⁴¹ Australian Energy Regulator (2010c). Queensland Distribution Determination 2010-11 to 2014-15, May, p.254.

⁴² Australian Energy Regulator (2009). Electricity Transmission and Distribution Network Service Providers, Statement of the Revised WACC Parameters (Transmission), Statement of Regulatory Intent on the Revised WACC Parameters (Distribution).

bond yield and averaging this with a portfolio of eleven bonds that have been assessed by a respected data provider.

4.2.5 Benchmark versus actual cost of debt

- 4.50 NT Gas is in a relatively unique situation in that should the AER choose to reference the APT bond when estimating the cost of debt to apply to the AGP, it is referencing the cost of debt of its majority owner, the APA Group. It is therefore referencing its actual cost of debt. Consistent with the practice applied by most Australian regulators, the AER estimates the cost of debt based on the cost that would be incurred by the 'efficient benchmark' service provider. Reference is not made to the regulated firm's actual cost of funds.
- 4.51 As outlined in section 2.2, the NGR specifies that in setting the return on capital it will be assumed that the service provider "meets benchmark levels of efficiency" and "uses a financing structure that meets benchmark standards". The National Electricity Rules (while not governing gas) prescribe that the cost of debt must be that of the "efficient benchmark" service provider.⁴³
- 4.52 The AER has not articulated how it intends to interpret this for gas but it has done so for electricity. While there are some fundamental risk differences between gas and electricity network businesses, in relation to estimating the cost of debt there is no reason why a benchmark approach should not be consistently applied in both cases.
- 4.53 In its 2008 Issues Paper released at the commencement of the development of its WACC Statements, the AER noted that:⁴⁴

It is common regulatory practice for regulators to use a benchmark approach rather than 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)
- means that customers are less likely to bear the cost associated with inefficient decisions (e.g. financing structures), and

⁴³ Rule 6.5.3(1).

⁴⁴ Australian Energy Regulator (2008). Issues Paper. Review of the Weighted Average Cost of Capital (WACC) Parameters for Electricity Transmission and Distribution, August, p.14.

- improves the comparability of regulatory decisions.

4.54 In other words, even though it noted that a benchmark approach was prescribed under the NER, the AER also considers this to be common regulatory practice. It reiterated that position in the final decision regarding its WACC statements:⁴⁵

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 a regulated business.

4.55 The key rationale provided by the AER is that the benchmark approach is consistent with the principles of incentive regulation. If the regulator references the firm's actual cost of debt, it could reward inefficient financing practices. Similarly, if a firm has put in place a particularly effective financing structure, basing the estimate on that cost of debt removes any benefit that would otherwise accrue to the firm. This in turn provides it with no incentive to implement more efficient strategies to reduce its cost of debt below the benchmark. This is not in the long-term interests of consumers.

4.56 As outlined above, the APT bond was issued to thirteen institutional investors. KangaNews recently awarded the issue the Australian Domestic Corporate Market Deal of the Year.⁴⁶ The methodology that is used to determine the awards is cited as follows:⁴⁷

Issuers, investors and intermediaries are invited to vote for the best houses, deals and intermediaries in the year, on a confidential basis. In 2010 over 100 market participants submitted their votes for the winners of the KangaNews awards. Because of the widescale input from genuine market participants, KangaNews is confident that its annual awards are the best and fairest recognition of excellence that exists in the Australasian debt markets.

4.57 It was also recently awarded Finance Asia's Best Local Bond Deal.⁴⁸

⁴⁵ Australian Energy Regulator (2009). p.20.

⁴⁶ <http://www.kanganews.com/index.php/component/content/article/1555>, accessed 15 December 2010..

⁴⁷ <http://www.kanganews.com/index.php/component/content/article/1555>, accessed 15 December 2010.

⁴⁸ <http://www.financeasia.com/News/241763,achievement-awards-2010---australia-and-nz-day-1.aspx?refresh=on>, accessed 20 December 2010.

- 4.58 This suggests that the deal was considered to be particularly innovative and unique (and the APA Group has advised that this is considered to be the case). In our opinion, it could also mean that this deal could not be easily replicated by other Australian corporate (including the 'efficient benchmark firm') and indeed, even the APA Group, at least in the short to medium-term.
- 4.59 The other reason it could be difficult to replicate is the size and scope of the APA Group's balance sheet. The APA Group is funding an asset base of some \$5 billion in total. This is likely to well exceed the size of the 'efficient benchmark firm' and is some fifty times the size of the AGP's RAB.
- 4.60 In referencing the yield on the APA Group's own bond issue, the AER is removing any benefit that should accrue to the firm from pursuing more efficient financing arrangements. This in turn significantly dilutes any incentive for the business to implement more efficient strategies to achieve a lower cost of funds than the benchmark, which is one of the main principles underpinning incentive regulation and is in the long-term interests of consumers.
- 4.61 Further, to the extent that this deal was seen as particularly innovative and unique, and difficult to replicate (not only because of the APA Group's size), it is not considered appropriate to use this to set the benchmark cost of funds. This will not provide any regulated business with an incentive to reduce its cost of funds below the benchmark if the benchmark itself is seen as difficult to achieve. That is, the deal may be more of an outlier than a benchmark. As outlined above, Bloomberg may also view the bond to be an outlier given it hasn't included it in the sample used to construct its fair value curve.
- 4.62 Not relying on outliers to establish benchmark parameters has also been addressed in relation to other parameters, such as the establishment of the benchmark notional credit rating. For example, in its 2004 decision in relation to the East Australian Pipeline Limited (EAPL), the Tribunal ruled that the ACCC should have excluded AGL's A credit rating when seeking to establish the notional credit rating for EAPL (the other three pipelines in the sample were rated BBB):⁴⁹

If attention is directed to the chosen class, the only rational conclusion is that AGL was an 'outrider' out of line with the other members of the class and should properly be ignored. That conclusion is reinforced by

⁴⁹ Australian Competition Tribunal (2004). Application by East Australian Pipeline Limited [2004] ACompT 8, para.66.

the material which shows AGL to be of such a size and its business of such a nature as to be a poor proxy for a pipeline operator.

4.2.6 Conclusions: APT Bond

- 4.63 Our overarching concern is why the APT bond would not be in Bloomberg's BBB sample. It was not in the Bloomberg BBB sample as at the 21st of December. It is possible that it has been since it was issued in July 2010 (we have not been able to establish this). If it has not been included, the question is why.
- 4.64 Normally Bloomberg will not include bonds that are thinly traded. Should the bond become reliable and considered by Bloomberg to be indicative of longer term yields, Bloomberg will include the bond in the estimation of their BFV curve. If the bond is subsequently included, the AER's method will result in double counting. Double counting will result in an erroneous estimate.
- 4.65 The AER observed that the yield on the APT BBB rated ten year bond is less than the Bloomberg seven year BBB yield. It has sought theoretical support by relying upon studies by Merton and He. The empirical evidence in the He study contradicts the observed relationship between the APT bond and the Bloomberg BBB yield. Additionally the He study does not provide support for the inclusion of the APT bond yield to be included in the DRP calculation.
- 4.66 The lack of trading liquidity at least partly explains the APT yield and provides strong justification for not considering the bond in the estimation of the DRP. It appears that Bloomberg has arrived at the same conclusion as they have not included the bond in the estimation of the seven year BBB yield.
- 4.67 The AER should not be placing such a weighting on a single observation regardless of the reliability of the observation. The most logical approach is to ignore the bond given its questionable reliability due to the lack of observed market prices.
- 4.68 Finally, we do not consider it appropriate to use the APA Group's actual cost of funds to set the benchmark cost of debt for any of its own regulated pipelines. When compared to the yields on other BBB issues, the yield on the APT bond issue appears low. Apart from the issues raised above regarding liquidity and the impact that this has on the yield, the fact that this deal was recently awarded the Australian Domestic Corporate Market Deal of the Year suggests that the market views this deal as particularly innovative.
- 4.69 Using this bond to set the benchmark removes any benefit that accrues to the regulated firm from achieving a more efficient financing structure. This in turn

materially dilutes any future incentive to achieve a lower cost of funds than the benchmark, which is not in the best interests of consumers in the long-term.

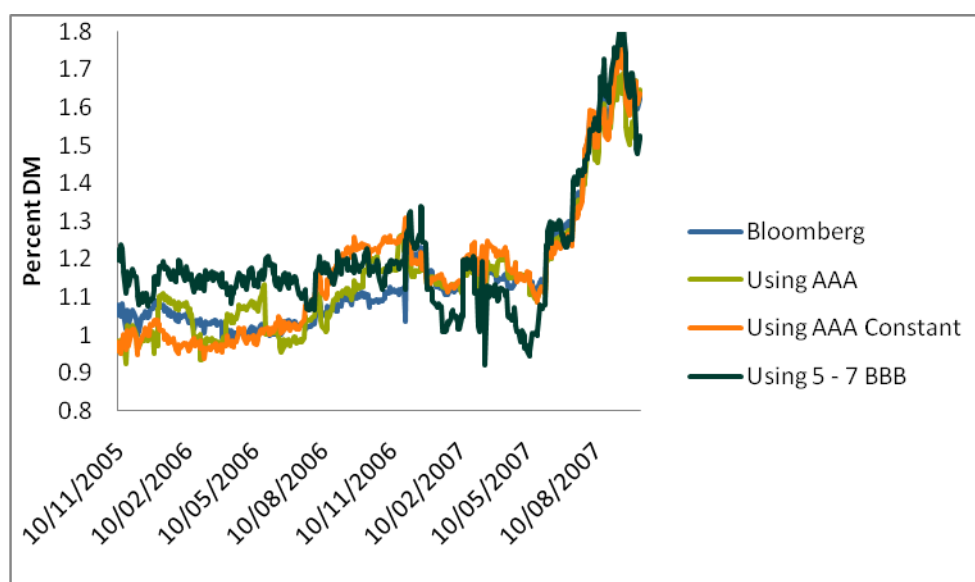
- 4.70 Further, to the extent that the deal was considered particularly innovative and difficult for an Australian corporate to replicate, we question whether it is appropriate to use it to inform the estimation of the benchmark cost of debt, not only for APA's regulated pipelines but for any regulated business. That is, this deal may be more of an outlier than indicative of the benchmark cost of funds.

4.3 Estimating the Bloomberg ten year BBB yield

- 4.71 Bloomberg ceased publishing ten year BBB yields in October 2007. The alternative approach that has been applied to estimate a ten year BBB yield has been to extrapolate seven year BBB yields by adding the margin between the seven and ten year AAA bond yields. This approach implies that the term structure from seven to ten years for BBB rated bonds is the same as for AAA rated bonds.
- 4.72 This solution was only a short-term one as AAA rated corporate bonds ceased to exist when the Commonwealth government withdrew its temporary guarantee of bank debt.
- 4.73 In the Victorian Final Decision, the AER proposed to continue to use the AAA yields. This approach now assumes that the term structure is not only the same between AAA and BBB but additionally that this term structure is now constant through time. This approach already resulted in a disconnect between credit ratings by implying that the slope of the AAA yield curve is the same as the slope of the BBB yield curve from seven to ten years, although it was considered an acceptable method by the AER in the circumstances. Additionally, this assumed relationship is now assumed to be constant over time to the extent that the AER continues to use the AAA estimates as at June 2010 (when publication ceased) for future estimates of the DRP.
- 4.74 An alternate approach that uses timely information is to estimate a Bloomberg ten year BBB yield using the term structure for the five to seven year period for the same yield curve. This assumes that the slope of the yield curve from five to seven years is the same as for seven years to ten years.
- 4.75 Figure 4 illustrates the Bloomberg ten year BBB yield for the period November 2005 to October 2007, which is a two year continuous reporting period and contains the latest estimates of a ten year BBB yield provided by Bloomberg. Three other yields are also displayed being:

- using AAA - a ten year BBB yield estimated using the seven year BBB yield and adding the seven to ten year (corporate) AAA term structure;
- using a constant AAA slope - a ten year BBB yield estimated using the seven year AAA yield and adding the seven to ten year AAA term structure for the start of the period; and
- using five to seven year BBB - a ten year BBB yield estimated using the seven year BBB yield and extrapolating this using the five to seven year BBB term structure.

Figure 4 Debt Margins 2005 - 2007



Data source: Bloomberg

- 4.76 This illustrates that the three estimation methods are all approximations of the ten year BBB yield when it was estimated and reported by Bloomberg.
- 4.77 The AER's approach to determining the preferred method is to examine the average squared difference between the estimate and the quoted ten year BBB yield⁵⁰. The following table illustrates the ranking of the results over the first three months and last three months of the period 2005 to 2007. Over the first three months, the best⁵¹ estimate of the ten year BBB yield is the seven to ten year AAA yield. Over the last three months, the method that best estimates the

⁵⁰ An approach similar to that used by the AER to determine preferred data providers

⁵¹ The best estimate is using the AER criteria of minimizing the sum of the squares.

ten year BBB yield is the extrapolation of the five to seven year BBB yield. It is obvious that the rankings change over time and they change for a variety of reasons.

Table 4 Ranking of Average Squared Differences

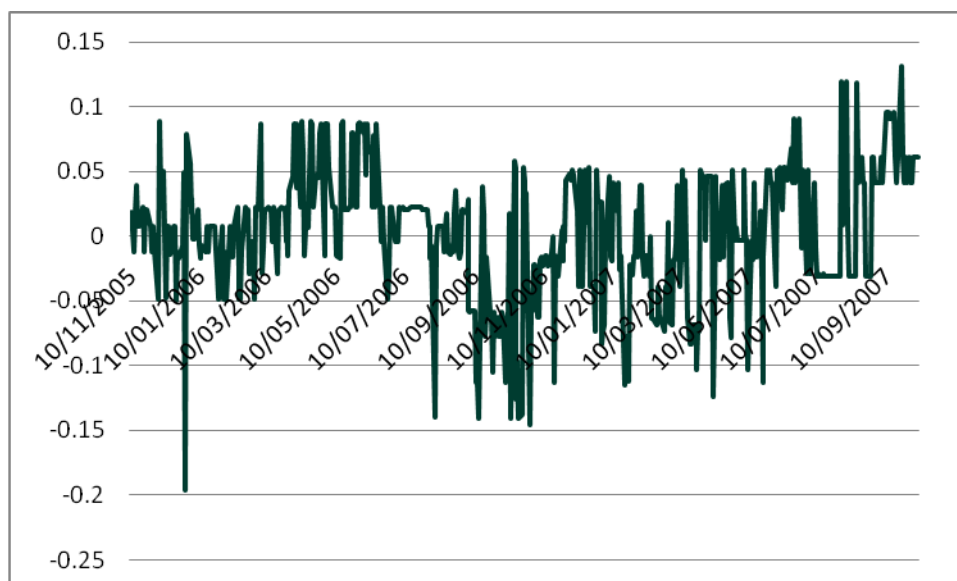
Date	Using 7-10 AAA	Using 7-10 AAA Constant	Using 5 - 7 BBB
First three months	1	2	3
Last three months	3	2	1

Source: Bloomberg and Synergies

4.3.2 Observations

- 4.78 The analysis that Synergies undertook was using data for a period prior to the global financial crisis. This is a limitation of the analysis but it is the best approach possible in the circumstance given the lack of data following the commencement of the crisis. Importantly, the analysis is theoretically sound and the results confirm expectations of outcomes that would be assumed regardless of whether the analysis were to be performed prior to or post (if it were to be possible) the commencement of the global financial crisis.
- 4.79 There are a number of observations that can be made about these results. The relationship between the slopes of the AAA and BBB yield curve do change over time. During the start of the test period, the AAA slope of the yield curve was a good approximation of the BBB yield curve. At the end of the period the five to seven year BBB slope was a better indicator than the seven to ten year AAA slope. This observation suggests that the AER should not use the constant AAA seven to ten slope as the spread does change over time. Figure 5 illustrates the change in the gradients of the BBB and AAA curves for seven to ten years between 2005 and 2007.

Figure 5 Difference in BBB and AAA yield gradient for seven to ten year years



Data source: Bloomberg

- 4.80 The behaviour of the observed data does not support the AER's approach of using a constant spread. Importantly, it is not logical to use a constant spread. Market conditions change and then the relationship between spreads change.
- 4.81 The AER referenced the findings of He⁵² in the Final Victorian decision. He found that during the period of analysis the slope of the five to ten BBB yield curve was .071⁵³ while the slope for the AAA curve was .014, providing no support for the proposition that the AAA yield is a reasonable approximation through time.
- 4.82 Importantly He also found that the earlier segment of the slope of the BBB yield curve was a better indicator of the later slope of the BBB yield curve up to the ten year period than using any other yield curve⁵⁴ as an indicator. This was also found in our test above for the latest three month period. In its report for the Victorian distribution businesses, CEG⁵⁵ also reached the same conclusion.
- 4.83 The AER has taken a statistical approach in using the sum of the squared differences. If the AER is looking at a statistical approach to provide a suitable solution, the AER should solve for the solution that provides the least

⁵² He, J, Hu, W., and Lang, L. (2000).

⁵³ He, J, Hu, W., and Lang, L. (2000). Table 10.

⁵⁴ He, J, Hu, W., and Lang, L. (2000), Table 10

⁵⁵ CEG (2010). Use of the APT Bond Yield in Establishing the NER Cost of Debt, A Report for Victorian Distribution Businesses, October.

difference. Obviously care must be exercised in selecting a suitable proxy or approach. The approach adopted must in the first instance be theoretically justifiable and then tested for suitability. The AER is suggesting the use of a gradient adjustment based upon dated data with a different credit risk to the benchmark that is being estimated. This is a questionable approach and loses sight of what is trying to be estimated.

4.3.3 Reliance upon Bloomberg

4.84 The AER has questioned the reasonableness of relying upon the one data provider being Bloomberg⁵⁶ :

...and the prudence of now relying on them as the sole or primary source of information for determining the DRP.

4.85 It questions the transparency of the Bloomberg estimates even though Bloomberg is a reputable and credible global provider of data to participants in financial markets.

4.86 The question of transparency has always been the case even when CBA Spectrum was providing estimates. In the past, the AER have been comfortable in relying upon the one data source depending on the outcomes of its testing methodology.

4.87 In placing reliance on the APT bond, the AER has gone as far as suggesting that:⁵⁷

...Bloomberg's 7 year BBB fair value estimate is likely to overstate the relevant benchmark corporate bond yield as evidenced by comparing Bloomberg's fair value curve with the APT bond.

4.88 Finance theory suggests that the yield for a ten year BBB+ rated bond should be higher than the Bloomberg seven year BBB yield. Empirical evidence provided by He also supports this claim. As we have explained earlier, Bloomberg undertake a rigorous approach to determine which bonds to include in the estimation of the BFV yield curve. It is doubtful that the AER's suggestion that the estimated yield based upon an unreliable price for a bond that is not traded is more credible.

⁵⁶ Australian Energy Regulator (2010b). p.493.

⁵⁷ Australian Energy Regulator (2010b). p.509.

- 4.89 Reference is also made to a detailed analysis undertaken by CEG as part of the submissions made to the AER by the Victorian distribution network businesses.⁵⁸ CEG concluded that the APT bond has an unusually low estimated debt risk premium for its credit rating and that sole reliance should be placed on the Bloomberg estimate.
- 4.90 In conclusion, while the method Bloomberg uses to construct its fair value curves is not known, it is not appropriate to assume that its fair value estimates are somehow biased or erroneous, particularly if this is being based on comparisons against yields on bonds that are illiquid.
- 4.91 Bloomberg is a respected global data service that has specialist skills and expertise in capital markets. It also has access to sophisticated tools and resources that it would use in analysing market data and trends. The market for the provision of these types of services is estimated to be worth \$16 billion of which Bloomberg's share is approximately one third, with an estimated revenue of \$6.6 billion.⁵⁹ Bloomberg is considered to be a leader in financial information across industries, and across the world. Importantly, the data is independent and Bloomberg has no specific agenda in constructing its fair value curves other than to interpret the current market data.
- 4.92 The dearth of suitable data is a problem facing all market participants. However, combining Bloomberg's fair value yield with the yield on the APT bond is not considered an appropriate solution. Indeed, we consider that given the significance of these issues and the potential complexities underpinning them, reliance should continue to be placed on an independent, reputable data provider that has specialist skills and expertise in this area. At the current time, this means placing sole reliance on Bloomberg's fair value estimates.

4.4 Conclusion

- 4.93 The AER's proposed approach gives rise to a number of concerns. The proposed approach is to provide undue weight to an illiquid APT bond that is not reflective of current market conditions.
- 4.94 Bloomberg calculates the yield based upon observed prices for a small number of BBB rated issues. The observed prices may be either actual traded prices or indicative prices. In the case of indicative prices, actual trades have not

⁵⁸ CEG (2010).

⁵⁹ S.Clifford & J. Creswell (2009). "At Bloomberg, Modest Strategy to Rule the World", New York Times, 14 November, <http://www.nytimes.com/2009/11/15/business/media/15bloom.html>, accessed 20 December 2010.

occurred. Bloomberg exercises discretion regarding the inclusion of the bond in the yield calculation for issues with indicative prices. If Bloomberg considers the bond to be liquid, indicative prices are considered by Bloomberg to be reasonable approximations of market prices.⁶⁰

- 4.95 The AER's approach may be subject to a number of statistical concerns being double counting, small sample size and non-representative sampling. These are some of the same failings in analysis as found by the Tribunal in the ActewAGL decision:⁶¹

In the Tribunal's view, it is not reasonable to decide which of three non-linear curves best fits a set of data that consists of only five points, especially when those points cover little more than half of the range of the independent variable, namely the term to maturity.

- 4.96 We are therefore of the opinion that reliance should only be placed on the Bloomberg fair value estimates. It is not considered appropriate to rely on a single, illiquid instrument for the sake of being able to cite an 'alternative' data source. This is consistent with the Tribunal's decision in respect of ActewAGL which found that:⁶²

If the AER cannot find a basis upon which to distinguish between the published curves, it is appropriate to average the yields provided by each curve, so long as the published curves are widely used and market respected.

- 4.97 While the AER has reduced the weighting to 25% the influence of that estimate at this weighting remains material. The inclusion of an illiquid estimate will not meet the requirement of being the "best estimate or forecast possible in the circumstances" that is "commensurate with prevailing conditions in the market for funds" as required under the NGR.
- 4.98 In addressing the issue of how to estimate a Bloomberg ten year BBB yield, there is a credible alternative and that is to extrapolate the Bloomberg seven year BBB yield using the term structure or gradient for five to seven years. Testing of this approach indicates that it can accurately predict the ten year BBB yield when it was reported by Bloomberg. Additionally support for this approach can be indirectly gained from the empirical work conducted by He.

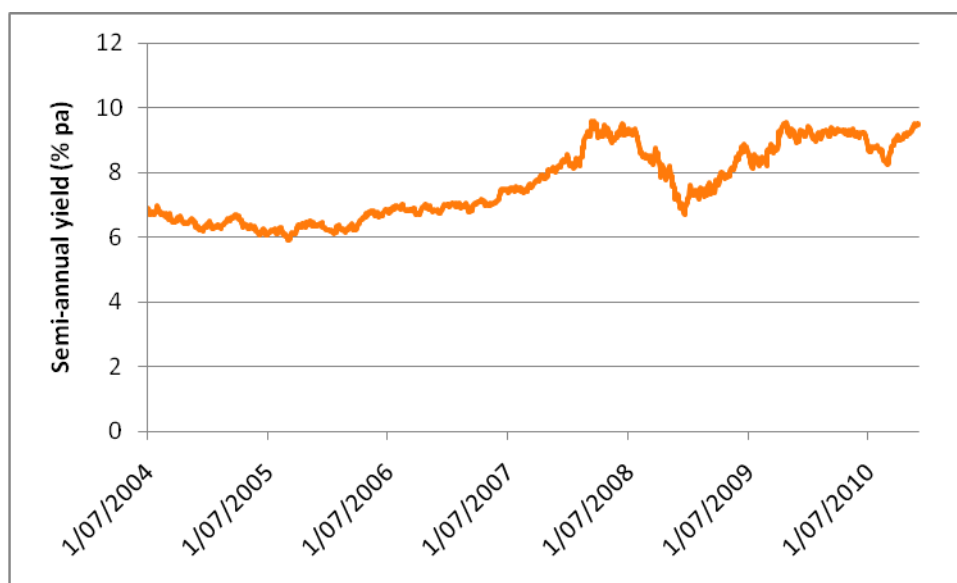
⁶⁰ Lee, M. (2007).

⁶¹ Australian Competition Tribunal (2010). Application by ActewAGL Distribution [2010] ACompT 4, para.39.

⁶² Australian Competition Tribunal (2010). para 78.

- 4.99 The debt margin has been estimated for NT Gas using Bloomberg data, extrapolating the seven year BBB yield based on the difference between the five and seven year yields (converted to annual effective rates). A twenty day averaging period to 30 November 2010 has been used. The resulting estimate is 546 basis points.
- 4.100 We note that at the end of November, the seven year BBB fair value yield was close to the highest it has been since the commencement of the global financial crisis, as shown in the following figure.

Figure 6 Bloomberg 7 year yield: 1 July 2004 to 30 November 2010



Data source: Bloomberg

- 4.101 This figure shows a significant dip in yields in early 2009 followed by a gradual increase back towards the levels that were observed around the time of the global financial crisis. Given the current uncertainty in the market, it is difficult to predict if yields will fall, or go even higher, in the future.
- 4.102 Estimating a 'benchmark' ten year BBB debt margin is clearly an extremely difficult task. In our opinion, reliance on data published by an independent and reputable data provider with expertise in financial markets remains the best solution. It is not an ideal solution, particularly as its fair value curves only reference bonds of shorter maturities. However, that reflects the fact that apart from the APT issue - which is potentially highly unique - there is no data for longer maturities. Further, while we do not know how it fits its yield curve to the limited data points available, we do know that it does go through an assessment process in determining whether to include a bond in its sample.

4.103 In conclusion, we have applied an estimate of the debt risk premium of 546 basis points in estimating NT Gas' indicative WACC.

5 Cost of debt and equity in the current market environment

5.1 Background

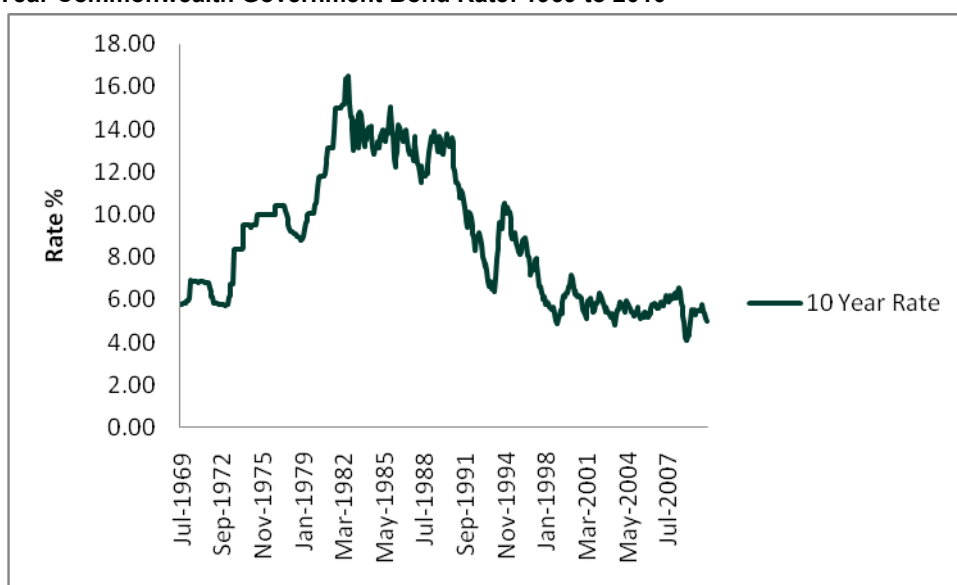
- 5.1 It is a well established finance theory that the cost of equity is more expensive than the cost of debt due to the risk characteristics of the two sources of funds. Equity holders would normally require and receive, on average, a higher rate of return than debt holders. Since the global financial crisis in 2008 and sub-prime collapse in 2007, the observed returns to equity holders have diminished and debt holders are demanding greater yields due to the increase in risk and illiquidity in the market. This compression in actual equity returns can be expected to result in a significant increase in the forward-looking return on equity.
- 5.2 The consequence of this current situation is that when the weighted average cost of capital is determined by a regulator based on the standard regulatory approach and assumptions, we have observed a contraction in the differential between the estimated cost of equity and the cost of debt. In some cases, the regulated cost of equity has even been less than the cost of debt (for example, the Queensland Competition Authority's 2010 decision for Gladstone Area Water Board).⁶³
- 5.3 This is not consistent with what we would expect. That is, there is no reasonable or plausible explanation as to why the returns expected by equity holders would have reduced relative to debt holders.
- 5.4 In essence, this anomaly emerges because for regulatory purposes current practice is to estimate the cost of equity using historical data (reflecting long-term averages) and the cost of debt using current market data.
- 5.5 Consider the calculation of the cost of equity. The key variables are the equity beta, the market risk premium and the risk free rate. The equity beta is normally estimated from a sample of comparator firms and it is then used as a forward looking estimate. The underlying assumption is that the equity beta is

⁶³ Refer: Queensland Competition Authority (2010). Final Report, Gladstone Area Water Board: Investigation of Pricing Practices. In this decision the cost of debt was determined to be 9.86% and the cost of equity 9.06%.

stationary and that the sensitivity between the business operations and the market that has been observed in the past will continue to apply in the future.

5.6 The risk free rate proxy is normally the yield on the ten year Commonwealth Government bond. Figure 7 displays the ten year Commonwealth Government bond yield from 1969 to 2010. The yield has varied from a high of 16.5% in August 1982 to 4.09% in January 2009, with a current yield in August 2010 of 4.98%. The calculation of the cost of equity uses the current yield⁶⁴ as the ‘best’ estimate of the forward-looking risk free rate.

Figure 7 10 Year Commonwealth Government Bond Rate: 1969 to 2010

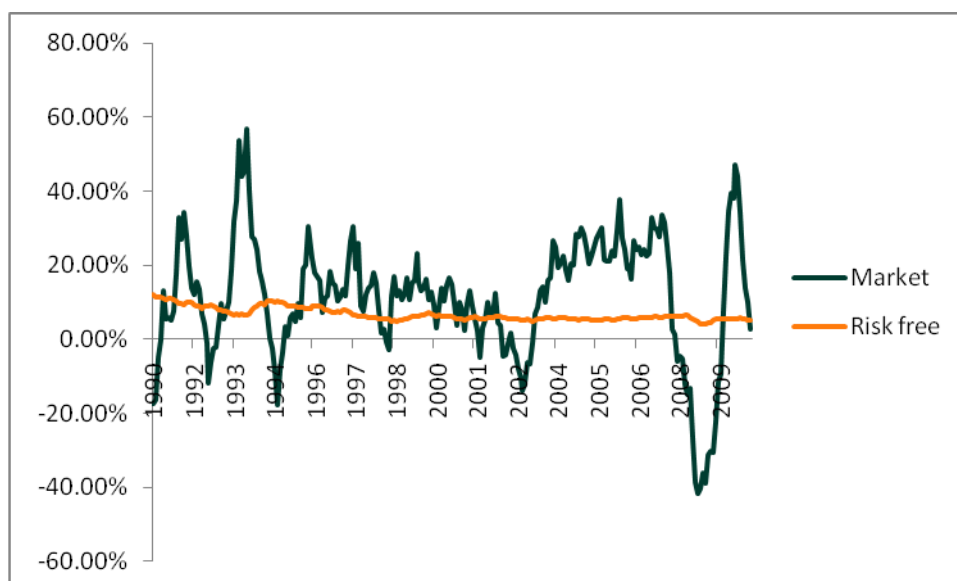


Source: Reserve Bank of Australia

5.7 The market risk premium (MRP) is the expected return on the market less the risk free rate. This variable is normally estimated as a long term historical average. A long term average is used as because in the short term, the MRP is extremely volatile. Figure 8 displays a yearly market return and risk free rate. The difference between the two is the MRP. The annual MRP to October 1993 was (approximately) positive 57% while the annual MRP in November 2008 was negative 47%.

⁶⁴ Normally averaged over a 20 to 40 day period.

Figure 8 Market risk premium: 1990 to 2010



Data source: RBA and Bloomberg

- 5.8 The cost of equity is estimated using a rate on the day (risk free rate), a medium term historic average equity beta (beta is estimated over five years) and a long term market risk premium (typically estimated over at least a forty year period). Following the extreme market conditions that have been experienced since the commencement of the global financial crisis, there is a risk that estimates derived in the traditional manner will materially understate the actual returns required by equity holders in the current market. This in turn will affect the ability of a regulated business to raise new equity capital.
- 5.9 We recognise that this issue is not easy to resolve. However, we consider that it is necessary to determine the historical relationship between debt and equity and to use this relationship as a 'reasonableness check' on any forward looking estimate. This reasonableness check is necessary to ensure a WACC is not determined that is based upon an implausible relationship between debt and equity.

5.2 Debt/equity relationship

- 5.10 The capital structure of an organisation is the mixture of debt and equity used to finance its investments. There are a number of capital structure theories that attempt to explain the relationship between debt and equity. The most

prominent positive theory from the finance/economics paradigm is that by Modigliani and Miller⁶⁵.

5.11 The Modigliani and Miller approach explains the choice regarding the amount of debt funding relative to equity funding as being a trade-off between the tax deductibility of debt and the bankruptcy costs associated with debt. In their seminal paper on cost of capital, corporate valuation and capital structure they assumed either implicitly or explicitly that:

- capital markets were frictionless
- individuals could borrow and lend at the risk free rate
- there were no bankruptcy costs
- the firm only issues two types of capital being risk free debt or risky equity
- all firms are in the same risk class
- only corporate taxes were considered
- all cash flows were in perpetuity with no growth
- managers were wealth maximisers acting in shareholders' interests
- both insiders and outsiders had the same information set.

5.12 Using these simplifying assumptions, Modigliani and Miller were able to develop the optimal capital structure theory and establish a number of important propositions. The simplifying assumptions do not detract from the model but rather add to the models ability to predict or explain 'real world' phenomena⁶⁶.

5.13 Importantly, Modigliani and Miller establish the relationship between the cost of debt and the cost of equity⁶⁷:

That is, the expected yield of a share of stock is equal to the appropriate capitalization rate for a pure equity stream of the class, plus a premium

⁶⁵ F. Modigliani and M. Miller (1958). The Cost of Capital, Corporation Finance, and the Theory of Investment, American Economic Review, June pp. 261-297; F. Modigliani and M. Miller (1963). Corporate Income Taxes and the Cost of Capital: A Correction', American Economic Review, June, pp. 433-442.

⁶⁶ Refer: M.Friedman (1966). The Methodology of Positive Economics, Essays In Positive Economics, University of Chicago Press, pp. 3-16.

⁶⁷ Modigliani F. and M. Miller, June 1958, p. 271

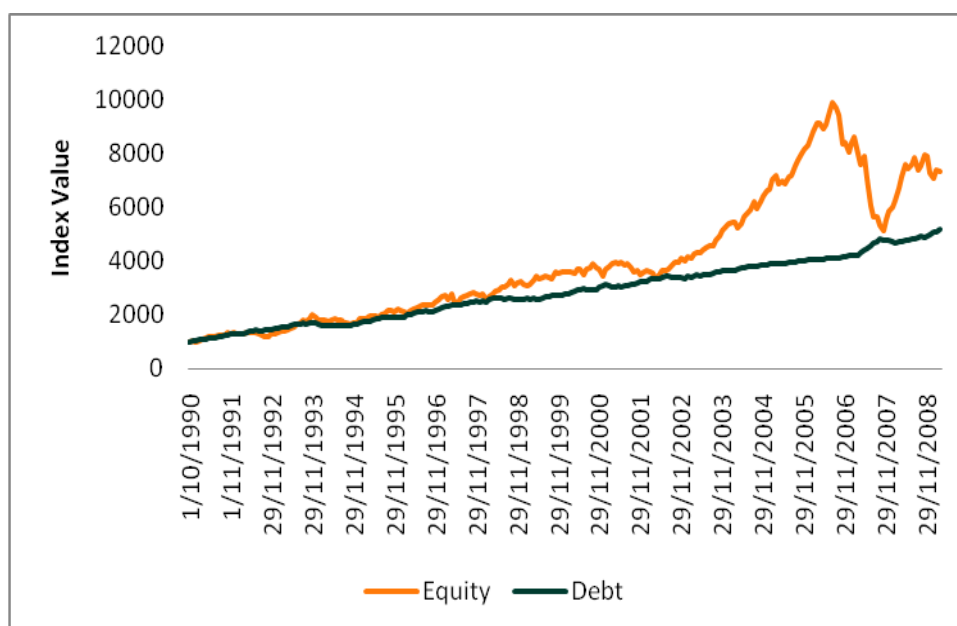
related to financial risk equal to the debt-to-equity ratio times the spread between the capitalization rate for a pure equity stream and the cost of debt.

- 5.14 To summarise, the capitalisation rate for a pure equity stream is the cost of equity for an all equity funded business. Debt is cheaper than equity due to the risk borne by debt holders compared to the risk borne by equity holders. As the firm becomes more reliant on debt or more heavily geared, the cost of equity increases. The cost of equity increases due to the financial risk introduced by debt funding. The financial risk is that debt holders have a priority over equity holders to the cash flows of the business. The equity holders' priority/claim over the firm's cash flows is diluted by the introduction of debt funding.
- 5.15 The Modigliani and Miller proposition can be easily tested by examining the historical relationship between the cost or return to equity and the cost or return to debt.

5.3 Historical relationship

- 5.16 To establish the relationship between the returns to equity and the returns to debt, an equity index can be compared to a debt index. In the case of equity, the index should measure both capital gains and dividends. In the case of debt, the index should measure the cost of debt both in terms of yields on debt and also the change in the market value of a debt portfolio.
- 5.17 The equity index chosen is the All Ordinaries Accumulation Index. This index measures the total return to equity investors. It captures both market movements (that is, capital gains) and dividends. The index includes 500 companies and it accounts for approximately 99% of total Australian listed equity market weighted by market capitalisation.
- 5.18 The debt index is the UBS Australian Composite Bond Index. Most bond and fixed interest funds benchmark their performance against this index. The composition of that index is approximately 20 per cent government bonds, 30 per cent semi government bonds, 20 per cent sovereign fund bonds and 30 per cent corporate debt securities.
- 5.19 Figure 9 displays the relationship between the All Ordinaries Accumulation Index and the UBS Australian Composite Index from 1990 to August 2010, a 20 year period. To facilitate comparison, the indices have been reset to 1,000.

Figure 9 Equity v debt indices: January 1990 to August 2010



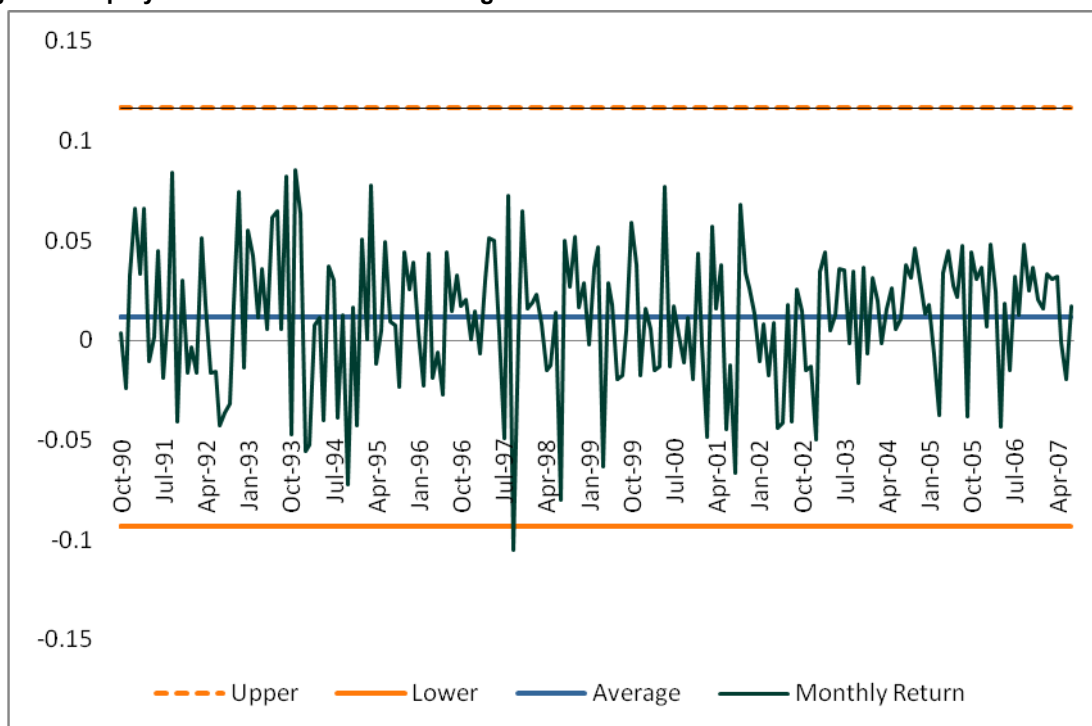
Data source: Bloomberg and UBS

- 5.20 The correlation between the two indices is 0.91, indicating a strong positive relationship between the two. This established strong positive relationship can be relied upon as a reasonableness check. This issue will be returned to later.
- 5.21 Figure 9 also displays the volatility in equity returns, particularly since the sub prime collapse in September 2007. The volatility in equity will be discussed next.

5.4 Equity behaviour

- 5.22 Figure 10 is a control chart mapping historical returns on equity from 1990 until August 2007, which was just prior to the sub-prime collapse. A control chart is a tool that can be used to monitor process variation. The aims of a control chart are to visualise the degree of natural variation in the process and to detect the presence of special causes or when the process is 'out of control'.
- 5.23 The upper and lower control limits represent the process when it is stable. The control chart is based on the properties of the normal distribution. The control limits are set at plus or minus three standard deviations from the average, which represents 99.73% of the normally distributed variation in a process.

Figure 10 Equity returns: October 1990 to August 2007



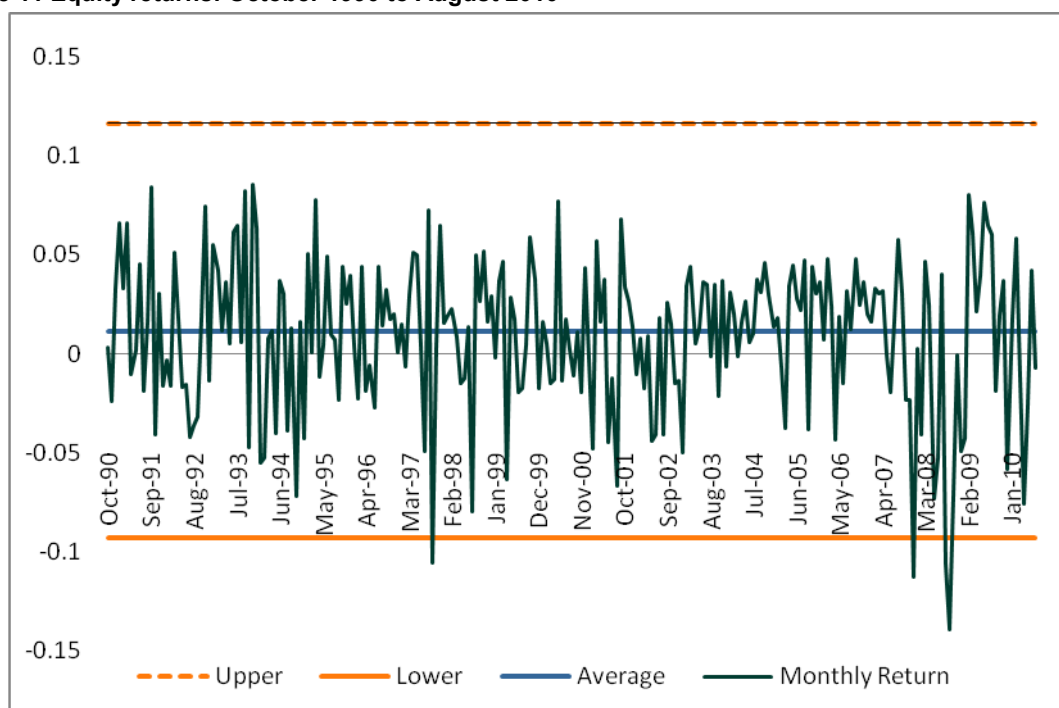
Data source: Bloomberg

5.24 This shows that there is natural variability in the return to equity holders. The variability is normally within the control limits indicating that the process or changes in return are normal. The figure displays a dip outside the lower control limit in October 1997 being the Asian Crisis⁶⁸. Over the entire period the average return to equity holders was 14.8% per annum.

5.25 Figure 11 extends the analysis to August 2010.

⁶⁸ The 27th October 1997 crash saw the Hong Kong's Hang Seng Index fall 6% and Japan's Nikkei fell 2% on the day.

Figure 11 Equity returns: October 1990 to August 2010

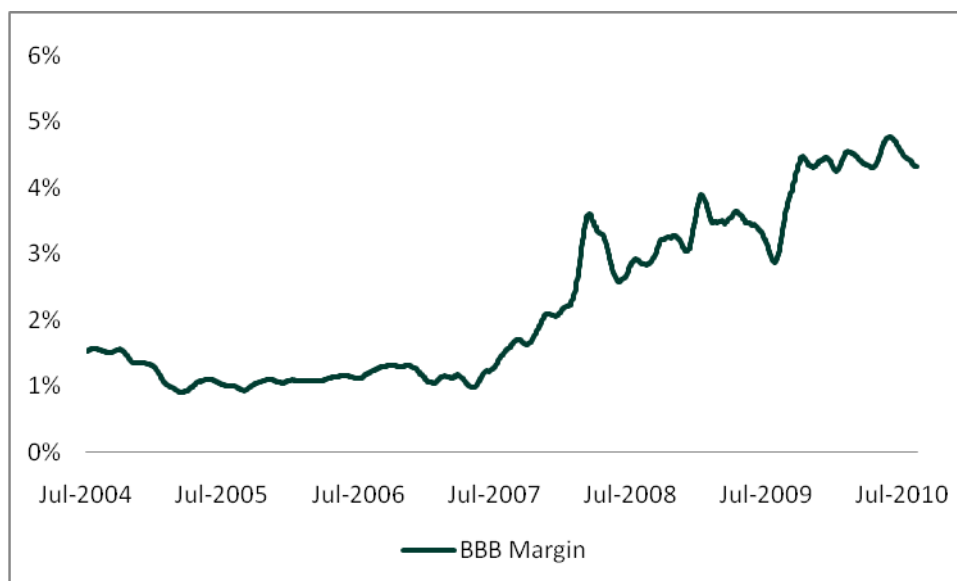


Data source: Bloomberg

5.26 The impact of the sub-prime collapse and the global financial crisis is clearly seen above. From August 2007, the normal volatility in equity returns moved below the lower bound of the control range. Caution must therefore be exercised when estimating equity returns from this sub period. Based on this analysis, this sub period is clearly not indicative of what normally happens with regard to equity returns. Alternatively, there may have been a change in the way investors assess and/or price risk (that is, a structural change) however this would be difficult to reliably determine without several years of data.

5.5 Debt behaviour

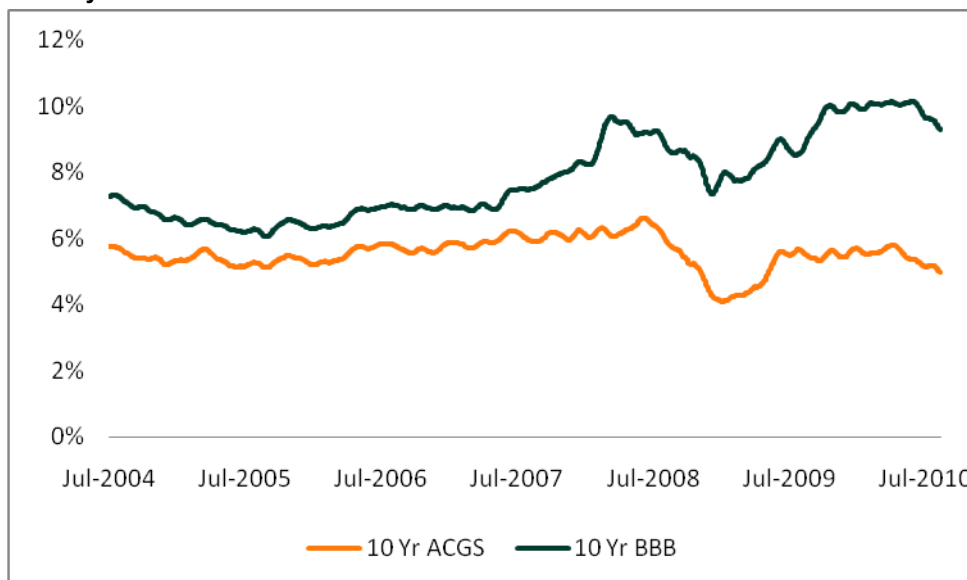
5.27 The cost of debt is normally calculated as the risk free rate plus the appropriate debt margin. The debt margin applicable to a regulated energy business is the margin between the yield on a ten year BBB+ corporate bond and the yield on a ten year Commonwealth Government bond (noting that as outlined previously, Bloomberg only publishes a single BBB yield curve, hence the reference to 'BBB' and not 'BBB+' in the following figures). Figure 12 displays the ten year BBB debt margin for the period of three years prior to the sub prime collapse and three years following the sub prime collapse (estimated using Bloomberg data).

Figure 12 BBB debt margins

Source: Bloomberg

- 5.28 Prior to the sub prime collapse in 2007, the debt margin varied around 1% to 2%. With the sub prime collapse and the global financial crisis, the debt margin has increased to nearly 5%.
- 5.29 Figure 13 displays the yield on ten year BBB corporate bonds and the ten year Commonwealth Government bond yield. The yield on Commonwealth Government bonds has fallen in response to the sub prime collapse while the yield on BBB rated bonds has increased due to illiquidity in the market, resulting in an increase in the debt margin. One of the key reasons for this is because in times of crisis, there will be a 'flight to quality' as risk-averse investors seek a 'safe haven' for their funds in lower risk assets. This in turn will increase the price of (and drive down the yields on) these low-risk assets.

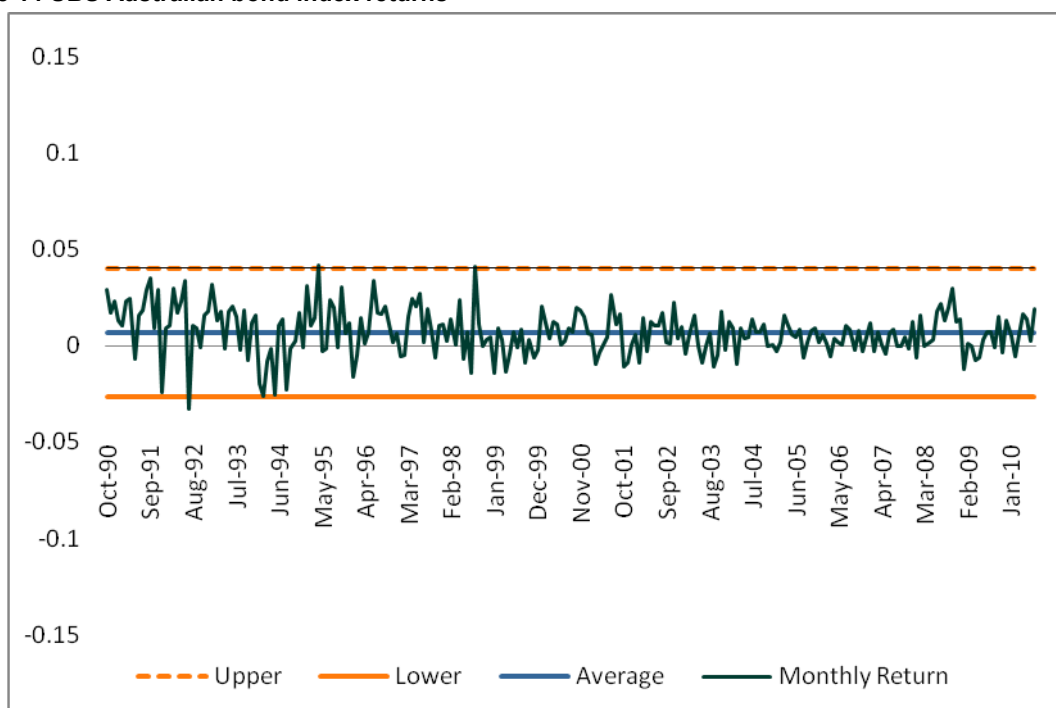
Figure 13 BBB yields and the risk free rate of return



Source: Bloomberg and RBA

- 5.30 The cost of or return on debt can be estimated from the UBS Australian Composite Index. Figure 14 is a control chart indicating changes in the bond index. The figure displays index returns over a 20 year period from October 1990 to August 2010. The control chart displays the variability in debt returns and importantly it indicates that the process is in control even with the sub prime collapse and the global financial crisis.
- 5.31 The average debt return to August 2007 was 8.86% and to August 2010, the average return was 8.73%. This indicates that the variability in the cost of, or return to, debt has a normal amount of variability around a mean and that the mean return is relatively constant.

Figure 14 UBS Australian bond index returns



Source: Bloomberg and RBA

5.32 In summary, the UBS Australian Composite Bond Index has remained within the bounds of the control range while the All Ordinaries Accumulation Index has fallen below the lower bounds of this range due to the effects of the global financial crisis.

5.6 Implications

5.33 Calculating the WACC using parameters and estimates derived from financial markets in a state of crisis could result in an estimate that is inconsistent with accepted finance theory and is implausible.

5.34 The cause of the problem is known. The Capital Asset Pricing Model (CAPM) is used to estimate the cost of equity. While the model works perfectly in theory, it has a number of application issues. For example, the risk free rate parameter is estimated as a rate of the day, the equity beta is estimated over the medium term and the market risk premium is a long term estimate.

5.35 The cost of debt is the observed ten year yield on BBB+ rated corporate bonds. Due to illiquidity in the market, the yield on the bonds have risen substantially since the sub prime collapse while the yield on the Commonwealth

Government ten year bond has fallen. The overall effect is that the cost of equity has fallen and the cost of debt has risen.

- 5.36 The estimated parameters are then used as forward looking estimates. This is appropriate if the past is a reasonable approximation of the future. Clearly the equity control chart has shown that at present this is not the case. Past calculations using today's observations will not necessarily be reasonable estimates of the future.
- 5.37 The implausible relationship between debt and equity can be remedied by relying upon established finance theory and processes that are 'in control'. During the period 1990 to 2007 the average equity return derived from the All Ordinaries Accumulation Index was 14.8%. The average return on a portfolio of debt securities including corporate and government debt of differing duration was 8.73%. The average difference between an equity portfolio with an equity beta of one and a mixture of corporate and government debt is 6.07%.
- 5.38 The average return on equity during a period that includes the effects of the current global financial crisis is 11.58%. The difference between the return on debt of 8.73% and equity of 11.58% is 2.85%.
- 5.39 The WACC reasonableness check is the difference between the cost of debt and the cost of equity. The difference should be at worst 2.85% and on average 6.07%.
- 5.40 It is logical to argue that the adjustment should be 6% rather than 3% because 6% is the average difference that prevailed between 1990 and 2007 (that is, prior to the sub-prime collapse). A conservative approach would to take the mid-point between 3% and 6%, which is 4.5%.

5.7 Conclusion

- 5.41 The cost of equity is more expensive than the cost of debt due to the risk characteristics of the two sources of funds. Equity holders would normally require and receive, on average, a higher rate of return than debt holders. Since the global financial crisis in 2008 and sub-prime collapse in 2007, the actual returns to equity holders have diminished and debt holders are demanding greater yields due to the risk and illiquidity in the market.
- 5.42 The consequence of this current situation is that when the weighted average cost of capital is calculated by a regulator based on the standard regulatory approaches and assumptions, the difference between the estimated cost of

equity and the cost of debt has contracted. This result is due to the actual cost of equity being highly volatile. Additionally the return on equity is estimated from the historical data. The cost of debt is estimated using current market data and as a consequence of the global financial crisis, the outcomes we observe in the current market are not consistent with the long term relationship between debt and equity.

- 5.43 This implausible result can be overcome by using established relationships between the cost of debt and the cost of equity, at least as the basis of a 'reasonableness check'. This reasonableness check compares the difference between the estimated cost of debt and equity derived during these turbulent and uncertain times and the average difference that has prevailed over the longer term.
- 5.44 As a reasonableness check, based on the observed historical differences the cost of equity should be at least 4.5% above the observed cost of debt. This is considered conservative because the average difference between 1990 and 2007 was around 6%. This reasonableness check is applied in section 8.

6 Market risk premium

6.1 Background

- 6.1 Since the development of its WACC Statements that apply to electricity transmission and distribution network businesses, the AER has applied a market risk premium (MRP) of 6.5% in both gas and electricity network decisions.⁶⁹ The decision to apply a MRP of 6.5% was in recognition of the market conditions prevailing following the commencement of the global financial crisis (GFC).
- 6.2 More recently, it has flagged that a recovery from the GFC is likely to see it revert back to what it sees as the “long-term equilibrium” of 6%.⁷⁰ In its most recent decision made in relation to the Victorian distribution network businesses (the Victorian Final Decision), it stated:⁷¹

While there is evidence that Australia’s economic conditions have improved since the GFC, the AER remains cautious to the extent of this recovery citing the views from prominent economic bodies’ warning of the fragility of the recovery in the global economy. Furthermore, conditions in global capital markets remain uncertain as the aftermath of the GFC continues to be felt and resolved.

Consequently, the AER considers it appropriate to maintain the value of 6.5 per cent until there is persuasive evidence that market conditions have stabilised.

6.2 Current market conditions

- 6.3 While some signs of a global economic recovery had clearly emerged, renewed uncertainty has entered the market, emanating from concerns regarding the financial stability of some of the members of the European Union. More recently, a ‘second wave’ to the crisis has been mooted. The Assistant Governor

⁶⁹ Australian Energy Regulator (2009). Electricity Transmission and Distribution Network Service Providers, Statement of the Revised WACC Parameters (Transmission), Statement of Regulatory Intent on the Revised WACC Parameters (Distribution).

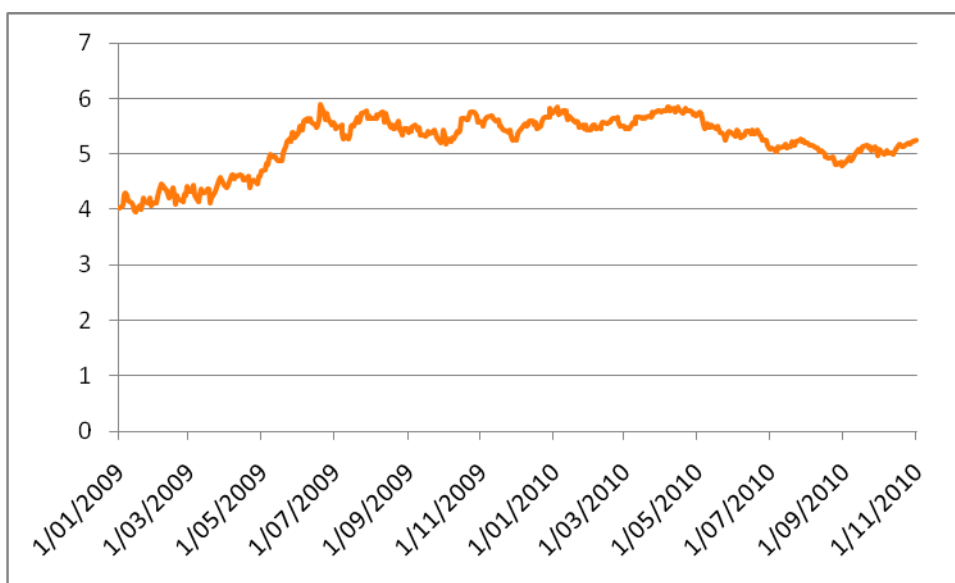
⁷⁰ Australian Energy Regulator (2010b). Final Decision, South Australia Distribution Determination 2010-11 to 2014-15, May.

⁷¹ Australian Energy Regulator (2010c). Final Decision: Victorian Electricity Network Service Providers, Distribution Determination 2011-2015, October.

of the Reserve Bank recently acknowledged the risk that the world could fall into a double dip recession but the likelihood is hard to quantify.⁷²

- 6.4 Concerns regarding the creditworthiness of a number of European Governments was cited by the Reserve Bank of Australia in its most recent Monetary Policy Decision (as at the date of preparation of this report), where it determined it would leave the cash rate unchanged.⁷³ It is also noted that the risk-free rate has reverted back towards the levels observed in the first half of 2009, as shown in Figure 15.

Figure 15 Risk-free rate: 1 January 2009 to 1 November 2010



Data source: Bloomberg

- 6.5 The following Box contains observations from a number of prominent organisations and commentators that have expressed concerns regarding the outlook for the world economy. We recognise that this is not fully representative of the sentiment across the entire market and that positive sentiments have also been expressed. We are not in a position to conclude whether the 'negative' or 'positive' scenario is more likely. However, this does support our contention that the outlook for the market remains uncertain.

⁷² "Risk of Double Dip Recession: DeBelle", The Sydney Morning Herald, <http://www.smh.com.au/business/risk-of-doubledip-recession-debelle-20100831-148ou.html>

⁷³ Reserve Bank of Australia (2010). Statement by Glenn Stevens, Governor: Monetary Policy Decision, 7 December, www.rba.gov.au.

Box 1 Observations on future of the world economy

Reserve Bank of Australia (2010), Financial Stability Review, March.

“Market sentiment in the major advanced economies remains fragile, and vulnerable to the possibility that further bad news could trigger a renewed heightening of risk aversion. The situation in the Asian region is very different; with the main risks at present being those associated not with risk aversion, but with rapid credit growth and rising asset prices.” (p.2)

“Confidence, however, remains fragile. A particular concern, focused on Europe, is the effect of the build-up in government debt on sovereign credit risk and the potential for contagion to other funding markets. More generally, investors are wary about the resilience of economic and financial conditions to the withdrawal of the extraordinary stimulus policies that supported the recovery. An ongoing concern is the interplay between the financial sector and the real economy, as in many countries credit supply remains tight and loan losses continue to weigh on bank profits.” (p.3)

World Bank (2010), Global Economic Prospects, Summer.

“...the very high government deficits and debt levels in several high-income countries (notably, Greece, Ireland, Italy, Portugal and Spain) has provoked a great deal of volatility in international financial (and even commodity) markets. So far, the main impacts for developing countries have been limited to a generalized decline in stock-market valuations, a significant fall in bond issuance in May (some due to seasonality), and an increase in volatility and a realignment of global currencies as the euro has depreciated against the dollar—to the benefit of exporters in countries tied to the euro, but to the detriment of those tied to the dollar.” (Topical Appendix p.1)

The Economist Intelligence Unit (2010). The Global Recovery Starts to Weaken. September.

That said, many of the region’s (EU) banks remain fragile and, to a greater extent than their US peers, vulnerable to funding constraints as a result of their dependence on the wholesale markets. It is estimated that euro zone and UK banks will have to refinance around €3.3trn of debt by 2015. The difficulties of refinancing on this scale in current market conditions and the higher costs likely to be faced by many banks augur ill for a robust recovery in credit in the EU over the short and medium term. (<http://qfs.eiu.com/Article.aspx?articleType=gef&articleId=1147358499&secID=1>)

The Economist Intelligence Unit (2010). Global Outlook Summary, August.

In the euro zone, concerns over government solvency continue to overshadow all else...We think Greece, for example, will eventually default, probably in 2012.(p.2)

OECD (2010). OECD Economic Outlook, Volume 2010/1, Number 87, May.

However, risks to the global recovery could be higher now, given the speed and magnitude of capital inflows in emerging-market economies and instability in sovereign debt markets...Overheating in emerging-market economies also poses a serious risk. A boom-bust scenario cannot be ruled out, requiring a much stronger tightening of monetary policy in some non-OECD countries, including China and India, to counter inflationary pressures reduce the risk of asset-price bubbles. (pp.9-10)

- 6.6 While we agree that the outlook for the Australian market is of primary relevance, it will continue to be strongly influenced by conditions in global markets and cannot be considered in isolation from them. It is clear that the Australian economy was not affected as severely as other economies as a consequence of the GFC. However, just as it is not possible to predict if a second wave of the crisis will be experienced, if it did occur it is not possible to predict how this will impact global capital markets or the Australian domestic market.
- 6.7 As outlined above, the AER increased the MRP to 6.5% in 2009 in consideration of the impacts of the GFC. Subsequent submissions have been lodged questioning whether this increase is sufficient. For example, the Victorian electricity distribution businesses lodged analysis by Officer and Bishop, who are both highly respected practitioners in the finance field in Australia.⁷⁴ Officer

⁷⁴ Professor B. Officer & Dr. S. Bishop (2009). Market Risk Premium, Estimate for 2011 – 2015, October.

and Bishop maintain that it is important to ensure that the forward-looking rate of return is commensurate with current market conditions and that, at the current time, the forward-looking MRP is well above the historical average as a consequence of the crisis.

- 6.8 As outlined previously, concerns have previously been expressed regarding the use of forward-looking estimates of the MRP, particularly as the short-term MRP is inherently volatile. Officer and Bishop's estimates are based on the implied volatility of options on the ASX 200 and spreads on corporate debt. They consider that recent advances in the derivation of these estimates provides sufficiently reliable evidence to justify a departure from the previously used method of using a long-term historical average MRP, noting that they anticipate that it will eventually revert to this mean, at which time, it would be appropriate to revert to this long-term average value method.
- 6.9 They consider this long-term average to be 7%. They estimate the forward-looking MRP to be 11% and consider the best estimate of the MRP over the period between 1 January 2011 and 31 December 2015 is between 7% and 8%. The Victorian distribution businesses proposed a MRP of 8%. The AER did not consider the evidence submitted by these businesses to be sufficiently persuasive to warrant a departure from its preferred estimate of 6.5%, noting that market conditions had "stabilised" since this decision was made.⁷⁵
- 6.10 The Officer and Bishop analysis suggests that the value of the forward-looking MRP is more likely to be between 7% and 8% between 2011 and 2015. The analysis we have undertaken in section 5 that compares the historical returns on debt and equity also suggests that to the extent that debt margins spiked following the commencement of the crisis and have continued to remain at these levels, the premium that equity investors require will have similarly increased and we have no reason to believe that it will fall, at least for as long as this uncertainty remains in the market.
- 6.11 We are therefore of the opinion that currently, 6.5% is likely to be a 'lower bound' estimate of the forward-looking MRP. Based on the analysis presented in section 5, while there continues to be debate over parameter estimates such as the MRP, we consider it important to undertake an overall reasonableness check of the resulting cost of debt and equity estimates against the actual

⁷⁵ Australian Energy Regulator (2010c). Draft Decision: Victorian Electricity Distribution Network Service Providers, Distribution Determination 2011-2015, June, p.503.

returns that were observed historically (particularly when market conditions were more stable). This is examined further in section 8.

7 Gamma

7.1 Background

7.1 Prior to the AER's decision to increase the value of gamma to 0.65 in its statements that apply to electricity transmission and distribution network service providers (the AER's WACC Statements), a value of 0.5 has been the value most commonly applied by Australian regulators.

7.2 Following the finalisation of its WACC Statements in 2009, the AER has consistently applied its preferred value of 0.65 to electricity distribution. It has also applied this value in gas decisions, including its most recent decision in relation to Jemena Gas Networks, where it concluded that:⁷⁶

...0.65 is the best estimate of gamma arrived at on a reasonable basis currently available, as required by rule 74 of the NGR.

7.3 It also considered that this value is consistent with the revenue and pricing principles contained in section 24 of the NGL and will contribute towards the achievement of the Objective of the NGL (refer paragraph 2.2).⁷⁷ The evidence and arguments relied upon by the AER in arriving at its conclusion are largely consistent with the evidence and arguments it relied upon in its WACC Statements and subsequent rebuttals of alternative proposals put forward by the energy network businesses.

7.4 We note that the AER's preferred value continues to be contested by gas and electricity network businesses in regulatory proposals made since the finalisation of its WACC statements, with values of 0.2 and 0.5 proposed. We also note that it is currently the subject of a number of merits review applications before the Tribunal, including applications by ETSA Utilities, Ergon Energy, ENERGEX and Jemena Gas Networks.

7.5 The applications for ETSA Utilities, Ergon Energy and ENERGEX have been heard together and an initial decision was issued in October 2010.⁷⁸ The process has not yet concluded. We expect that the final outcome will have a significant influence on the gamma that the AER will seek to determine for NT Gas and all other regulated energy network businesses. The AER has already

⁷⁶ Australian Energy Regulator (2010a). p.227.

⁷⁷ Australian Energy Regulator (2010a). p.227.

⁷⁸ Australian Competition Tribunal (2010) Application by Energex Limited (No 2) [2010] ACompT 7.

had regard to this in the Victorian Final Decision, recognising that the outcomes have not been finalised.

7.1.2 Status of ETSA Utilities, Ergon Energy and ENERGEX appeals

Distribution rate

7.6 The AER acknowledged that it had made an error in interpreting Hathaway and Officer's 71% distribution rate as reflecting credits created and distributed in a year. It has now acknowledged that this rate is the annual average distribution rate and includes both credits created in that year, as well as the distribution of retained credits created in previous years. The Tribunal accepted this error. It has also acknowledged this in the Victorian Final Decision.

7.7 However, the AER did not accept that the value of the distribution rate should be 71%. It also made this position very clear in the Victorian Final Decision. In particular, it continues to maintain the view that retained credits must have some value, even if this is less than previously thought, and while the distribution rate may not be 100%, it is somewhere between 70% and 100%.⁷⁹ It applies this range in the Victorian Final Decision.

7.8 The Tribunal did not request that this matter be remitted to the AER for consideration. Instead, further submissions will be made on the issue based on the material that is already before it.

Value of franking credits (theta)

7.9 The Tribunal also found that the AER had made an error in relation to the value of theta. It requested preparation of a report that:⁸⁰

- proposes an approach that correctly uses tax statistics studies and dividend drop-off studies;
- reviews dividend drop-off studies from as many sources as possible to see whether confident use can be made of any of them; and
- if possible, provides results from a newly-commissioned dividend drop-off study that is "state of the art".

⁷⁹ Australian Energy Regulator (2010c).

⁸⁰ Australian Competition Tribunal (2010). para.146.

7.10 On reading the Victorian Final Decision it is apparent that the AER has not materially altered its position on theta, and maintains that the most appropriate value is still 0.65.⁸¹ In particular:

- it remains 'unconvinced' that the SFG study produces a reliable estimate of theta and puts considerable weight on the filtering method used by Beggs and Skeels. It maintains that it should still give full weight to the Beggs and Skeels study;
- it proposes to continue to place reliance on tax statistics and the results of the Handley and Maheswaran study as an 'upper bound' for theta, the limitations of which are seen to be outweighed by its "informative value".

7.11 The AER concludes that combining a range for the distribution rate of 70% to 100% with a theta value of 0.65 results in a range for gamma of 0.465 to 0.65. In recognition of the inherent uncertainty associated with the estimation of theta, it considers that a departure from its gamma value of 0.65 is warranted (as specified in the WACC Guidelines, noting that these do not apply to gas distribution). It therefore determined a value for gamma of 0.5 in the Victorian Final Decision.

7.2 Issues with the AER's preferred value for gamma

7.12 While the AER has proposed to move to a gamma of 0.5, we still disagree with its contention that:

- the value of the distribution rate is somewhere between 70% and 100%; and
- 0.65 remains an appropriate estimate for theta.

7.13 We have already presented analysis on this issue to the AER as part of the APT Allgas submission that was lodged in September 2010. Our assessment of this matter has not changed. We have summarised that analysis here for completeness.

⁸¹ Australian Energy Regulator (2010c).

7.3 Distribution rate

7.3.1 Issues with the AER's decision

- 7.14 The key issue of contention in relation to the distribution rate remains its assumption that retained credits must have some value. The AER's original decision was based on advice received from Associate Professor Handley.⁸² One of Handley's contentions has been that retained cash flow can be reinvested and it will earn the firm's cost of capital. This contention is irrelevant to the valuation of retained credits because imputation credits cannot be reinvested. They are only of value to resident shareholders once the dividends are distributed. Confusing imputation credits with free cash flows results in the erroneous conclusion by Handley that a 100% payout ratio is appropriate.
- 7.15 Handley questions the payout of around 70%. He disregards the twenty three years of evidence since the introduction of dividend imputation regarding payout ratios. Based on an examination of ATO taxation statistics, it is evident that firms consistently have paid out, on average, 70% of the franking credits.⁸³
- 7.16 There are many opportunities for companies to distribute the credits but still the franking account balance increases. It is therefore questioned as to why these franking account balances increase when credits are only of value when distributed to shareholders. In our opinion, a plausible answer is the retained credits are not of much value to shareholders and certainly not as valuable as the AER suggests.

7.3.2 What is a reasonable estimate for the distribution rate

- 7.17 The AER has interpreted the position submitted by the distribution network service providers to be that retained credits will never be paid out.⁸⁴ However, it is now acknowledged that to the extent that retained credits have been subsequently paid out, this is already reflected in the 70% average distribution rate reported by Hathaway and Officer.
- 7.18 There is no evidence supporting its contention that retained credits must have some value. The AER has acknowledged that there is some uncertainty

⁸² J. Handley (2009). Advice on Gamma in Relation to the 2010-2015 QLD/SA Electricity Distribution Determinations, Memorandum to the AER, 20 October 2009.

⁸³ Synergies Economic Consulting (2009). Memorandum to Ergon Energy and ENERGEX, Gamma: New Analysis Using Tax Statistics, May.

⁸⁴ Australian Energy Regulator (2010c).

regarding the value of retained credits. Particularly given the asymmetric consequences of error, we do not consider that it is appropriate to seek to ascribe a value other than zero unless there is evidence to support it. In our opinion, it remains more reasonable and plausible to assume they have no value. This in turn supports an assumption for the distribution rate of 71%.

7.19 We maintain that the distribution rate should be based on the average distribution rate that is observed in the market and is most commonly applied by practitioners, as estimated by Hathaway and Officer⁸⁵, which is 71%.

7.4 The value of franking credits (theta)

7.20 The AER's preferred value for theta is 0.65, which is mid-way between two points estimates it selected, being:

- 0.57, which is based on a 2006 dividend drop-off study by Beggs and Skeels⁸⁶;
- 0.74, which is based on a 2008 tax statistics analysis by Handley and Maheswaran.⁸⁷

The AER reiterated this position in the 2010 decision for the Jemena gas networks and is maintaining reliance on this evidence in the Victorian Final decision.

7.4.2 Valuing theta using dividend drop-off studies

7.21 We do not agree that full weight should be placed on the Beggs and Skeels study and no weight is applied to the SFG study. For example, when considering the issue of multicollinearity, which is of fundamental importance in interpreting the results of dividend drop-off studies, the AER recognises that it is a problem that is common to all such studies.⁸⁸

7.22 Again, however, it focuses this discussion on the SFG study and does not acknowledge the potential implications of this problem for Beggs and Skeels.

⁸⁵ N. Hathaway and R. Officer (2004). The Value of Imputation Tax Credits: Update 2004, Unpublished Working Paper, Capital Research Pty Ltd.

⁸⁶ D. Beggs & C. Skeels (2006).

⁸⁷ J. Handley and K. Maheswaran (2008). A Measure of the Efficacy of the Australian Imputation Tax System, The Economic Record, vol.84, no.264, March.

⁸⁸ Australian Energy Regulator (2010c). p.543.

Because SFG's full dataset is available, it looks at the correlation between the independent variables but such an analysis has not been undertaken on Beggs and Skeels' dataset. Instead, it considers that the presence of this problem places particular importance on the data filtering methodology and focuses on why it considers that Beggs and Skeels' filtering methodology is superior.

- 7.23 We do not consider that the filtering methodology applied has any impact on the presence of multicollinearity. The AER's position is also not consistent with the Tribunal's findings, such as:⁸⁹

The Beggs and Skeels (2006) data set was said to have been pre-filtered by Commsec and was subsequently further filtered by the authors in a manner they describe. No material was before the Tribunal regarding the nature of the Commsec filtering or the effects of the filtering by the authors. However, from the description given, it seems unlikely that the filtering would have reduced multicollinearity; nor was it intended to do so. One thing that can be said with some certainty is that any filtering reduces the size of the data set, which is exactly counter to the recommended approach to multicollinearity. Of course, filtering to deal with other problems may well be necessary.

- 7.24 It also questions why the standard errors for the Beggs and Skeels' estimates were smaller than that found by SFG and stated that:⁹⁰

Unfortunately, due to the proprietary nature of the data set and lack of review related material available to the Tribunal regarding the nature of the Commsec filtering process, that question cannot be answered.

- 7.25 Overall, the Tribunal concludes that:⁹¹

...the results of Beggs and Skeels (2006) must be regarded with something approaching equal caution to that applying to the SFG study.

- 7.26 We maintain our position that we consider that it is important to consider a number of studies to value theta. One of the reasons the evidence the AER has considered is so limited is because it has concluded that a 'structural' break occurred with tax law changes implemented in 2000, which in turn means that it will only consider analysis that only includes post-2000 data. The evidence it

⁸⁹ Australian Competition Tribunal (2010). para.131,

⁹⁰ Australian Competition Tribunal (2010). para.137.

⁹¹ Australian Competition Tribunal (2010) para.139.

relied upon in concluding that this structural break occurred was the Beggs and Skeels study.

- 7.27 Reports prepared by SFG and Synergies that have previously been submitted to the AER showed that the Beggs and Skeels results do not provide sufficiently reliable evidence to demonstrate that a structural break occurred.⁹² We therefore do not accept that studies that have used data prior to 2000 should be excluded.
- 7.28 There are a number of reputable Australian studies that have sought to estimate the value of gamma using market data. These are summarised in the following table.

⁹² SFG Consulting (2009). The Value of Imputation Credits as Implied by the Methodology of Beggs and Skeels (2006), Report Prepared for ENA, APIA and Grid Australia, February; Synergies Economic Consulting (2009). Peer Review of SFG Consulting Reports on Gamma, A Report to the ENA, APIA and Grid Australia, January.

Table 5 Summary of key studies

Study	Methodology	Time Period for Estimation	Value of franking credits (V)
Hathaway and Officer (2004) ^a	Dividend drop-off	1988-2002	0.5
Bellamy & Gray (2004) ^b	Dividend drop-off (adjusted)	1995-2002	0
Cannavan, Finn & Gray (2004) ^c	Analysis of futures and physical market (no arbitrage framework)	Pre- 45 day rule (1997)	Up to 0.5 (high-yielding stocks)
		Post- 45 day rule	0
Beggs & Skeels (2006) ^d	Dividend drop-off	1986-1988	0.75
		1989-1990	0.45
		1991	0.38
		1992-1997	0.2
		1998-1999	0.42
		2000	0.128
SFG Consulting (2010) ^e	Dividend drop-off, based on Beggs & Skeels methodology	1 Jul 1997 – 30 Jun 1999	0.24
		1 Jul 1999 – 30 June 2000	0.36
		1 July 2000 – 20 June 2006	0.23
Feuerherdt, Gray and Hall (2010) ^f	Dividend drop-off, hybrid securities	Pre-1997 (45 day rule)	0
		Post-1997 to 2000	
		Post 2000	

a N. Hathaway and R. Officer (2004). The Value of Imputation Tax Credits: Update 2004, Unpublished Working Paper, Capital Research Pty Ltd.

b D. Bellamy & S. Gray (2004). Using Stock Price Changes to Estimate the Value of Dividend Franking Credits, Working Paper, University of Queensland.

c D. Cannavan, F. Finn and S. Gray (2004). The Valuation of Dividend Imputation Tax Credits in Australia. Journal of Financial Economics, 73, 167-197.

d D. Beggs & C. Skeels (2006). Market Arbitrage of Cash Dividends and Franking Credits. Economic Record, 82, 239-252.

e SFG Consulting (2010). Further Analysis in Response to AER Draft Determination in Relation to Gamma, Prepared for ETSA Utilities, February.

f C. Feuerherdt, S. Gray and J. Hall (2010). The Value of Imputation Tax Credits on Australian Hybrid Securities, International Review of Finance, 10:3, 365-401.

7.29 We concur with the AER's consultants, McKenzie and Partington, who advocate consideration of a range of studies. We consider that this is particularly important given the inherent uncertainty associated with valuing theta. All of the studies in the table above have sought to estimate the value of theta using market data. The table includes dividend drop-off studies, as well as:

1. A study by Cannavan, Finn and Gray, published in 2004, which does not use the dividend drop off method but has sought to infer the value of cash dividends and franking credits from the relative prices of share futures and the underlying shares on which these contracts are written, based on a no-arbitrage framework. This study was published in a reputable journal (the Journal of Financial Economics) and hence has been 'academically peer reviewed'.

2. A study by Feuerherdt, Gray and Hall, published in 2010, which tests the value of imputation credits based on the prices of hybrid securities.

A key reason for examining these securities is:

- the signal-to-noise ratio is considered higher than for ordinary shares, reducing the multicollinearity problem associated with the dividend drop-off methodology; and
- hybrid issues tend to be marketed exclusively to domestic investors. Hence, in order to address regulators' concerns regarding the relevance of foreign investors in setting the value of imputation credits, they have chosen an environment where trading is likely to be almost exclusively domestic-based.

This study was published in a reputable journal (the International Review of Finance) and hence has been 'academically peer reviewed'.

7.30 Excluding Beggs and Skeels' 1986-1988 sub-period, the estimate for their post-2000 sub-period is the highest estimate for the value of theta (0.57), which is the estimate that has been adopted by the AER. While it has stated that this is not a 'lower bound', it is the lower of its two point estimates. A number of other studies have concluded that the value of theta is zero.

7.31 As outlined above, we do not consider that the AER has relied on sufficiently robust evidence to enable it to conclude that the analysis should be limited to post 2000 data. Indeed, this assumption by the AER is critical to its conclusions and given the asymmetric consequences of error, the evidence of a structural break must be robust and reliable. As we do not consider that evidence to be sufficiently robust and reliable, it is not appropriate to assume that a structural break has occurred and hence it is valid to include studies that have used data prior to 2000 in the scope of our review.

7.32 In our opinion, this evidence shows that a value of zero should at least be included within the bounds of a reasonable range. The upper bound for this range would be 0.57, based on the Beggs and Skeels study.

7.4.3 Tax statistics analysis

7.33 We maintain our view that tax statistics analysis cannot be used to value theta. As we have previously submitted, the main reason why we consider that tax

statistics analysis cannot be used to value theta is because it is inconsistent with the definition of theta. The AER has stated that:⁹³

The generally accepted regulatory approach to date in Australia has been to define the value of imputation credits in accordance with the Monkhouse definition.

7.34 Under the Monkhouse definition for gamma:⁹⁴

- the imputation payout ratio is the face value of imputation credits distributed by the firm as a proportion of the face value of imputation credits generated by the firm in the period; and
- the utilisation rate (theta) is defined as the value of distributed imputation credits to investors as a proportion of their face value.

7.35 What is important with the definition is the distinction between face value and value. Value (with reference to the calculation of theta) in itself would normally be interpreted as market value while face value is not market value. This distinction is important to the claim made by the AER in stating that:⁹⁵

...the methodologies used in both studies were attempting to estimate the same value.

7.36 The Beggs and Skeels study attempts to use market data to estimate the effect on value of theta when dividends are paid. The second study referred to by the AER is the tax statistics study by Handley and Maheswaran. This study does not attempt to estimate value and is therefore inconsistent with the Monkhouse definition. This study measures the extent to which imputation credits have reduced personal taxation liabilities. This is very different to the Beggs and Skeels study. Beggs and Skeels attempt to measure the market value of the ability to offset credits while the Handley and Maheswaran study measures the proportional offset of personal taxation liabilities given the credit.

7.37 In support of relying upon the taxation statistics study the AER states that:

The AER acknowledges that tax statistics are based upon book values which may not reflect the market. That said, consistent with the AER's

⁹³ Australian Energy Regulator (2009a). p. 393.

⁹⁴ P. Monkhouse (1997). Adapting the APV Valuation Methodology and the Beta Gearing Formula to the Dividend Imputation Tax System. Accounting and Finance, 37, vol. 1, pp. 69-88.

⁹⁵ Australian Energy Regulator (2009a). p. 204.

approach to gearing in the WACC review, the AER considers that book values can be used as a proxy for market values.⁹⁶

7.38 The AER acknowledges that book values are a proxy for market values and are not market values themselves. As a proxy there is no consideration given to how close the proxy is to market values and how appropriate it is to use the proxy estimate as a market value estimate.

7.39 Where the AER normally uses book values as a proxy for market values is where either:

- market values are not obtainable (which they are in the case of theta); or
- the book value is a reasonable proxy for market value, as in say, the case of gearing.

7.40 The ratio based upon taxation statistics is not even a book value measure of theta. Theta is the value of distributed imputation credits to investors as a proportion of their face value as defined by Monkhouse. Handley and Mashewaran define their measure as:⁹⁷

We define this utilization value as the incremental reduction in personal tax, if any, which arises from the receipt of a franked dividend compared to the receipt of an otherwise equivalent unfranked dividend.

7.41 The obvious differences between the two are:

- the Monkhouse definition requires market value to be used; and
- the Monkhouse definition considers what companies have distributed as a proportion of their face value. What Handley and Mashewaran have measured is the credits received and the credits used.

7.42 The two issues with the taxation statistics approach are that book values are used instead of market values and there is an indirect link between book value and market value in this instance. Additionally, a further weakening in the relationship is that Handley and Mashewaran consider credits received by investors and credits used. They do not accurately capture the distributed credits that are lost.

⁹⁶ Australian Energy Regulator (2009c). Draft Decision, Queensland, Draft Distribution Determination, 2010-11 to 2014-15, p. 209.

⁹⁷ J. Handley and K. Maheswaran (2008). p. 84

- 7.43 The AER maintains that it is necessary to rely on this evidence because of the methodological problems associated with dividend drop-off studies. This is supported by advice from McKenzie and Partington, who indicated that:⁹⁸

In this respect the AER's approach of considering both ex-dividend and taxation statistics has merit, but we would recommend a broader range of studies to triangulate the evidence considered by the AER...Triangulation of the evidence relating to the value of dividends and credits distributed would suggest that the gamma value supplied by SFG is substantially on the low side while the gamma value determined by the AER to be on the high side, but much more evidence can be added to support the AER's gamma value. However, a precise estimate of gamma remains elusive both because of econometric problems and the fundamental problem of splitting the combined value of dividends and franking credits into its component parts.

- 7.44 The tax statistics approach is not a value-based approach. It is a ratio of the claimed imputation credit to the created and distributed imputation credit. It is not a proxy for market value as it does not attempt to be a measure of or reflective of this value. The relationship between market values and this value are indirect.
- 7.45 While we concur that a range of evidence should be submitted, this should be limited to evidence that seeks to estimate the value of theta, as outlined above. In our opinion, despite the recognised limitations of other methods it is misleading to include a method that does not value theta.

7.5 Conclusion: value of gamma

- 7.46 Based on a distribution rate of 71% and a range for theta of between zero and 0.57, an appropriate range for gamma is between zero and 0.4. In applying a point estimate based on this range it is considered appropriate to use the mid-point, which is 0.2.

⁹⁸ M. McKenzie and G. Partington (2010).pp.4-5.

8 Reasonableness check of the WACC estimate

- 8.1 It is important to put the individual parameter estimates in context by comparing the reasonableness of the cost of debt and equity, having regard to the current market environment. We have therefore estimated a WACC for NT Gas using the standard regulatory assumptions and approaches, as well as any recommendations we have made in this report (noting that the latter primarily influences the cashflows rather than the WACC estimate).
- 8.2 This is summarised in the following table. The risk-free rate and debt margin have been estimated over the twenty business days ending on 30 November 2010 for these indicative calculations, noting that the actual averaging period that is proposed for pricing purposes will be (confidentially) determined prior to the finalisation of the determination.

Table 6 WACC estimate

Parameter	Rationale	Estimate
Risk-free rate	Averaged over the 20 business days to 30 November 2010, annualised as per AER approach.	5.48%
Debt to value	Regulatory precedent.	60%
Debt margin	Bloomberg 7 year BBB yield rate extrapolated based on the difference between the 5 and 7 year BBB yields. Averaged over the 20 business days to 30 November 2010, annualised as per AER approach.	5.46%
Debt raising costs	Based on ACG methodology updated by the AER, assuming that with a total debt of less than \$250 million (one bond issue), debt issuance costs would be in AER's category 1.	10.8 bp pa
MRP	Previous AER decisions	6.5%
Gamma	Refer section 7 of this report	0.2
Equity beta	Refer section 3 of this report	1
Cost of equity		11.98%
Cost of debt		11.05%
Post tax nominal vanilla WACC		11.42%

- 8.3 As outlined in section 5, if regard is given to the average cost of debt and equity prevailing prior to the global financial crisis, the difference between the cost of debt and equity should be between 4.5% and 6%. The difference implied by the above estimates is less than 1%. As the cost of debt is estimated based on current market data, whereas the cost of equity is more reflective of a long term average (with the exception of the risk-free rate), our concern is that the return of equity will provide equity investors with inadequate compensation for the risks they bear in the current market environment. The AER has already made it very clear that it will not consider any further increases in the MRP, having

mooted a reduction back to 6%, which will lower the cost of equity even further.

- 8.4 One of the key risks identified for NT Gas is stranding risk. As discussed in section 3, this is not currently compensated via the rate of return. Provided the risk is material, we are of the opinion that there is a case for compensation via an explicit cash flow adjustment. The method that can be used for such an adjustment is based on a risk assessment framework that adjusts for the probability of the risk.

Authors' statement

This report has been prepared by Mark Christensen, Euan Morton and Joanne Blades. Our qualifications are contained in Attachment A.

We confirm that in preparing this report, we have made all the inquiries that we believe are desirable and appropriate and that no matters of significance that we regard as relevant have, to our knowledge, been withheld from the report.

A list of the key source materials we have relied upon are contained in Attachment B. We have provided copies of our key source documents to the AER.

Signed



(Mark Christensen)

21 December 2010

Signed



(Euan Morton)

21 December 2010

Signed



(Joanne Blades)

21 December 2010

A Qualifications

Mark Christensen

Current position

Associate, Synergies Economic Consulting
Deputy Chairman, Queensland Competition Authority

Qualifications

Bachelor of Business
Master of Financial Management
Senior Fellow - FINSIA
CPA

Relevant experience

- estimated an asset beta for passenger rail services for Queensland Treasury;
- estimated the WACC of a coal port for the Queensland Government as part of a submission to the Queensland Competition Authority;
- developed an approach to estimate a long term WACC for the provision of port services with a fixed fee for 40 years;
- estimated divisional WACCs for Queensland Rail. Each major business unit derived a WACC to be used as a benchmark for project evaluation and performance review;
- reviewed the discount rate for Powerlink when pricing non-regulated services based on a WACC methodology;
- estimated asymmetric risk adjustments that are required for a regulated gas pipeline;
- using a WACC methodology, determined the discount rates to be applied for the generation of power by coal and alternative energy sources;
- estimated the WACC parameters for Queensland Rail as part of the second review of its access undertaking;
- provided comments on behalf of Queensland Rail to the QCA on a WACC discussion paper;

- provided comments and made representations to the Independent Pricing and Regulatory Tribunal and the Australian Competition and Consumer Commission on behalf of ARTC regarding WACC parameters and issues;
- provided WACC parameter estimates and comments for both Perth and Darwin airports, as part of pricing negotiations;
- calculated an appropriate discount rate for SEQWater to use for analysing bulk water storage;
- provided comments to Sunwater regarding the value of the asset beta and gamma;
- provided an analysis to Gladstone Area Water Board of systematic and non-systematic risk;
- developed a financial model to assess the impairment of water assets applying AASB136;
- estimated the cost of capital to apply to WestNet Rail as part of its review by the Economic Regulation Authority;
- estimated the cost of capital to apply to The Pilbara Infrastructure as part of its review by the Economic Regulation Authority;
- provided advice to overcome infrequency of trading issues when estimating beta;
- provided advice regarding WACC parameter estimates for ENERGEX and Ergon Energy as part of their submission to the Australian Energy Regulator;
- developed a discount rate to be used for analysing the social costs of crime, as part of a program to stop recidivism by juveniles;
- estimated discount rates and reviewed valuation approaches for SME business valuations;
- provided advice regarding the appropriate discount rate to use to value impaired water assets, based on a WACC methodology;
- provided advice to the Queensland Audit Office regarding discount rates applicable for the valuation of water assets and forests;
- provided advice regarding discount rates applicable to Council business units, using a WACC methodology;
- acted as an expert witness or provided expert evidence on numerous occasions on WACC-related issues;

- provided advice regarding discount rates and non-systematic risks for setting a bid price for a power station;
- provide education courses across Australia for infrastructure businesses regarding discounted cash flows analysis, risk analysis and WACC;
- provided Brisbane Water with a valuation of a waste water plant to calculate lease payments to the end user. The model required calculation of the WACC, the effect of risk sharing and the calculation of the lease payment;
- conducted risk workshops where risks have been identified and quantified and included in the valuation analysis;
- reviewed a number of submissions received by the Queensland Competition Authority on WACC issues;
- provided a valuation to Brisbane Water of a stand-alone replication of water assets to supply a major end user;
- provided education courses via Queensland Treasury Corporation for Government Owned Corporations. One of the courses is 'Cost of Capital';
- reviewed the discount rate to be used in the gaming industry. The rate was estimated using a WACC methodology;
- written topics and chapters for education courses for FINSIA and CPA Australia. Topics have included valuation techniques, WACC and WACC-related issues;
- provided advice to Royal Dutch Shell. The advice was designed to improve the scoping of new explorations so that the final investment decision was undertaken with greater certainty and with a focus on the value added to the organisation. The two year contract focused of the final investment decision and included a number of assignments across the business;
- provided advice to the AGSM regarding the methodology for the estimation of beta;
- reviewed numerous journal and conference submissions. The topics have been corporate finance related.

Euan Morton

Current position

Principal, Synergies Economic Consulting

Qualifications

Bachelor of Commerce, University of Queensland, 1986

Bachelor of Law (with Honours), University of Queensland, 1988

Admission as a Solicitor, Supreme Court of Queensland, 1991

Bachelor of Economics, University of Queensland, 1992

Bachelor of Economics (1st Class Honours), University of Queensland, 1994

Relevant experience

- undertook a detailed quantitative review of the factors affecting an asset beta for Queensland Rail's below-rail coal network;
- evaluated the key issues associated with reviewing the WACC for Telstra's mobile termination services businesses as it approached a regulatory review and advised on the overall strategy that could be undertaken in the regulatory review;
- advised ARTC on the strategy that could be undertaken in approaching the review of its cost of capital as part of the review of its access undertaking by the ACCC. Detailed reviews were undertaken for ARTC's interstate and Hunter Valley coal networks;
- advised WestNet Rail on the cost of capital for regulatory purposes;
- advised Fortescue Metals Limited on the cost of capital and the inclusion of asymmetric risks for regulatory and valuation purposes;
- provided advice to Sunwater on the cost of capital to apply for rural water pricing, including the preparation of submissions to the QCA;
- advised Sunwater on the appropriate discount rate to use for analysing bulk water storage and wastewater using a WACC methodology;
- estimated the cost of capital for a coal terminal for the Dalrymple Bay Coal Terminal User Group. This work provided exposure to the perspective of a customer regarding WACC issues for a regulated entity;
- provided advice to Babcock and Brown regarding the WACC to be applied for due diligence purposes for the acquisition of the below rail assets of WestNet Rail;

- conducted an extensive review for the South East Queensland Water Corporation on the cost of capital in connection with its existing storage services and the additional risks associated with water treatment and recycling. Considerations included the appropriateness of using CAPM, the appropriate capital structure, developments in the estimation of beta and the value of the inputs;
- advised Brisbane Water on the WACC for its urban water and wastewater businesses;
- advised Queensland Treasury on the WACC to apply to urban water and wastewater providers to enable an assessment to be made as to whether certain infrastructure providers should be referred for prices oversight;
- advised Gladstone Area Water Board on the WACC associated with water storage and transmission;
- undertook an extensive review of the WACC for Sugar Terminal Limited;
- advised on the appropriate rate of return for a greenfields project (Alice Springs to Darwin railway), highlighting the circular nature of the rate of return for regulatory purposes in such a case;
- provided advice to the Queensland Office of Gaming Regulation regarding an appropriate cost of capital to apply to an entity operating in the gaming industry;
- undertook a detailed process to assess the cost of capital for Energy Australia, including the assessment of the form of WACC to be applied, the valuation of the key parameters and the preparation of submissions to IPART and the ACCC;
- estimated the appropriate cost of capital for ElectraNet SA, including preparation of a submission, to support ElectraNet's revenue reset application to the ACCC;
- estimated the appropriate cost of capital for Transend, including preparation of a submission, to support Transend's revenue reset application to the ACCC.

Joanne Blades

Current position

Director, Synergies Economic Consulting

Qualifications

Master of Applied Finance, Macquarie University, 2004

Bachelor of Commerce (Hons) – Economics, Griffith University, 1991

Bachelor of Business – Banking and Finance (with Distinction), University of Southern Queensland, 1989

Relevant experience

- prepared a cost of capital submission to the Economic Regulation Authority in relation to its review of the Goldfields Gas Pipeline;
- prepared a response to the Economic Regulation Authority's Draft Decision on the cost of capital to apply to the Goldfields Gas Pipe Pipeline;
- assisted ENERGEX and Ergon Energy as part of the industry response to the Australian Energy Regulator's review of the cost of capital parameters to apply to electricity network businesses;
- assisted ENERGEX and Ergon Energy in developing their cost of capital proposals to the Australian Energy Regulator. This included the provision of advice and the preparation of submissions;
- prepared a cost of capital submission for the Gladstone Area Water Board as part of its pricing review by the Queensland Competition Authority;
- prepared a cost of capital submission to the Queensland Competition Authority for QR Network as part of the second review of its access undertaking;
- prepared a submission to the Queensland Competition Authority reviewing the cost of equity that should apply to QR Network as part of the third review of its access undertaking. This included the preparation of an independent report and a further response to the QCA's Draft Decision;
- preparation of a cost of capital submission for GasNet as part of its regulatory review by the ACCC;
- prepared a cost of capital submission for Vector as part of its price control review by the Commerce Commission in New Zealand;

- undertook a review of the cost of capital to apply to Perth Airport based on regulatory principles;
- undertook a review of the cost of capital to apply to Darwin Airport based on regulatory principles;
- undertook an assessment of an appropriate beta for a regulated airport facility in New Zealand as part of a cost of capital review;
- reviewed the cost of capital to apply to The Pilbara Infrastructure as part of its review by the Economic Regulation Authority;
- undertook a cost of capital review for Cooperative Bulk Handling Limited;
- undertook a review of SEQWater Corporation's cost of capital, for both regulatory and commercial purposes;
- prepared two cost of capital submissions for ARTC as part of regulatory reviews, one for the Hunter Valley coal network and the other for its interstate rail network;
- prepared a response for ARTC in relation to IPART's Issues Paper on the proposed cost of capital to apply to the Hunter Valley coal network;
- prepared a response for ARTC in relation to IPART's Draft Decision on the proposed cost of capital to apply to the Hunter Valley coal network;
- undertook a review of the cost of capital for Sugar Terminals Limited to be used for pricing purposes.

B Source materials

1. The Allen Consulting Group (2007). Empirical Evidence on Proxy Beta Values for Regulated Gas Distribution Activities, Report to the Essential Services Commission of Victoria, June.
2. The Allen Consulting Group (2008). Beta for Regulated Electricity Transmission and Distribution, Report to Energy Networks Association, Grid Australia and APIA, September.
3. The Allen Consulting Group (2009). 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 Energy Networks Association, Grid Australia and Australian Pipeline Industry Association, January.
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