Issues paper

Review of the weighted average cost of capital (WACC) parameters for electricity transmission and distribution

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AUSTRALIAN ENERGY REGULATOR

Contents

Summary

The National Electricity Rules (NER) provide that the Australian Energy Regulator (AER) may review the weighted average cost of capital (WACC) parameters to be adopted in determinations for electricity transmission and distribution network service providers (TNSPs and DNSPs). Reviews are to be conducted every five years with the first review concluded by 31 March 2009, at which time the AER will release a final decision for both transmission and distribution.[1]

Scope of review

The AER's review is limited by the NER to the individual WACC parameters rather than a review of the overarching framework in which the WACC is used. For example, the use of the nominal post-tax framework or the use of the capital asset pricing model (CAPM) for calculating the cost of equity are not subject to review by the AER.

The AER may review the values of and methods used to calculate:

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

The AER considers there is merit in also reviewing the methods for determining:

- forecast inflation, and
- debt and equity raising costs.

However the inclusion of these additional matters in this review is intended to provide guidance only as to how the AER may approach these matters in future determinations.

[1] The AER submitted a rule change proposal to the AEMC on 14 April 2008 seeking to align the timeframes of the electricity distribution and transmission WACC reviews. The AEMC approved a rule change to align these reviews, which took effect on 1 July 2008.

Applicability of review to forthcoming determinations

The outcomes of this review will only apply to electricity transmission and distribution determinations where the proposal is submitted after 31 March 2009 and before 1 April 2014.[2]

For clarity this means that the outcome of this review will apply to the forthcoming South Australian, Queensland and Victorian distribution determinations. The outcome of this review will not apply to:

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

The applicability of this review to forthcoming determinations is illustrated in table A.1.

Table A.1 Applicability of the review to TNSP and DNSP determinations

Electricity Transmission — **Date of submission of regulatory proposal**

	2008	2009	2010	2011	2012	2013	2014	…
NSW	31-May					31-May		
QLD				31-May				
VIC						28-Feb		
SA					31-May			
TAS	31-May					31-May		
Interconnectors								
Direct Link							31-May	
Murray Link				31-May				

Electricity Distribution — **Date of submission of regulatory proposal**

	2008	2009	2010	2011	2012	2013	2014	…
NSW	31-May					31-May		
ACT	31-May					31-May		
QLD		31-May					31-May	
SA		31-May					31-May	
VIC		30-Nov					30-Nov	
TAS				30-Nov				

Subject to current 'locked-in' WACC parameters
Subject to WACC parameters arising from AER's first WACC review (completion 31 March 2009)
Subject to WACC parameters arising from AER's second WACC review (completion 31 March 2014)

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

[2] NER, cll. 6.5.4(a)-(b), 6.5.4(f), 6A.6.2(f)-(h) and 6A.6.4(b)-(c).

This review has no direct or formal applicability to gas access arrangements. However given the similarity of issues across the gas and electricity sectors the AER may use the outcomes of this review for the consideration of WACC issues in future gas access arrangements determined by the AER.

Timelines

For both electricity transmission and distribution, the AER must complete its review of WACC parameters by 31 March 2009.[3]

In conducting its review the AER must follow the transmission consultation procedures and distribution consultation procedures.[4] These procedures effectively require the AER to publish a draft decision, allowing for no less than 30 business days for the making of submissions. The AER is not required to consider any submissions received after the close date for submissions has expired. Within 80 business days of the draft decision, the AER must publish its final statement of regulatory intent (SRI) and final decision for electricity distribution and transmission, respectively.[5]

While not a NER requirement, the AER may publish such issues, consultation and discussion papers, and hold such conferences and information sessions in relation the review as it considers appropriate.[6]

Table A.2 outlines the AER's planned consultation process for its review of the WACC parameters.

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

[4] NER, cll. 6.5.4(a), 6A.6.2(f) and 6A.6.4(b).

[5] NER, cll. 6.16 and 6A.20.

[6] NER, cll. 6.16 and 6A.20.

Table A.2 Consultation process

Date	Action
6 August 2008	Publish issues paper and invite written submissions
17 September 2008	Close of written submissions on issues paper
9 December 2008	Publish draft statement of regulatory intent (distribution) and draft decision (transmission) and invite written submissions
December 2008	Host public forum on draft statement of regulatory intent and draft decision and invite oral submissions
23 January 2009	Close of written submissions on draft decision
31 March 2009	Publish final statement of regulatory intent (distribution) and final decision (transmission)

Request for submissions

Interested parties are invited to make written submissions to the AER on the issues discussed in this paper by the close of business Wednesday, 17 September 2008. Submissions can be sent electronically to AERinquiry@aer.gov.au. Alternatively, written submissions can be sent to:

Mr Chris Pattas
General Manager
Network Regulation South Branch
Australian Energy Regulator
GPO Box 520
Melbourne Vic 3001
Tel: (03) 9290 1444
Fax: (03) 9290 1457

The AER prefers that all submissions be in an electronic format and publicly available, to facilitate an informed, transparent and robust consultation process. Accordingly, submissions will be treated as public documents and posted on the AER's website, www.aer.gov.au, except and unless prior arrangements are made with the AER to treat the submission, or portions of it, as confidential.

Any enquiries about this issues paper, or about lodging submissions, should be directed to the AER's Network Regulation South Branch on (03) 9290 1444 or at the above email address.

1 Introduction

1.1 Background to review

The National Electricity Rules (NER) provide that the Australian Energy Regulator (AER) may review the weighted average cost of capital (WACC) parameters to be adopted in determinations for electricity transmission and distribution network service providers (TNSPs and DNSPs). Reviews are to be conducted every five years with the first review concluded by 31 March 2009, at which time the AER will release a final decision for both transmission and distribution.[7]

The AER will release a statement of regulatory intent (SRI) as part of its final decision for electricity distribution. The WACC parameters in the SRI will apply to all distribution determinations where the regulatory proposal is submitted after 31 March 2009 and before 1 April 2014, unless there is persuasive evidence provided in individual distribution proposals that justify a departure from the WACC values or methodologies set out in the SRI. [8] In the case of electricity transmission however, the AER's final decision on the WACC parameter values or methodologies that will apply to TNSPs' transmission determinations is 'locked-in' for all transmission regulatory proposals submitted after 31 March 2009 and before 1 April 2014.

The AER's review is limited to the individual WACC parameters rather than a review of the overarching framework in which the WACC is applied. For example, neither the use of the nominal post-tax framework or the use of the capital asset pricing model (CAPM) for calculating the cost of equity are subject to review by the AER. To clarify the scope of the AER's review, on 14 April 2008 the AER submitted a rule change proposal to the Australian Energy Market Commission (AEMC) seeking to address several technical drafting issues with the then drafting of the relevant sections of the NER. The AEMC approved this proposal and amended the NER with effect from 1 July 2008.[9] The AER is also aware that the EUAA has submitted a rule change proposal seeking to amend the values for the equity beta and the assumed utilisation of imputation credits ('gamma'). Given that the equity beta and gamma values are to be reviewed as part of this review, the AER intends to take into account public submissions received by the AEMC as part of its process, where appropriate.

The AER considers that, for completeness, there is merit in also reviewing the methods for determining forecast inflation and debt and equity raising costs. However the outcome of the review of these matters will not have the same status as that of the other WACC parameters. This is discussed further in section 1.3.

1.2 Definition of the WACC

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

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7 The AER submitted a rule change proposal to the AEMC on 14 April 2008 seeking to align the electricity distribution and transmission WACC reviews. The AEMC approved a rule change to align these reviews to take effect on 1 July 2008.

8 NER, cll. 6.5.4(a)-(b), 6.5.4(f), 6A.6.2(f)-(h) and 6A.6.4(b)-(c).

9 This rule change proposal on technical drafting issues was in addition to the rule change proposal seeking to align the timing of the reviews, noted in footnote seven.

> The rate of return for a [Network Service Provider] for a regulatory control period is the cost of capital as measured by the return required by investors in a commercial enterprise with a similar nature and degree of non-diversifiable risk as that faced by the [network] business of the provider…[10]

The NER provides that the cost of capital must be calculated as a 'nominal vanilla' WACC, in accordance with the formula set out in figure 1.1.

Figure 1.1: The weighted average cost of capital

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

where:

k_e	=	the expected rate of return on equity or cost of equity
k_d	=	the expected rate of return on debt or cost of debt
E/V	=	the market value of equity as a proportion of the market value of equity and debt, which is 1 – D/V
D/V	=	the market value of debt as a proportion of the market value of equity and debt

The NER provides that the cost of equity is to be determined using the CAPM, calculated in accordance with the formula in figure 1.2.

Figure 1.2: The capital asset pricing model

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

where:

r_f	=	the nominal risk free rate of return
β_e	=	the equity beta
MRP	=	the expected market risk premium

The CAPM specifies a relationship between the expected return of an individual risky asset or firm and the level of systematic (or non-diversifiable) risk. The higher (lower) the level of non-diversifiable risk the higher (lower) the required or expected rate of return. The CAPM provides no compensation for bearing non-systematic (or diversifiable) risk, on the assumption that investors can eliminate this risk costlessly by holding a well-diversified portfolio of assets.[11]

[10] NER, cll. 6.5.2(b) and 6A.6.2(b).

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

The level of systematic (or non-diversifiable) risk borne by an equity holder of a particular firm is a combination of the market risk premium (MRP) and the equity beta. The MRP represents the additional return that investors require and expect to earn for investing in a well diversified portfolio of assets, as compared with investing in a risk free asset. That is, the expected MRP is the premium that investors require over the risk free rate in order to be induced to invest in the market portfolio. The equity beta is a measure of the sensitivity of the return of a particular asset or firm to the return on the market portfolio. An equity beta of less than one indicates that the asset has low systematic risk relative to the market (the market portfolio beta being equal to one). Conversely, an equity beta of more than one indicates the asset has a higher systematic risk relative to the market.

The NER provides that the expected cost of debt is to be calculated in accordance with the formula in figure 1.3.

Figure 1.3: The expected cost of debt

$$k_d = r_f + DRP$$

where:

r_f = the nominal risk-free rate of return

DRP = the debt risk premium

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

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

The NER also require the AER to review the assumed value of imputation credits (referred to as 'gamma'), which is an input to determining the estimated cost of corporate income tax. Under the imputation tax system in Australia, imputation credits attached to dividends have a value to investors in that they represent a saving in personal tax liabilities (or a cash rebate in some circumstances). This tax saving or cash rebate amount is quantified by the gamma value which measures the extent to which imputation credits are distributed and utilised in the Australian economy. The gamma value is not included in the WACC as the AER is required to apply a vanilla WACC (i.e. after tax WACC), but is included directly in the cash flows as a separate 'building block' for TNSPs and DNSPs.[12]

[12] Even though the gamma parameter is not a direct input into the WACC formula, for the purpose of this issues paper the gamma is referred to as a 'WACC parameter'.

1.3 Scope of the review

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

The AER may review the values of and methods used to calculate:

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

The AER considers that there is merit in also reviewing the methods for determining forecast inflation, and debt and equity raising costs. The review of debt and equity raising costs will not prevent a service provider from proposing alternative methods in its regulatory proposal, nor does it bind the AER in the method that will be adopted in a particular determination. Compensation for these expenses either through capital expenditure [i.e. through the regulatory asset base (RAB)] or through operating expenditure must be assessed against the relevant objectives, criteria and factors in the NER at the time of each determination. The inclusion of these matters in this review is intended to allow all stakeholders to comment on the issues associated with these matters in one forum, with the outcome providing guidance only as to how the AER may approach these matters in future determinations.

1.4 AER's approach to the review

In undertaking a review of the WACC parameters for both electricity transmission and distribution, the NER require the AER to have regard to:

> (1) the need for the rate of return … to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing prescribed transmission services [or standard control services, as the case may be]
>
> (2) the need for the cost of debt to reflect the current cost of borrowings for comparable debt;
>
> (3) the need for the values attributable to the parameters … to be based on a benchmark efficient [Network Service Provider]; and
>
> (4) where the values that are attributable to parameters … cannot be determined with certainty:

(i) the need to achieve an outcome that is consistent with the *national electricity objective*; and

(ii) the need for persuasive evidence before adopting a value or the method for their calculation (as the case may be) for that parameter that differs from the value or the method for their calculation that has previously been adopted for it.[13]

Given that the WACC parameters subject to this review cannot be directly observed, the AER considers it may be that none of the WACC parameters can be determined with certainty. Therefore in accordance with the NER and as a matter of good regulatory practice, for each of the WACC parameters the AER intends on having regard to the national electricity objective and the need for persuasive evidence before departing from a previously adopted value or method.

The National Electricity Law (NEL) sets out the national electricity objective, which is:

> …to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:
>
> a) price, quality, safety, reliability and security of supply of electricity, and
>
> b) the reliability, safety and security of the national electricity system.

In order to have regard to all of the above criteria set out in the NER, the AER considers that the following factors are relevant:

- past regulatory practice
- the use of benchmarks rather than business specific WACC parameters values
- the use of the latest empirical information to the extent it is objective, available, robust and replicable over time[14]
- regard to the latest academic empirical research and theory, particularly research conducted in an Australian regulatory context, and
- regard to relevant non-energy infrastructure developments.

When examining a previously adopted value or method for electricity distribution, the AER has taken into account the jurisdictional decisions for both electricity and gas distribution, given the similar (or equivalent) nature of the issues involved across the two sectors. Notwithstanding, the AER recognises that there may be differences between the two sectors in relation to some of the WACC parameters subject to this review.

13 NER, cll. 6.5.4(e), 6A.6.2(j) and 6A.6.4(e).
14 Robust in this context refers to statistically stable.

1.5 Applicability of this review to forthcoming regulatory determinations

1.5.1 Electricity transmission

The NER provides that the AER may, as a consequence of this review, adopt revised values, methodologies or credit rating levels in a transmission determination, but only for the purposes of a revenue proposal that is submitted to the AER after the completion of the first review (i.e. 31 March 2009), or after completion of a future five-yearly review (as the case may be).[15]

1.5.2 Electricity distribution

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

> (g) A distribution determination to which a *statement of regulatory intent* is applicable must be consistent with the statement unless there is persuasive evidence justifying a departure, in the particular case, from a value, method or credit rating level set in the statement.
>
> (h) In deciding whether a departure from a value, method or credit rating level set in a *statement of regulatory intent* is justified in a distribution determination, the *AER* must consider:
>
> (1) the criteria on which the value, method or credit rating level was set in the *statement of regulatory intent* (the ***underlying criteria***); and
>
> (2) whether, in the light of the underlying criteria, a material change in circumstances since the date of the statement, or any other relevant factor, now makes a value, method or credit rating level set in the statement inappropriate.
>
> (i) If the *AER*, in making a distribution determination, in fact departs from a value, method or credit rating level set in a *statement of regulatory intent*, it must:
>
> (1) state the substitute value, method or credit rating level in the determination; and
>
> (2) demonstrate, in its reasons for the departure, that the departure is justified on the basis of the underlying criteria.[16]

1.5.3 Gas transmission and distribution

The outcome of the AER's WACC review applies only to electricity determinations, and has no direct or formal applicability to gas access arrangements. The determination of the WACC for access arrangements is subject to requirements under

[15] NER, cl. 6A.6.2(h).
[16] NER, cl. 6.5.4.

the National Gas Law (NGL) and National Gas Rules (NGR), which are not being considered in this review.

Nonetheless, given the similarity of issues, the AER may use the outcome of this review for the consideration of WACC issues in future gas access arrangement reviews.[17]

1.6 Structure of this issues paper

The remainder of this issues paper is structured as follows:

- chapter two addresses 'broader' issues that are relevant to all or most of the parameters subject to review
- chapter three addresses the market value of debt as a proportion of the market value of debt and equity (i.e. gearing), which is relevant to the return on equity and the cost of debt
- chapter four addresses the nominal risk free rate, which is relevant to the return on equity and the cost of debt
- chapter five addresses the equity beta, which is relevant to the return on equity
- chapter six addresses the market risk premium, which is relevant to the return on equity
- chapter seven addresses the credit rating level, which is relevant to the cost of debt
- chapter eight addresses the assumed utilisation of imputation credits (i.e. gamma), which is relevant to the estimated cost of corporate income tax building block
- chapter nine addresses forecast inflation, which is an input into the post-tax revenue model (PTRM) applicable to electricity transmission and distribution, and
- chapter ten addresses debt and equity raising costs.

[17] The National Gas Rules specifies that a well accepted approach that incorporates the cost of equity and debt; such as the WACC, is to be used; and a well accepted financial model such as the CAPM is to be used.

2 Multi-parameter considerations

2.1 Introduction

This chapter identifies the broader issues that have implications for the AER's review across the WACC parameters. A particular feature and advantage of conducting a full review of all WACC parameters simultaneously is that the linkages and inter-relationships between each WACC parameter can be considered. In particular, the importance of consistency in approach in terms of methodologies applied to consideration of each parameter becomes more evident. The AER intends to be guided by past regulatory practice in its approach to estimating each WACC parameter and where there may be some departures from previous approaches, the AER will be informed by the views of interested parties and the recent empirical and academic research.

The issue of consistency, however, can be considered at a broader level when looking at both the form of the CAPM to be adopted and the nature of parameter benchmarking that may be appropriate. These issues are relevant to a number of parameters and are discussed in the following section.

2.2 Consistency between parameters in estimation

2.2.1 Form of the CAPM (domestic or international)

One of the key areas of debate in the Australian regulatory literature is the extent to which foreign investors should be recognised in the Australian domestic capital market. The choice of whether to adopt a domestic CAPM or an international CAPM is likely to influence the estimation of the following WACC parameters:

- the nominal risk free rate,
- the expected DRP
- the expected MRP
- the equity beta and
- the assumed utilisation of imputation credits (gamma).[18]

It has been argued by some experts that any recognition of foreign investors in the estimation of the WACC parameters is inconsistent with the assumptions

[18] The assumptions in the theory underpinning the use of a domestic CAPM is that international capital markets are completely segregated and therefore domestic investors hold a combination of the domestic risk free rate and domestic market portfolio. In this circumstance, only domestic systematic risk is priced for determining the WACC and the appropriate measure of an assets non-diversifiable risk is the beta of the asset to the domestic portfolio. In contrast, the international CAPM assumes that investors hold a global portfolio of assets and global capital markets are fully integrated. Under this approach, the non-diversifiable risk is the beta of the asset to the global market portfolio and the appropriate market risk premium will be the market risk premium relevant to the global market portfolio.

underpinning the standard 'domestic' form of the CAPM such as the Officer (1994) CAPM commonly adopted by Australian regulators. As the Officer version of the CAPM assumes that the domestic capital market is fully segmented from the rest of the world, it is argued that any recognition of foreign investors will result in an internal inconsistency and a non-equilibrium outcome.

Conversely, it has been argued by other experts that it would be unrealistic to assume that zero foreign investment in the Australian capital market occurs, given what is observed in practice.

The NER does not specify the form of CAPM that should be used by the AER in the conduct of its review.[19] The AER proposes to continue with the Officer (1994) CAPM framework as it is consistent with past regulatory practice and is accepted by finance practitioners. Notwithstanding, it is important to recognise that, from a practical and empirical point of view, the information that has been used to inform the estimates of the 'domestic' risk free rate, equity beta and MRP parameters inevitably includes the presence of foreign investors in the Australian capital market.[20] This would also mean, for consistency, that it is appropriate to recognise the presence of foreign investors in the estimation of the gamma parameter (see section 8.3.3.1).

While this approach may represent a departure from the strict 'full segmentation' assumption of the Officer (1994) CAPM, it appears appropriate and reasonable given past regulatory practice and the reality of cross-border capital flows. The alternative 'full integration' assumption implies the adoption of an international CAPM, with the domestic market containing mainly foreign investors and unrestricted capital flows. The assumptions relating to an international CAPM are also not considered appropriate given that these conditions have not been observed in the Australian market to date.

In sum, the AER proposes to adopt the Officer (1994) CAPM as the underlying framework, with foreign investors recognised consistent with their presence in the Australian domestic capital market.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

2.1 Given that foreign investors are likely to influence the market data upon which the estimates of a number of WACC parameters are based, is it appropriate, feasible and practical to adopt either a fully segmented or a fully integrated version of the CAPM?

2.2 Is the AER's proposed approach to adopt a domestic form of the CAPM with foreign investors recognised appropriate from a theoretical and practical point of view? If not, what are the alternatives?

[19] It is noted that the NER requires the AER to use an Australian corporate bond in determining the debt risk premium.

[20] It is noted that the NER requires the AER to have regard to prevailing conditions in the market for funds in estimating the WACC parameters where applicable – see section 1.5 above.

2.2.2 Definition of the benchmark efficient service provider

The NER requires that the AER must, in undertaking its review, have regard to a benchmark efficient DNSP and TNSP. However, the NER does not define what a 'benchmark efficient' service provider should encapsulate.

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
- improves the comparability of regulatory decisions.

The definition of the benchmark efficient service provider is an important issue in estimating the WACC parameters, as this benchmark could be based upon:

- a 'first principles' benchmark (i.e. theoretical stand alone service provider)[21]
- a domestic industry benchmark, with various levels of industry definition (i.e. energy / non-energy; regulated / non-regulated), or
- a domestic market-wide benchmark – includes all businesses in the Australian market.

The AER's approach to estimating the benchmark efficient service provider will affect the estimated gearing level, equity beta, credit rating, and gamma parameters. The key issue is whether consistency considerations require the exact same benchmark to be used for each parameter.

The choice of a 'first principles' (theoretical stand alone service provider) benchmark is likely to be more open to debate than the adoption of an industry benchmark, as this is based on theoretical or conceptual considerations. However, a 'first principles' benchmark could be used in conjunction with other benchmarking approaches.

Where non-energy businesses are included in the industry benchmark, there is greater scope for argument that these businesses are less comparable for benchmarking purposes. This is also likely to be the case where regulated businesses in overseas markets are included in the benchmark. In Australia, there are more listed energy firms than in most other regulated infrastructure industries (e.g. rail, telecommunications). This means that for energy, more reliance can be placed on domestic industry comparators, whereas for regulated non-energy industries, a greater reliance on international industry comparators, while less desirable, may be unavoidable. The use of foreign businesses is discussed in section 2.2.3.3.

In contrast, in estimating the benchmark gearing and credit rating levels, the adoption of an industry benchmark that includes non-energy businesses may be more

[21] Clauses 6.5.2(b) and 6A.6.2(b) of the NER defines the WACC as measured by the return required by investors in a commercial enterprise with a similar nature and degree of non-diversifiable risk.

appropriate. This is because industry specific factors are likely to be less relevant and businesses that exhibit common characteristics such as stable cash flows, natural monopoly elements and inelastic demand may provide an efficient benchmark for regulated businesses. Further, in relation to estimating certain aspects of the gamma parameter (e.g. the utilisation rate), it may be appropriate to adopt a domestic market-wide estimate across all investors rather than an industry-specific measure.

The AER will also consider information from overseas capital markets to the extent relevant and as a cross-check on the reasonableness of its WACC parameter estimates.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

2.3 Is it appropriate that the businesses included in the sample to obtain a WACC parameter for a benchmark efficient service provider may vary depending on the parameter being considered? For example, is it appropriate to use an energy industry benchmark to estimate the equity beta, but to use a broader benchmark which includes non-energy businesses to estimate the gearing and credit rating levels?

2.2.3 Nature of industry benchmarks

The AER considers that if an industry benchmark approach is to be used, the approach used to select businesses should be consistent with that used for other parameters employing an industry benchmark approach. This does not necessarily mean that the same businesses will be used to estimate each parameter (e.g. the equity beta is likely to be more energy industry specific, while a broader benchmark may be adopted to estimate the gearing and credit rating levels), as there may be reasons to exclude different businesses from the sample.

This approach appears to be consistent with previous regulatory practice in Australia, and essentially results in two types of industry benchmarks. These include:

- energy specific benchmarks (e.g. electricity and gas, distribution and transmission businesses), and
- broader industry benchmarks (e.g. may include non-energy and/or non-regulated businesses).

The inclusion of sample businesses within a benchmark may be informed by considering businesses with similar financial and operating characteristics – as discussed below in section 2.2.3.1.

2.2.3.1 Selecting businesses with similar characteristics

Selecting businesses with similar financial and operating characteristics involves selecting the businesses and then pooling these businesses into a group. For example, characteristics used to pool businesses may include:

- the activities of the business

- the ownership structure
- the structure of the market
- the financial characteristics of the firm
- the rate of technological change
- the regulatory regime
- the business' operating environment, and/or
- other factors.

The choice of characteristics and how they are applied will have a significant impact on the number of sample businesses included in the benchmark. In particular, selecting sample businesses to calculate the benchmark gearing ratio has been a point of contention between regulators and regulated businesses in the past.[22]

The AER notes that the selection of sample firms may not be limited to a single industry. For example, for the purposes of obtaining a benchmark credit rating the AER has previously pooled electricity distribution together with electricity transmission; however gas businesses were not included. The AER has previously stated that:

> In determining the appropriate benchmark credit rating to be used in electricity transmission revenue regulation, the AER believes it is necessary to first survey the existing credit ratings of government and private electricity transmission and distribution companies.[23]

In response, the Allen Consulting Group (ACG) has submitted that there is no *a priori* case for believing that the credit rating of transmission and distribution, and/or, gas and electricity business that were otherwise identical would be different for the purposes of benchmarking credit ratings.[24]

Application of selecting businesses with similar characteristics

In deciding how sample businesses are selected for the gearing parameter, the ACG has in the past used a 'hierarchical approach'.[25] For example, the hierarchy for selecting sample businesses to use as a benchmark for Australian electricity transmission businesses may be:

- regulated electricity transmission businesses

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22 For example see, ACG, *Queensland Distribution Network Service Providers - Cost of Capital Study*, Report to the QCA, December 2004, p. 10, and ACG, *Electricity Networks Access Code 2004: Advance Determination of a WACC Methodology*, Report to ERA, January 2005, p. 38.

23 AER, *Australian Energy Market Commission – Draft National Electricity Amendment (Economic Regulation of Transmission Service) Rule 2006*, Submission, March 2006, p. 26.

24 ACG, *Credit Rating for a Benchmark Electricity Transmission Business*, Report to ETNOF, May 2006, pp. v-vi.

25 ACG, *Electricity Networks Access Code 2004: Advance Determination of a WACC Methodology*, Report to ERA, January 2005, p. 30.

- regulated electricity distribution businesses
- regulated energy transmission and/or distribution businesses
- regulated utility transmission and/or distribution businesses
- regulated utilities (e.g. including roads and airports)
- unregulated utility transmission and or distribution businesses
- unregulated utilities, and
- unregulated businesses.

Under this approach benchmark businesses would be obtained by including businesses from the top of the hierarchy that are considered to be the most comparable and moving down the hierarchy to include businesses that are considered less comparable, until there is deemed to be a sufficient number of businesses to provide a reliable estimate. This provides a trade-off between obtaining a group of sample businesses that are representative of the businesses being regulated, and the statistical robustness of the parameter being estimated as businesses are added from lower positions in the hierarchy.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

2.4 Which characteristics should be considered and what amount of weight to particular characteristics should be given when selecting sample businesses?

2.5 Is it appropriate to pool electricity and gas distribution and transmission businesses in selecting the sample of businesses for some of the WACC parameters? For which parameters is it appropriate?

2.6 Should a hierarchical approach or another approach be used to select benchmark businesses?

2.2.3.2 Unregulated activities and mergers and acquisitions

The AER notes that in the past the ACG has considered, in relation to gearing, that industry benchmarks should exclude businesses that are involved with a large portion of unregulated activities and are subject to acquisition activity such as AGL and Alinta[26]. However, where the sample business is affecting the data due to a merger or an acquisition, it may not be necessary to remove the entire business from the sample. When examining observations relating to the business in question, it may be acceptable to remove observations that have been affected by acquisition activity rather than removing the business from the sample.

[26] ACG, *Queensland Distribution Network Service Providers - Cost of Capital Study*, Report to the QCA, December 2004, p. 9.

The AER also notes that the Australian Competition Tribunal ('the Tribunal') does not consider that a simple averaging methodology is appropriate when the sample includes outliers (referred to as 'outriders') such as AGL.[27] It concluded that AGL should be removed from the sample when considering the debt risk premium (DRP), which resulted in the change of the average credit rating from BBB+ to BBB.[28] Although this decision had no impact on the gearing ratio adopted in the Australian Competition and Consumer Commission's (the ACCC) final regulated tariff for the Moomba to Sydney Pipeline (MSP), the methodology for selecting sample businesses for the DRP has implications for estimating the benchmark gearing ratio.

Another potential approach to addressing the issue of outlier businesses may be to apply a weight or adjustment based upon the percentage of the business' assets that relate to regulated activities. This approach has been taken in other regulated industries (such as telecommunications).

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

2.7 Should businesses with significant unregulated activities be included in the sample used to obtain an industry benchmark?

2.8 If businesses with significant unregulated activities are included as part of the industry benchmark, should specific observations be removed or should specific adjustments be made?

2.2.3.3 Foreign comparators

The AER notes that to ensure the industry benchmark is reliable and indicative of an efficient benchmark, some form of cross-checking may need to be undertaken. This has been important in an Australian context due to a lack of comparator businesses in obtaining an industry benchmark. In particular, in conducting analyses of WACC parameters a second step in the process has usually involved sampling international comparator businesses. For example, the ACG has used gas and electricity distribution businesses operating in the United States to ensure that the Australian sample provided a realistic benchmark level of gearing for Queensland DNSPs.[29] In using these businesses as a cross-check, the ACG noted:

> A problem, however, with electricity companies in the US is that they are usually integrated. Most have interests in electricity generation, which is commonly recognised as a riskier enterprise than distribution. So, for similar reasons as in Australia, the observed company-wide gearing levels are likely

[27] The Tribunal considered, as the ACG have in the past, that AGL was not representative of benchmark firm given that AGL was involved with a large portion of unregulated activities and was acquisitive in nature; Australian Competition Tribunal, *Application by East Australian Pipeline Limited [2004],* ACompT 8, 66-67.

[28] Australian Competition Tribunal, *Application by East Australian Pipeline Limited [2004],* ACompT 8, 66-67.

[29] ACG, *Queensland Distribution Network Service Providers - Cost of Capital Study*, Report to the QCA, December 2004, pp. 11-12.

> to understate the gearing a company solely distributing electricity could support.[30]

Other problems that may arise in selecting international comparators as a cross-check involve differences in regulatory regimes, and differences in the physical operating environment (e.g. weather and geography) to that of Australia.

For example, when using foreign comparator businesses for the purposes of estimating an equity beta, the ACG has noted that caution should be taken:

> While considering it would be 'improper to pay no attention at all to the foreign comparables', Gray and Officer believed it is not possible to 'directly use as an estimate of a domestic company's beta, the beta of a comparable company from another market or economy.' ACG concurs with this view. However, it is difficult to envisage mechanical adjustments (apart from market leverage adjustments), and the order of magnitude of any such adjustments would necessarily be crude. We therefore recommend that although foreign evidence should be reviewed, this should be undertaken with caution.[31]

The issues relating to the application of adjustments to 'domestic' equity beta estimations are discussed later in section 6.3.2.3. The alternative to using foreign WACC parameters to adjust the 'domestic' WACC parameters is to compare the foreign WACC parameter to the unadjusted domestic WACC parameter. This comparison may involve either looking at an unadjusted foreign WACC parameter or adjusting the foreign WACC parameter to account for domestic conditions. In comparing foreign WACC parameters it is also important to understand that these parameters are affected by a number of factors which may not apply in the Australian context. For example, the systematic risk of an overseas business may be affected by the macroeconomic environment and regulatory framework in which it operates.

Given these considerations, it may be difficult to make objective adjustments to foreign WACC parameters for the purposes of comparison with domestic parameters. Nevertheless, the AER notes that foreign WACC parameters have been used by regulators in the past (e.g. as a broad cross-check of the reasonableness of domestic equity beta estimates).

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

2.9 Which foreign businesses could be considered for the purposes of cross-checking WACC parameters estimated based on domestic data?

2.10 Which criteria (i.e. similar markets and legal systems) should be used to pool foreign comparator businesses?

2.11 Other than the use of direct estimation and foreign comparators, is there another method that could be used to check the reasonableness of WACC parameters?

30 ibid., p. 11.
31 ibid., p. 35.

3 Gearing

3.1 Introduction

Gearing refers to the ratio of debt to total assets (i.e. debt and equity), and is used to weight the costs of debt and equity when formulating a WACC. A business' capital structure will have a major bearing on the required return on debt and the required return on equity (although in theory it is unlikely to affect the cost of capital).[32] In theory, the cost of capital should be stable within a gearing range of 40 to 70 per cent.[33]

Apart from being used to weight the required return on debt and equity to derive the WACC, the benchmark gearing level is used:

- to re-lever asset betas for the purposes of comparison and
- as a factor considered when determining a credit rating for deriving the DRP.

The equity beta and DRP are discussed in chapters six and seven, respectively. This chapter outlines the NER requirements, past regulatory practice, and the issues relating to the measurement of gearing.

3.2 Previously adopted value

Where a parameter cannot be determined with certainty, the NER provides that the AER must have regard to the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it. The AER must also have regard to the need to achieve an outcome that is consistent with the national electricity objective.[34]

This section outlines the value of the level of gearing previously adopted in determinations for electricity transmission and distribution service providers.

3.2.1 Transmission

The NER deemed the initial value of the market value of debt as a proportion of the market value of equity and debt (D/V) to be 0.6.[35] The initial value of the market value of equity as a proportion of the market value of equity and debt (E/V) was deemed to be 1 – (D/V). [36] Therefore the initial gearing ratio in the NER was set at 60:40 for electricity transmission service providers.

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32 The cost of capital is invariant over a broad range of gearing possibilities under the assumptions of perfect information, no taxes and no transaction costs. See F Modigliani, and M H Miller, 'The Cost of Capital, Corporation Finance and the Theory of Investment', *American Economic Review*, Vol.48, No. 3, 1958, pp. 261-297.

33 Officer, *A Weighted Average Cost of Capital for a Benchmark Australian Electricity Transmission Business-A Report for SPI PowerNet*, February 2002, p. 38.

34 NER, cll. 6.5.4(e)(4) and 6A.6.2(j)(4).

35 NER, cl. 6A.6.2(b).

36 ibid.

3.2.2 Distribution

The NER did not deem an initial value for the level of gearing. However, without exception jurisdictional regulators have chosen to adopt a gearing ratio of 60:40 to apply to distribution network service providers. When examining a previously adopted value or method for the level of gearing, the AER has taken into account the jurisdictional decisions for both electricity and gas distribution, given the similar (or equivalent) nature of the issues involved across the two sectors. Notwithstanding, the AER recognises that there may be differences between the two sectors in relation to the level of gearing subject to this review. Table 3.1 sets out the jurisdictional decisions on gearing that have been taken into account by the AER as part of its review.

Table 3.1: Electricity and gas distribution determinations – gearing

Regulator (year)	Sector	Gearing (final)
ESC (2008)	Gas	60:40
OTTER (2007)	Electricity	60:40
ESCOSA (2006)	Gas	60:40
QCA (2006)	Gas	60:40
ESC (2006)	Electricity	60:40
QCA (2005)	Electricity	60:40
ESCOSA (2005)	Electricity	60:40
IPART (2005)	Gas	60:40
ICRC (2004)	Gas	60:40
IPART (2004)	Electricity	60:40
ICRC (2004)	Electricity	60:40
Estimate (low-high)	**Energy**	60:40

Source: ESC[37], OTTER[38], ESCOSA[39], QCA[40], IPART[41], ICRC[42].

37 ESC, *Gas access arrangement review 2008-2012 – final decision – public version*, 7 March 2008, pp.489-490; ESC, *Electricity distribution price review 2006-10 – October 2005 price determination as amended in accordance with a decision of the Appeal Panel dated 17 February 2006 – final decision – volume 1 – statement of purpose and reasons*, October 2006, p.332.

38 OTTER, *Investigation of prices for electricity distribution services and retail tariffs on mainland Tasmania – final report and proposed maximum prices*, September 2007, p.152.

39 ESCOSA, *Proposed revisions to the access arrangement for the South Australian gas distribution system – final decision*, June 2006, p.74; ESCOSA, *2005-2010 electricity distribution price determination – part A – statement of reasons*, April 2005, p.55.

40 QCA, *Final decision – revised access arrangement for gas distribution networks: Allgas Energy*, May 2006, p.66; QCA, *Final decision – revised access arrangement for gas distribution networks:*

The main sources of information relied upon is consistency with recent decisions made by other regulators and evidence from capital markets. A detailed discussion of the issues raised in the more recent reviews is included in the following sections.

3.3 Issues

Market evidence supporting a gearing ratio of 60:40 has mainly been used to support submissions from interested parties or relied upon by external advisors to jurisdictional regulators. While regulators have adopted a 60:40 gearing ratio, when an industry benchmark level of gearing has been considered, interested parties have focused upon how the efficient benchmark is measured. The main issues that have been raised by interested parties relating to the measurement of gearing are:

- the selection and characteristics of businesses used to obtain an average industry benchmark and
- the methodology used to measure the level of gearing.

3.3.1 Data availability

In general, the AER recognises the importance of having a consistent approach to estimating the different WACC parameters, to the extent possible. An example of this is the selection of benchmark businesses (as discussed in section 2.2.3). However, there are some instances where a consistent approach to estimating WACC parameters may not be possible. For example, the selection and frequency of an averaging period of market data for gearing will vary for estimating the equity beta, market risk premium, risk free rate and the debt margin. This may be due to the nature of the parameter, and the availability and reliability of data.

The AER recognises that the main limitations in obtaining data to calculate benchmark gearing involve the relevance and or reliability of data due to:

- mergers and acquisition activities (see section 2.2.3.2)
- 'unrepresentative events' that may have impacts on the valuation of debt and equity (see section 6.3.2.1 for a discussion about potential impacts) and
- the relevance of data available beyond that of financial reports (annual and half yearly) and report cards from reputable credit rating agencies.

In particular, the presence of the above issues may affect the length of time that could reliably be used to estimate an appropriate gearing ratio to provide a forward looking benchmark. This in turn has a significant impact upon the number of observations as

Envestra, May 2006, p.97; QCA, *Final determination – regulation of electricity distribution*, April 2005, p.106.

41 IPART, *Revised access arrangement for Country Energy gas network – final decision*, November 2005, p.66; IPART, *Revised access arrangement for AGL gas networks – final decision*, April 2005, p.99; IPART, *NSW electricity distribution pricing 2004-05 to 2008-09 – final report*, June 2004, p.221.

42 ICRC, *Final decision – review of access arrangement for ActewAGL natural gas system in ACT, Queanbeyan and Yarrowlumla*, October 2004, p.190; ICRC, *Final decision – Investigation into prices for electricity distribution services in the ACT*, March 2004, p.70.

gearing is likely to be only observed on an annual or semi-annual basis. Accordingly, to ensure the sample used to calculate a benchmark is robust, there is an issue in how this problem can be addressed. Increasing the sampling period to smooth out shocks may provide a statistically robust estimate but it may also result in a less relevant estimate.[43] On the other hand removing unrepresentative years in order to ensure the data used to estimate the benchmark gearing ratio is relevant may lead to a larger range of gearing estimates due to a higher variance.[44]

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

3.1 What is an appropriate time period and frequency for estimating the benchmark gearing ratio from available market data?

3.3.2 Measurement of gearing

The AER notes that the NER define gearing as the ratio of the market value of debt to the market value of equity and debt. This creates definitional and measurement issues as the market value of debt and equity may not necessarily equate to the ratio of debt to total assets (as used by the ACCC and AER in the past). The AER considers that issues relating to the measurement of gearing fall into two broad categories. The first category is the valuation method of debt, equity and assets (e.g. market valuation or historical cost). The second category involves defining what should be considered debt and equity.

3.3.2.1 Valuation methodologies

There are a number of approaches to estimating the benchmark gearing ratio. These include:

- debt to debt and equity
- debt to total capital and
- debt to the regulatory asset base.[45]

The first two methods can then be split between 'market gearing' and 'book levels' of gearing. Both of these methods use the book value of debt but vary on the measurement of equity. The ACG previously noted that:

> …using the book value of an entity to derive a gearing level is generally eschewed in financial economics, as accounting values may provide a misleading impression of market values. However, a number of the Australian energy utilities have been sold recently in trade sales, where it would be expected that the book values of the entities were reset at the purchase price.

43 This assumes that the new observations may reduce the overall variance of the sample.
44 This assumes that the removed observations may increase the overall variance of the sample.
45 ACG, *Queensland Distribution Network Service Providers - Cost of Capital Study*, Report to the QCA, December 2004, p. 8.

> In this case, the book values of the entities are likely to provide a reasonable proxy for their market values.[46]

Although the NER require for transmission that a market valuation is used for both debt and equity, this may not be possible as the market valuation of debt or equity may be unavailable under specific circumstances. The debt to RAB method has been used to measure gearing in regulatory decisions as it reflects the level gearing relating to the regulated firm's business. Further, the RAB is based upon an initial asset base (which is valued based upon the depreciated optimised replacement cost) and capital expenditure (capex) in nominal dollars. Therefore it is considered more likely that the RAB may provide an amount more reflective of the market value rather than book value. However, the ACG further noted:

> …when determining the benchmark gearing level for a regulated entity is the fact that both the market and book values have tended to exceed the regulatory values of the entities. Thus, the level of debt as a proportion of the regulatory value would be expected to be much higher than that of the market or book value of the entity…
>
> …these figures incorporate the debt of the entire company, they may overstate the gearing levels of the regulated businesses.[47]

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

3.2 Are objective market valuations for debt and equity available to estimate gearing ratios?

3.3 If an objective market valuation measure does not exist, then should the percentage of debt be measured relative to the value of the RAB be applied or book values of debt to debt and equity?

3.3.2.2 Definition of debt and equity

In financial statements there are a number of different items that will have impacts on the gearing of a business or businesses. Whether these items are defined as debt or equity, or are excluded from the examination of gearing is a crucial issue in measuring an industry benchmark level of gearing. Most of these items fall into broad categories such as:

- hybrid securities and quasi debt
- long-term provisions, and
- current assets and liabilities.

The presence and definition of hybrid securities (as either debt or equity) is likely to have implications on the gearing ratio if hybrid securities form a large part of a

46 ibid., pp. 8-9.
47 ibid., pp. 9-10.

regulated entity's financing arrangements. Hybrid securities are also known as forms of quasi debt such as convertible notes and infrastructure trust agreements.

Long-term provisions are amounts set aside to offset expected losses such as bad debts and depreciation. It is unclear whether long-term provisions should be included (if possible) and whether they should be treated as debt or equity.

Current assets and liabilities relate to the daily operation of business and include non-capitalised leases, debtors, receivables and other forms of short-term financing. It has been assumed in the past that current assets (for example receivables) and liabilities (for example purchases) will balance each other out in measuring the benchmark gearing ratio. Whether this has occurred will determine whether this will be a prevalent issue for regulated businesses.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

3.4 What definition of debt and equity should be applied where data is available?

3.5 Which items should be excluded and or included when measuring an industry benchmark gearing ratio?

3.6 If hybrid securities and other forms of quasi debt are included in the measurement of the benchmark gearing ratio, how should specific types of hybrid securities be classified in terms of debt or equity?

4 Nominal risk free rate

4.1 Introduction

The risk free rate is the rate of return an investor receives from holding an asset with guaranteed payments (i.e. no risk of default). Where a risk free rate is calculated in nominal terms (actual cash flows) the risk free rate will compensate investors for the opportunity cost of not being able to invest in the next best equivalent 'riskless' investment. This includes compensation for:

- the time value of money
- the expected cost of inflation which is expected to decrease the purchasing power of the certain cash flows to be received and
- other possible premiums for certain risks, which might include liquidity and inflation risk.[48]

A risk free rate is used as a direct input into the CAPM to determine the required return on equity. In addition, a risk free rate is used as an input in the calculation of the required return on debt.

4.2 Previously adopted method

Where a parameter cannot be determined with certainty, the NER provides that the AER must have regard to the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it. The AER must also have regard to the need to achieve an outcome that is consistent with the national electricity objective.[49]

This section outlines the method of determining the nominal risk free rate previously adopted in determinations for electricity transmission and distribution service providers.

The NER deemed the initial method for estimating the nominal risk free rate for both electricity transmission and distribution, consistent with current regulatory practice.[50] The prescribed NER methodology for transmission and distribution is almost identical [clauses 6.5.2(c)-(d) and 6A.6.2(c)-(d)], as set out below:

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48 The liquidity premium positively compensates investors for bearing higher interest rate risk on longer-term bonds. The inflation risk premium compensates investors for bearing the risk of higher inflation risk on longer-term nominal bonds.

49 NER, cll. 6.5.4(e)(4) and 6A.6.2(j)(4).

50 NER, cll. 6.5.2(c)-(d) and 6A.6.2(c)-(d).

(c) The nominal risk free rate for a regulatory control period is the rate determined for that regulatory control period by the AER on a moving average basis from the annualised yield on Commonwealth Government bonds with a maturity of 10 years using:

(1) the indicative mid rates published by the Reserve Bank of Australia; and

(2) a period of time which is either:

(i) a period ('the agreed period') proposed by the relevant [Network Service Provider], and agreed by the AER (such agreement is not to be unreasonably withheld); or

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Transmission

(ii) a period specified by the AER, and notified to the provider prior to the commencement of that period, if the period proposed by the provider is not agreed by the AER under subparagraph (i),

Distribution

(ii) a period specified by the AER, and notified to the provider within a reasonable time prior to the commencement of that period, if the period proposed by the provider is not agreed by the AER under subparagraph (i),

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and, for the purposes of subparagraph (i):

(iii) the start date and end date for the agreed period may be kept confidential, but only until the expiration of the agreed period; and

(iv) the AER must notify the [Network Service Provider] whether or not it agrees with the proposed period within 30 business days of the date of submission of the [initial regulatory proposal].

(d) If there are no Commonwealth Government bonds with a maturity of 10 years on any day in the period referred to in paragraph (c)(2), the AER must (unless some different provision is made by a relevant statement of regulatory intent) determine the nominal risk free rate for the regulatory control period by interpolating on a straight line basis from the two Commonwealth Government bonds closest to the 10 year term and which also straddle the 10 year expiry date.

4.2.1 Transmission

In line with the current NER requirements, the ACCC and the AER have previously adopted a 10-year CGS yield as the proxy for the nominal risk free asset. On the averaging period, the AER has adopted the ACCC's position as set out in the *Statement of principles for the regulation of electricity transmission revenues* (the 'SRP'), as follows:

The ACCC will accept the period used to calculate the moving average of the risk free rate (between 5 and 40 days) submitted by a TNSP in its application.[51]

4.2.2 Distribution

Currently all jurisdictional regulators in the NEM adopt the observed yield to maturity on 10-year Commonwealth Government bonds as the proxy for the risk free rate. The averaging period adopted in distribution decisions has generally varied between 10 and 20 days in length.

The most recent jurisdictional electricity and gas distribution decisions on the risk free rate are set out in table 4.1.

Table 4.1: Electricity and gas distribution determinations – risk free rate

Regulator (year)	Energy	Risk free rate (proxy)	Risk free rate (sampling period)
ESC (2008)	Gas	10-year nominal CGS	20 days
OTTER (2007)	Electricity	10-year nominal CGS	20 days
ESCOSA (2006)	Gas	10-year nominal CGS	10 days
QCA (2006)	Gas	10-year nominal CGS	20 days
ESC (2006)	Electricity	10-year index-linked CGS*	20 days
QCA (2005)	Electricity	10-year nominal CGS	20 days
ESCOSA (2005)	Electricity	10-year nominal CGS	5-year rolling avg
IPART (2005)	Gas	10-year nominal CGS	20 days
ICRC (2004)	Gas	10-year nominal CGS	20 days
IPART (2004)	Electricity	10-year nominal CGS	20 days
ICRC (2004)	Electricity	10-year nominal CGS	20 days

Source: ESC[52], OTTER[53], ESCOSA[54], QCA[55], IPART[56], ICRC[57].
* The ESC adopted a real framework in its 2006 decision

51 ACCC, *Statement of principles for the regulation of electricity transmission revenues*, 8 December 2004, p.98
52 ESC, op. cit., 7 March 2008, p.456; ESC, op. cit., October 2006, p.344.
53 OTTER, op. cit., September 2007, p.134.
54 ESCOSA, op. cit., June 2006, pp.67-68; ESCOSA, op. cit., April 2005, p.132.
55 QCA, op. cit.,May 2006, p.65; QCA, op. cit., May 2006, p.96; QCA, op. cit., April 2005, p.102-104.
56 IPART, op. cit., November 2005, p.63; IPART, op. cit., pp.95-96; IPART, op. cit., June 2004, p.61.
57 ICRC, op. cit., October 2004, p.154; ICRC, op. cit., March 2004, p.68.

4.3 Issues

There are three major issues involved in determining a methodology for calculating the nominal risk free rate. These include the appropriate:

- proxy for the risk free rate asset
- term to maturity (term) of the risk free asset proxy and
- sampling period over which the proxy is measured.

4.3.1 Proxy for the risk free asset

As the risk free asset is not directly observable, a proxy must be chosen for the risk free asset of the chosen maturity. The yield-to-maturity on Australian Commonwealth Government Securities (CGS) is generally considered to be the best proxy for the nominal risk free rate in Australia, as these bonds:

- are essentially default risk free (government guaranteed returns)
- are highly liquid assets, and
- have yields that are transparent and published.

Currently, issued Australian CGS have maturities ranging from one to over twelve years. The Australian government is committed to maintaining a sufficiently liquid and active bond market to support the efficient and effective operation of Australia's financial markets.[58] The AER considers, therefore, that Australian CGS of any maturity out to ten years can reliably be used as a proxy for the nominal risk free rate.

The AER notes recent debate in this area arising from a series of NERA reports regarding the continued appropriateness of using CGS yields as a proxy for the risk free rate.[59] In the context of the nominal risk free rate, NERA contended (at the time) that there existed an 'absolute bias' in nominal CGS yields principally attributable to increased institutional demand and reduced supply of these bonds. As an alternative, NERA proposed that the yields on corporate bonds less (matched) credit default swap (CDS) rates provide a better proxy for the nominal risk free rate.

As part of recent ACCC and AER decisions for GasNet, SP AusNet and ElectraNet, the ACCC and the AER received views from the Reserve Bank of Australia (RBA) and Australian Treasury regarding the claims made by NERA in its reports. Both the RBA and Australian Treasury did not consider there to be an absolute bias in nominal CGS yields, and considered that CGS remain the best proxy for the nominal risk free asset.[60]

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58 Treasurer of the Commonwealth of Australia, *Increasing Commonwealth Government Securities to bolster Australia's financial markets*, Media release No.058, 20 May 2008.

59 NERA, *Bias in indexed CGS yields as a proxy for the CAPM risk free rate*, March 2007; and NERA, *Absolute bias in (nominal) Commonwealth Government Securities*, 7 June 2007.

60 Debelle, *Letter from Reserve Bank of Australia Financial Market Group to Mr Joe Dimasi ACCC re: distortions in CGS yields*, 9 August 2007; and Murphy, *Letter from the Australian Government*

In any case, given the recent market volatility it is unclear whether CDS rates could provide a viable alternative to CGS yields as a proxy for the nominal risk free rate.

A fundamental assumption of the NERA approach is that, should a firm that has issued a corporate bond (and also purchased a CDS) default, the return to the purchaser of the bond is still guaranteed as the CDS issuer will 'step in' and guarantee the return to the bond purchaser (that is, the CDS issuer will provide any remaining return not provided to the bond purchaser by the bond issuer before it defaulted). Amongst other issues, for this methodology to generate a 'risk free' rate there must be a zero probability of the CDS issuer itself defaulting. However, recent experience in the US associated with the 'sub prime crisis' has demonstrated that CDS issuers are not themselves free from the risk of default. Therefore significant concerns arise over using this alternative methodology to determine a proxy for the risk free rate.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

4.1 Are there any viable alternatives to Commonwealth Government Securities (excluding using Credit Default Swaps) as an appropriate proxy for the nominal risk-free asset in the context of a domestic Australian CAPM?

4.3.2 Term of the risk free proxy

As stated above, since the Tribunal's GasNet decision, all regulators in the NEM have adopted a 10-year Commonwealth Government bond as the risk free proxy (including the ACCC and the AER).[61]

Despite the consistency in Australian regulatory practice regarding the term of the risk free rate, the AER considers that the appropriate term to adopt in a regulatory setting needs to be reviewed. As this is the first in-depth review of all of the WACC parameters across the energy sector since the Tribunal's decision, it would seem appropriate to re-examine this issue afresh, in particular to establish whether there is persuasive evidence to justify a departure from current practice.

The AER's objective is to set a term for the risk free rate that results in fair ex-ante compensation for any given investment over both the regulatory period and the life of the assets. This should result in an ex-ante expected compensation that investors would get elsewhere in the capital markets for investments of similar risk.

With this in mind, the AER has identified two major issues regarding the appropriate term for the risk free rate in a regulatory setting, as follows:

- whether matching the term with regulated asset lives violates the 'present value principle' and
- maintaining consistency with the estimation of the market risk premium.

Treasury Markets Group to Mr Joe Dimasi ACCC re: the use of treasury bond yields in estimating the CAPM risk free rate, 7 August 2007.

[61] It should be noted that some jurisdictional regulators adopted this method prior to the GasNet decision.

4.3.2.1 Matching the term with asset lives and the 'present value principle'

The Tribunal concluded in the GasNet decision that the use of a 10-year CGS yield as a proxy for the risk free rate was:

> …in accordance with the conventional use of a ten year bond rate by economists and regulators where the life of the assets and length of the investment approximated thirty years...[62]

The principal arguments for matching the maturity of the risk free rate with the life of the firm's assets relate to refinancing risk and the assumed investment horizon.

Refinancing risk

An optimal (low risk) financing strategy suggests that the duration of debt should as closely as possible match the duration (life) of the assets that it finances. NECG stated that the incentive for a company to structure its debt in such a way is to avoid refinancing risk:

> If a company contracts for a shorter period than the life of the asset, there is the risk that when the short-term borrowing matures, the company will not be able to obtain new financing at the same terms and conditions.[63]

Davis also suggested that the incentive to pursue long-term debt may reflect a desire to minimise transactions costs of debt issuance or to avoid an increase in the debt premium. However, Davis suggested that such a strategy does not necessarily require the use of long-term debt, as it can also be achieved with a combination of short-term debt and appropriate hedging measures.[64]

In any case the AER considers that such a financing strategy is and should be at the discretion of the regulated entity. Provided the regulator commits to resetting interest rates (and cash flows) at the end of the regulatory period, and the firm refinances in the specified averaging period, the exposure to interest rate risk will be minimised to the greatest extent possible. However, if firms choose to take on interest rate risk to maximise profits they should be entitled to do so. This also provides an incentive for regulated firms to be structurally efficient with their capital on issue, as any gains over the base rate awarded by the regulator are retained.

Further, given that there are very few bonds on issue with a maturity greater than 10 years, it is not be practically possible to match the duration of debt with the average life of electricity network assets, which generally exceeds 30 years. Therefore the use of a 10 year risk free rate will not eliminate refinancing risk.

There may also be other important aspects of refinancing risk that are issuer-specific, such as the firm's credit rating and debt raising costs. These aspects are discussed separately in section 7.3.2 (credit rating).

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62 Australian Competition Tribunal, *Application by GasNet Australia (Operations) Pty Ltd [2003] ACompT* 6, p.18

63 NECG, *2003 Review of the Draft Statement of Principles for the Regulation of Transmission Revenues – Submission to the ACCC for the electricity TNSPs from Network Economics Consulting Group*, November 2003, p.40

64 Davis, *Report on risk free interest rate and equity and debt beta determination in the WACC*, Prepared for the ACCC, August 2003, p.15

The investment horizon

In terms of estimating the return to equity, NECG has argued that the appropriate maturity for the risk free rate is the life of the assets, given the long-term investment horizon of infrastructure providers.[65] However, this argument related to the return on equity also appears to ignore the effect of regulatory resets on the risks facing the regulated firm and its equity capital providers.

Present value principle

While the arguments for a long-term risk free rate (for both the return on debt and equity) may be applicable in a general setting, they may be less relevant in the context of the current regulatory framework – where the risk free rate is adjusted at each reset. The AER notes that the Tribunal did not specifically discuss or address in its GasNet decision the possibility of over-compensation resulting from the use of a term for the risk free rate that exceeds the length of the regulatory period.

The term of the risk free asset can affect allowed returns to regulated firms where the term structure of interest rates is not flat over the long run. As Davis pointed out, the importance of the term of the risk free rate in a regulatory setting is dictated by an assumption that:

> …long term interest rates will, on average, exceed short term rates for reasons other than expectations of future increases in interest rates.[66]

In other words, all else being equal, the presence of a 'liquidity premium' and/or an 'inflation risk premium' in bond yields suggests that use of a long-term risk free rate will generally provide higher returns compared to a short-term risk free rate.[67] Conversely, if the observed difference in bond rates of differing maturities was purely explained by the 'expectations hypothesis', the relevance of the term of the risk free rate is diminished.[68] This is because any over or under compensation resulting from the use of a longer term rather than a shorter term bond would net itself out in the long-run.

In addition, recent empirical work by Davis finds that long-term Australian government bonds have had significant positive systematic risk, and that the systematic risk of bonds increases with maturity.[69] This may imply that 10-year CGS yields overestimate the appropriate risk free rate over a shorter (say, five year) regulatory period, and therefore that use of a bond of maturity greater than the length of the regulatory period may result in over-compensation (at least on average).

These arguments suggest that, in a regulatory setting, use of a term for the risk free rate that exceeds the length of the regulatory period may lead to overcompensation – for risks that are essentially removed at each reset. These risks may include:

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65 NECG, op. cit., 2003, pp.42-43

66 Davis, op. cit., 2003, p.5

67 The liquidity premium positively compensates investors for bearing higher interest rate risk on longer-term bonds. The inflation risk premium compensates investors for bearing the risk of higher inflation on longer-term nominal bonds.

68 The expectations hypothesis states that the interest rate on a long-term bond will equal an average of short-term interest rates that the market expects to occur over the life of the long-term bond.

69 Davis, 'The systematic risk of debt: Australian evidence', *Australian Economic Papers*, 2005.

- interest rate risk (the liquidity premium)
- inflation risk and
- any other systematic risk.

This outcome does not appear consistent with the principle that in setting fair rates of return on regulated investments, the present value of expected future cash flows should equate to the initial investment such that the net present value of the investment is zero (the 'present value principle').[70]

A number of authors have argued that if this 'present value principle' is to be satisfied in a regulatory setting, the appropriate term of the risk free rate is the length of the regulatory period. For example, Lally demonstrated that setting a term for the risk free rate which is greater than the length of the regulatory period is inappropriate because:

> In the presence of a liquidity premium in the term structure of interest rates, the allowed price is greater than it would otherwise be. This increased allowance is inappropriate because the regulated firm is being compensated for bearing interest rate risk for a period beyond the review term, when it does not face that risk due to the resetting of the output price to reflect interest rate changes.[71]

Lally stated that the only policy that satisfies the present value principle is the setting of prices using a term for the risk free rate that matches the regulatory period. According to Lally's analysis, this result holds even in the presence of other risks that may arise during the regulatory period such as those relating to cost, volume and various asset valuation methodologies.[72]

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

4.2 What is the typical term over which a regulated network business in Australia refinances its debt? How relevant is this term in a regulatory setting?

4.3 What is the true extent of interest rate and refinancing risk faced by regulated network businesses as a result of the regulatory regime? Can regulated network businesses manage their refinancing risk via swaps and other financial instruments?

4.4 As the nominal risk free rate is reset at the commencement of each regulatory period, should the term of the nominal risk free proxy (all else equal) be the same as the term of the regulatory period?

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70 It is also worth noting that the use of a term for the risk free rate that is less than the length of the regulatory period may lead to under-compensation.

71 Lally, *Determining the risk free rate for regulated companies*, prepared for the ACCC, August 2002, pp.4-8. See also: Davis, op.cit., 2003, pp.6-10.

72 Lally, 'Regulation and the choice of the risk free rate', *Accounting Research Journal*, 2004: 17(1).

4.3.2.2 Maintaining consistency with the market risk premium

The need to maintain consistency with the estimation of a long-term MRP has been raised as one of the key arguments for using a long-term risk free rate throughout the CAPM.

The risk free rate appears twice in the CAPM equation, as set out in figure 4.1.

Figure 4.1: The risk free rate in the CAPM equation

$$k_e = r_f + \beta_e \times (r_m - r_f)$$

where:

k_e	=	the expected the return on equity
r_f	=	the nominal risk free rate of return
β_e	=	the equity beta
r_m	=	the expected return on the market portfolio
$r_m - r_f$	=	the expected market risk premium (MRP)

It has been argued that for consistency, only one risk free rate should be used throughout the application of the CAPM. The Tribunal in its GasNet came to this conclusion, as follows:

> While it is no doubt true that the CAPM permits some flexibility in the choice of the inputs required by the model, it nevertheless requires that one remain true to the mathematical logic underlying the CAPM formula… the use of different values for a risk free rate in the working out of a Rate of Return by the CAPM formula is neither true to the formula nor a conventional use of the CAPM.[73]

As a consequence, given that the MRP for GasNet had been estimated as a long-run historical average using the 10-year bond rate, the Tribunal concluded that consistency required the use of the 10-year bond rate throughout the CAPM.

The theory supporting a consistent risk free rate within the CAPM can be illustrated with a simple example whereby the business is assumed to have the same equity beta as the market portfolio (ie. β equals 1). On this basis the CAPM equation requires that:

$$k_{e[\beta=1]} = r_{m[\beta=1]}$$

In order to satisfy the CAPM equation under these assumptions, both the first and second risk free rates as they appear in the CAPM equation must be equal. This

[73] Australian Competition Tribunal, op. cit., 2003, pp.17-18.

position – that consistency in this area is a prerequisite to using the CAPM – is supported by a number of authors such as NECG as well as Boyle et al.[74]

On the other hand, the significance of the consistency issue has been questioned by Lally as well as Davis,[75] primarily on the basis that the traditional method for estimating a long-run historical MRP provides an imperfect proxy for the forward-looking MRP parameter as strictly required by the CAPM.

The AER recognises that the issue of maintaining consistency with the MRP has been raised previously as an important factor to consider in determining the appropriate term for the risk free rate in a regulatory setting. It remains open to question whether estimating the MRP using historical excess market returns over short-term government bond rates is required for consistency, even for a CAPM that assumes a short-term investor horizon. This is because the use of historical excess returns is only a proxy for the forward looking MRP.

These issues are discussed in more detail at section 5.3.1.4 (MRP).

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

4.5 What is the significance of consistency between the risk free rate proxy and the MRP from both a theoretical and a practical point of view?

4.6 How does the objective of maintaining consistency with the MRP interact with the 'present value principle' in determining an appropriate term for the risk free rate in the CAPM?

4.3.3 Measuring the risk free rate of return

As stated above in section 4.2, the NER currently prescribes the methodology for calculating the nominal risk free rate for the purposes of a regulatory reset. In reviewing the prescribed methodology the AER has identified two major issues with measurement, as follows:

- the averaging period and
- method of interpolation from published data.

Averaging period

The NER currently allow (for both electricity transmission and distribution) businesses to propose an averaging period over which the nominal risk free rate is measured for the purposes of a regulatory determination.[76] The AER must 'not unreasonably withhold' its approval of the proposed averaging period. However no

74 NECG, op. cit., 2003, pp.36-39; and Boyle, Evans and Guthrie, *Estimating the WACC in a Regulatory Setting*, New Zealand Institute for the Study of Competition and Regulation Inc., March 2006, pp.15-16.

75 Lally, *The cost of capital for regulated entities – Report prepared for the Queensland Competition Authority*, February 2006, pp.68-70; and Davis, op. cit., 2003, pp.11-12.

76 NER, cll. 6.5.2(c) and 6A.6.2(c).

guidance is provided in the NER as to the appropriate length and start date of the averaging period, or what would constitute the reasonable withholding of approval.

All energy regulators in Australia (including the ACCC and the AER) have generally accepted an averaging period of between 5 and 40 days in length. The AER's current approach is to accept a proposed starting date to the averaging period which is as close as practically possible to the commencement of the regulatory control period, to ensure an unbiased estimate of the risk free rate (and the corporate bond rate). To obtain an unbiased estimate, the averaging period should also be a future period (that is, the averaging period should be determined in advance).

In theory, taking the published risk free rate of return on the day that the regulatory determination comes into effect is likely to give the best expectation of future interest rates. This is because this rate is not influenced by information that may no longer be relevant going forward which is implicit in past prices. However, the risk free rate on a given day may also have a high standard error due to market volatility. Hence in determining the period over which the risk free rate of return is measured, there may be a direct trade off between 'volatility driven error' and 'old information driven error' in interest rate estimates.

It remains open to question whether an averaging period of 5 to 10 days in length can sufficiently overcome volatility driven error. In addition, there may be certain times of year (e.g. the Christmas period) that are less suitable for the purposes of obtaining an unbiased estimate of the risk free rate, due to the inherent potential for thinner market activity.

The NER currently allow the AER to assess such issues on a case-by-case basis at the time a regulated business submits its proposed averaging period. However it may be useful in the course of this review to explore these issues so as to provide more certainty over the AER's approach.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

4.7 Does the current regulatory practice of effectively accepting any averaging period to calculate the nominal risk free rate of between 5 and 40 days in length (and commencing as close as possible to the start of the regulatory period) require re-consideration?

4.8 In determining an appropriate averaging period, are there certain times of the year (e.g. the Christmas period) that should be excluded?

Method of interpolation from published data

The NER currently prescribe (for both electricity transmission and distribution) that where there are no Commonwealth Government bonds that mature after the appropriate term (currently 10 years) on any day during the averaging period, the

AER must linearly interpolate a nominal risk free rate of the appropriate term by using the two CGS bonds that are closest to but also straddle the appropriate term.[77]

The AER understands that the use of linear interpolation may result in over (under) compensation in circumstances where the yield curve slopes upwards (downwards) at an increasing rate. However the extent of over or under-compensation seems likely to be marginal. Further, the AER is not aware of any widely accepted and clearly superior interpolation methodologies.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

4.9 In calculating the nominal risk-free rate over the agreed averaging period, are there any alternative methodologies (other than linear interpolation) that should be considered?

[77] NER, cll. 6.5.2(d) and 6A.6.2(d).

5 Market risk premium

5.1 Introduction

The MRP is the expected return over the risk free rate that investors would require in order to invest in a well diversified portfolio of risky assets. By definition, the market portfolio has a beta of one. The MRP represents the premium investors who invest in such a portfolio can expect to earn for bearing only non-diversifiable risk. The MRP is common to all assets in the economy and is not specific to an individual asset or firm. The MRP is scaled up or down by the equity beta to reflect the risk premium equity holders would require to hold a particular risky asset as part of the investor's well diversified portfolio. The equity beta reflects the degree of systematic risk a particular asset is exposed to. As with all other components of the CAPM, the MRP is a forward-looking parameter which should reflect investors' expectations of future returns.

5.2 Previously adopted value

Where a parameter cannot be determined with certainty, the NER provides that the AER must have regard to the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it. The AER must also have regard to the need to achieve an outcome that is consistent with the national electricity objective.[78]

This section outlines the value of the market risk premium previously adopted in determinations for electricity transmission and distribution service providers.

5.2.1 Transmission

The NER deemed the initial value of the MRP for electricity transmission to be 6.0 per cent.[79]

5.2.2 Distribution

The NER did not deem an initial value of the MRP for electricity distribution.

The AER considers it appropriate to consider the MRPs previously adopted by jurisdictional energy regulators in both electricity and gas distribution, given the similar nature of the issues involved in both. Without exception, since at least 2004, jurisdictional energy regulators have either adopted a point estimate for the MRP of 6.0 per cent, or adopted a range for the MRP with 6.0 per cent falling within that range.

Table 5.1 below outlines the MRPs adopted by jurisdictional energy regulators in the most recent electricity and gas distribution determinations for each NEM jurisdiction.

78 NER, cll. 6.5.4(e)(4) and 6A.6.2(j)(4).
79 NER, cl. 6A.6.2(b).

Table 5.1 Electricity and gas distribution determinations – market risk premium

Regulator (year)	Sector	MRP (range)	MRP (final)
ESC (2008)	Gas	4.00% to 7.00%	6.00%
OTTER (2007)	Electricity	N/A	6.00%
ESCOSA (2006)	Gas	N/A	6.00%
QCA (2006)	Gas	N/A	6.00%
ESC (2006)	Electricity	N/A	6.00%
QCA (2005)	Electricity	N/A	6.00%
ESCOSA (2005)	Electricity	N/A	6.00%
IPART (2005)[80]	Gas	5.50% to 6.50%	6.00%
ICRC (2004)	Gas	N/A	6.00%
IPART (2004)	Electricity	5.00% to 6.00%	N/A
ICRC (2004)	Electricity	N/A	6.00%
Estimate (low-high)	**Energy**	**4.00% to 7.00%**	**6.00%**

Source: ESC[81], OTTER[82], ESCOSA[83], QCA[84], IPART[85], ICRC[86].

A detailed discussion of the issues raised in the more recent of these reviews is included in the following sections.

5.3 Issues

The MRP is an expected return which is not directly observable and so must be estimated. The most common approaches to estimating the MRP involve using historical excess market returns (over a government bond rate) as a proxy for the forward looking MRP. These approaches are commonly referred to as ex-post measures of the MRP and assume that investors' future expectations will be determined by historical experience. Ex-post measures include:

- estimating the expected MRP based on historical excess market returns, and

80 In its April 2005 decision for AGL, IPART determined the MRP to be between 5.5% and 6.0%, uniformly distributed. In its November 2005 decision for Country Energy, IPART accepted Country Energy's proposed MRP of 6.0%.

81 ESC, op. cit., 7 March 2008, p.489; ESC, op. cit., October 2006, p.332.

82 OTTER, op. cit., September 2007, p.152.

83 ESCOSA, op. cit., June 2006, p.80; ESCOSA, op. cit., April 2005, p.161.

84 QCA, op. cit., May 2006, p.62; QCA, op. cit., May 2006, p.92; QCA, op. cit., April 2005, p.97.

85 IPART, op. cit., November 2005, p.69; IPART, op. cit., April 2005, p.104; IPART, op. cit., June 2004, p.218.

86 ICRC, op. cit., October 2004, p.190; ICRC, op. cit., March 2004, p.70.

- adjusting historical excess market returns to remove significant unexpected returns or one-off events from the historical data or to account for expected changes in the future MRP.

Alternatively, the expected MRP may be estimated by more forward looking ex-ante measures of the MRP. Ex-ante measures include:

- adopting the MRP from surveys of market practitioners, and
- estimating the MRP based on forecasts of future cash flows.

The issues involved with these four measures are discussed in turn. The last section, section 5.3.5, raises issues on whether it is appropriate to consider all of these measures, and if so, how these measures should be weighted.

5.3.1 Historical measures

Estimates based on historical averages are arguably the most common proxy of the MRP. Using these historical estimates assumes that the MRP has been stable over the historical estimation period and is expected to remain stable going forward. If this assumption holds then the historical sample mean may be an unbiased estimator of the future population (true) mean such that historical returns are a good estimate of forward looking expectations of the MRP. Issues involved with using historical estimates directly (i.e. 'unadjusted') are discussed in this section. Issues involved with adjusting historical estimates are discussed in section 5.3.2.

5.3.1.1 Selection of the appropriate proxy for the market portfolio

Theoretically the CAPM market portfolio consists of all risky assets in the economy and is not limited to equities. However for practical reasons this is commonly restricted to a subset of listed stock.

Due to data availability issues different data sources on stock market returns are utilised depending on the time period selected. However for the same time periods, similar data sources appear to be used across different studies and the selection of the appropriate proxy for the market portfolio has not been an issue of considerable debate. Stock market accumulation indices are generally employed to capture the return from both capital gains and dividends.[87]

If a domestic CAPM[88] is assumed, then a domestic market portfolio is required. However, as with other parameters (e.g. the equity beta) the use of foreign data may be appropriate as a 'cross-check' on the reasonableness of the MRP estimate. The use of foreign data is discussed further in section 2.2.3.3.

[87] Issues involving the interaction between the MRP and gamma are discussed in section 5.3.2.3.

[88] As discussed in section 2.2, consistent with past regulatory practice, the AER assumes that the CAPM is essentially a domestic CAPM, though one that recognises the presence of foreign investors in Australian capital markets.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

5.1 Is the data source for Australian historical market returns an issue of contention? Are there certain data sources that should be preferred over others?

5.2 Should foreign stock market data be used as a 'cross-check' on the use of Australian excess market returns as a proxy for the domestic MRP? Are there particular foreign studies that should be considered? What characteristics should be considered in selecting foreign countries as a cross-check?

5.3.1.2 Length of estimation period

The appropriate length of the estimation period is generally determined with regard to a number of factors, including:

- *economic considerations* – longer term data series may be unrepresentative of expectations because they include several structural breaks (i.e. the composition of the market portfolio may have substantively changed over time); shorter term data series may be unrepresentative because they may be influenced by the present stage of the business cycle, or conversely, shorter term data series may reflect the current (and therefore the near future) expectations more accurately, and

- *empirical(i.e. statistical) considerations* – longer term data series may produce a greater number of observations which may generally decrease the standard error producing a more precise estimate; shorter term data series are likely to include 'higher quality' data as improved data sources have become available over time.

The appropriate length of the estimation period should represent a balance or 'trade-off' between these often competing considerations.

If the MRP is stable over time, then it might be argued that a longer estimation period is appropriate as increased observations may lead to lower standard errors and a more precise estimate. However, concerns over data availability and data quality increase the longer the estimation period.[89] Further, the stability of the MRP over time is also a point of debate. Where it can be demonstrated that the MRP is not stable (statistically) over time, it may be possible to use a shorter data set and at the same time lower the standard error from what it otherwise would be by using certain estimation techniques. Also, for a given time period statistical methods that place greater weight on the more recent data are an alternative to shortening the estimation period. It has been argued in the literature by some authors that shorter term data indicates that the MRP is declining. This issue is discussed in section 5.3.2.2.

[89] Brailsford, T., J.C.Handley, and K.Maheswaran (2008), 'Re-examination of this historical equity risk premium in Australia', *Accounting and Finance*, Vol.48, pp.73-97.

Studies that argue for a shorter estimation period generally consider data covering approximately the last 30 years to be appropriate, though these studies do not generally give a reason for this specific timeframe. Studies that argue for a longer estimation period generally incorporate data from around the last 120 years; presumably as this incorporates all data available. Brailsford, Handley and Maheswaran examined the quality of Australian market return data and government bill and bond data over time, and present estimates of Australian historical excess returns corresponding to specifically determined periods of increasing data quality but of decreasing sample size. [90] The authors considered that Australian data prior to 1958 should be used with caution. Concerns over the small sample of firms, exclusion of certain sectors, and government stock price controls result in a probable bias that overstate equity returns up to the mid-1950s. Brailsford et al also raise concerns over how dividend yields have been incorporated into historical market returns in previous studies.

Brailsford et. al. found that relative to bonds, Australian excess market returns have averaged 6.2 per cent p.a. over 1883-2005 and 6.3 per cent p.a. over 1958-2005. The authors concluded that Australian historical excess market returns are significantly lower than previously reported estimates would otherwise suggest. Consistent with most historical studies, the excess returns estimated by Brailsford et al are accompanied by very high standard errors or standard deviations. For example, a range based on one standard deviation from the mean would result in a range of -9.8 to 22.2 per cent for the 1883-2005 estimate, and a range of -15.7 to 28.3 per cent for the 1958-2005.[91]

Hancock assessed the predictive power of various estimation techniques including simple averages, moving averages, exponentially weighted moving averages and Hodrick-Prescott filters. [92] Hancock found that the Hodrick-Prescott filter using a moving average period of 30 years performs the best and produces an expected excess return of 5.6 per cent. Hancock considered that this estimation technique (filter) produces trend estimates that are strongly suggestive of a downward move in historical excess returns since the late 1950s. However, Bishop argued that updated data shows this apparent downward trend has been substantially reversed,[93] though more recent data than that used by Bishop may reduce the apparent upswing in recent historical excess returns.

This highlights that along with the length of the estimation period, the start and end dates of the estimation period are important. It may be argued that start and end dates should be selected to ensure that the estimation period includes 'full' business cycles, and does not include an additional 'boom period' than a 'bust period', or vice versa.

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90 Brailsford, T., J.C.Handley, and K.Maheswaran (2008),op. cit., pp.73-97.

91 ibid. Quoted arithmetic means.

92 Hancock, J. (2005), *The market risk premium for Australian regulatory decisions*, South Australian Centre for Economic Studies, pp.32-34.

93 Bishop (2007), *Market risk premium – commentary on recent papers*, Capital Value, p.5.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following: 5.3 What factors should be considered in determining the length of the estimation period? 5.4 Should a shorter term or longer term data series be considered? 5.5 What start and end dates should be considered?

5.3.1.3 Method of averaging returns over multiple periods (arithmetic or geometric)

Historical excess market returns are sensitive to the method of averaging returns over multiple periods. For example, Brailsford et al found that, relative to bonds, the historical excess market return over 1958-2005 was 4.0 per cent using a geometric average or 6.3 per cent using an arithmetic average.[94] If returns vary over time, a geometric average will always be less than an arithmetic average.

It is has been standard regulatory practice to use a geometric average when assessing historical performance, whereas an arithmetic average is generally considered appropriate when estimating a forward looking estimate from historical data. Hathaway, and Gray and Officer argued that it is generally accepted that investors think in terms of arithmetic, rather than geometric, averages. Therefore investors' expectations will be influenced by arithmetic averages.[95] Adopting an arithmetic average to estimate a forward looking MRP from historical data also assumes that all returns are independent from each other, in a statistical sense, and this assumption may be questionable. Though an arithmetic average also takes into account the volatility of historical returns, which appears appropriate.[96]

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following: 5.6 Is an arithmetic or geometric average of historical excess returns more appropriate as an estimate of a forward looking MRP?

5.3.1.4 Interaction between MRP and term of the risk free rate

Issues involving the estimation of the risk free rate are discussed in chapter four of this paper. Issues involving the interaction between the MRP and the term of the risk free rate are discussed in this section.

The risk free rate appears twice in the CAPM equation. It appears once by itself and once as part of the MRP. The equation of the CAPM is shown in figure 5.1:

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94 Brailsford, T., J.C. Handley, and K. Maheswaran (2008), op. cit., p.90.

95 Hathaway, N. (2005), *Australian market risk premium*, Capital Research, pp.18-20; Gray, S., and R.R. Officer (2005), *A review of the market risk premium and commentary on two recent papers – a report for the Energy Networks Association*, p.9.

96 ibid.

Figure 5.1 The CAPM equation

$$k_e = r_f + \beta_e \times (r_m - r_f)$$

where:

k_e	=	the expected rate of return on equity or cost of equity
r_f	=	the nominal risk free rate of return
β_e	=	the equity beta
r_m	=	the expected return on the market portfolio
$(r_m - r_f)$	=	the expected market risk premium

The CAPM is a single period model, though with an unspecified time period (that is, it may be applied for any time period). Internal consistency in the model would imply that when a time horizon is determined for one parameter, such as the risk free rate, then the same time horizon should be adopted for all parameters. For example, if the term of the first risk free rate is set equal to the term of the regulatory control period (in general, five years), then for consistency it would be argued that the term of the expected return on the market portfolio and the second risk free rate should also be set equal to the term of the regulatory control period.

This implies that MRPs of different terms can be determined depending on the investor time horizon that is adopted. Generally, studies recommend a 'current' MRP, but consider that the precision required to estimate MRPs for specific time horizons cannot be achieved due to the significant estimation issues.[97] In studies where a term is attached to the MRP, it is often for the next 'one year ahead'.

It remains open to question whether estimating historical excess market returns using short-term government bond rates is required for consistency, even for a CAPM that assumes a short-term investor horizon. This is because the use of historical excess returns is only a proxy for the forward looking MRP. If data on shorter term government bond rates are unavailable for long estimation periods or are not preferred for other reasons, then historical market returns based on ten year bond rates may be a more appropriate proxy for a forward looking MRP. This may be the case even where a forward looking MRP of a shorter term is adopted (e.g. the length of the regulatory control period).

For the period 1958-2005, Brailsford et al. estimated an Australian historical excess return of 6.3 per cent per annum relative to 'bonds' (i.e. 10 year government bonds), and 6.8 per cent per annum relative to 'bills' (i.e. government bills or bank bills of a duration between 90 days and two years).[98]

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97 See for example, Hathaway, N. (2005), *Australian market risk premium*, Capital Research, p.2.

98 Brailsford, T., J.C.Handley, and K.Maheswaran (2008), op. cit., p.91. This difference is because the yield curve on bonds is generally upward sloping, meaning that at most times the yield to maturity increases with the term of the bond. This may be the case where future yields on short term bonds are expected to increase (the 'expectations hypothesis'). It may also result if investors

If the MRP is estimated based on historical excess returns, then these historical estimates should be interpreted with regard to the strengths and weaknesses of the underlying data used. More broadly, and as already stated, the forward looking MRP is unobservable. Regardless of the data used, any MRP based on historical data is only a proxy for the forward looking MRP. Accordingly, along with historical estimates, regulators may also consider other measures such as adjusted historical estimates, surveys or cash flow measures (weighing up the strengths and weaknesses of all four measures in determining a 'final' MRP). These other measures, including the issue of weighting different measures, are discussed in the following sections.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

5.7 Could the MRP be estimated for different terms? For example, could a distinct forward-looking MRP for 1, 5, and 10 year terms be determined? Or do the various estimation difficulties limit the precision of estimates to a 'current' MRP?

5.8 Should the term of the risk free rate proxy used in estimating the historical excess returns must be consistent with the term of the 'first' risk free rate? What other considerations are relevant in determining the risk free rate proxy used in estimating historical excess returns?

5.3.2 Adjusted historical measures

While historical excess market returns are often used as a proxy for the MRP, these returns may not be reflective of forward looking expectations. Even where structural breaks have not occurred in the estimation period, the historical excess returns may not have represented the 'expected' MRP at the time due to unexpected returns or one-off events that subsequently occurred. Where structural breaks have occurred, or are expected to be presently occurring, using historical excess returns will also not be a good proxy for a forward looking estimate. Issues involving adjustments to historical estimates to improve the use of historical excess returns as a proxy for a forward looking MRP are raised in this section.

5.3.2.1 Treatment of unexpected returns or one-off events in historical data

It has been argued that significant events in the past which are not expected to reoccur in the future should be discounted out of the historical excess market return, in order to estimate a forward looking MRP. For example, after having adjusted the historical data for unexpected or one-off events, Hathaway estimated the current MRP (at time of publication) to be 4.5 per cent, whereas Hancock estimated the most likely value of the MRP is in between 4.5-5.0 per cent.[99]

require a premium to hold longer term securities (the 'liquidity premium hypothesis'). The possible drivers of an upward sloping yield curve are discussed in greater detail in section 4.3.2.

[99] Hathaway, N. (2005), *Australian market risk premium*, Capital Research; Hancock, J. (2005), *The market risk premium for Australian regulatory decisions*, South Australian Centre for Economic Studies.

One-off increase in PER

The price-earnings ratio (PER) is calculated as the share price divided by the earnings per share (EPS). Hathaway found that over 1980-1990, the Australian market PER increased from about 9 times to 17 times – meaning that the price of earnings almost doubled over this period.[100] It was concluded that this shift in the PER added 145 basis points to the 1965-2005 period historical excess market return. Hathaway noted that some analysts discount this effect out of their MRP estimates on the grounds it was a one-off re-pricing of earnings that will not occur again, though accepting that the current PER represents a fair price for earnings. By contrast, other analysts consider earnings are overpriced and the Australian market PER will mean revert back to some historical norm. Recent evidence may support this view given that the PER has declined over 2008. This would imply that the future MRP will be lower than the historical MRP to accommodate this reversion. Hathaway considered the inflation of the PER was a one-off historical event.

Unexpected introduction of dividend imputation in 1987

Hancock argued that the introduction of dividend imputation in Australia in 1987 produced a large unexpected excess return as observed by the excess return of 21 per cent from July to September 1987. Hancock estimated this unexpected event biases up the 30 year average MRP by approximately two thirds of a per cent. [101]

Unexpected gains from a long term downward move in discount rates

Hancock also noted that real interest rates fell around one per cent over the 30 year period from the early 1970's. Hancock argued that on an unchanged earnings outlook, this would have increased stock values by approximately 10 per cent, which in turn may have biased up the 30 year average MRP by approximately one third of a per cent.[102]

Arguments against adjustments to historical estimates

The adjustments to the historical data proposed by Hathaway and by Hancock have been reviewed by Gray and Officer and by Bishop.[103] In both cases, the authors argued against the proposed adjustments, arguing they are 'ad hoc' and may themselves be a source of bias.

Gray and Officer noted that there are many unique economic events that affect stock returns, and to eliminate all of them would leave a data set of limited use. Gray and Officer further argued that it is because there are unexpected events that a risk premium is required.[104] Bishop argued that a lack of a well developed theory behind what drives the MRP makes events that might lead to bias in the historical data difficult to identify.[105] Both sets of authors also note that, except for Hathaway's acknowledgement of the relationship between the MRP and imputation credits, only

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100 Hathaway, N. (2005), op. cit., pp.7-9.
101 Hancock, J. (2005),op. cit., p.11.
102 ibid., pp.11-12.
103 Gray, S., and R.R. Officer (2005), op. cit.; Bishop (2007), *Market risk premium – commentary on recent papers*, Capital Value.
104 Gray, S., and R.R. Officer (2005), op. cit., pp.25-29.
105 Bishop (2007), op. cit., pp.6-7.

events that might bias the historical MRP upwards had been considered, and not events that might do the reverse.

Gray and Officer argued that rather than making adjustments to the historical data, it is better to analyse a longer series of data that includes both positive and negative shocks.[106]

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

5.9 Should adjustments be made to historical excess returns to account for significant unexpected or one-off events?

5.10 If yes, are the adjustments proposed by Hathaway and by Hancock appropriate? If no, why? Are there any other relevant adjustments?

5.3.2.2 Evidence of a declining MRP

It has been argued that the MRP has been declining. This is argued on both quantitative and qualitative grounds. If the MRP is declining, this implies that historical excess returns would overstate a forward looking MRP. Methods to address this include shortening the historical estimation period or placing more weight on more recent data. Alternatively, if a range of excess returns are calculated from historical data, the MRP could be set towards the bottom of that range. The length of the estimation period has been addressed above.

As noted above, Hancock assessed various estimation techniques and finds that the Hodrick-Prescott filter using a moving average period of 30 years performs the best and produces an expected excess return of 5.6 per cent. Hancock considered that this estimation technique (filter) produces trend estimates that are strongly suggestive of a downward move in historical excess returns since the late 1950's.[107]

AMP Capital Investors noted several qualitative factors suggesting the MRP may have fallen over time. This includes reduced business cycle volatility and improved regulatory and legal protection for investors. However, other factors noted by AMP Capital Investors, such as low inflation, may be less applicable, at least presently, than at the time of publication.[108]

[106] Gray, S., and R.R. Officer (2005), op. cit., p.3.
[107] Hancock, J. (2005), op. cit., pp.32-34.
[108] AMP Capital Investors (2006), *The equity risk premium – is it enough? Oliver's insights*, Ed.13, 4 May.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following: 5.11 Is the MRP declining? What quantitative data or qualitative factors suggest that the MRP is, or is not, declining? 5.12 How should any decline affect the MRP the AER adopts?

5.3.2.3 Interaction between MRP and gamma

Issues involving the estimation of the value of gamma to be used in determining the benchmark corporate income tax building block are discussed in chapter eight of this paper. Issues involving the interaction between the MRP and gamma are discussed in this section.

Since 1 July 1987, a dividend imputation tax system has been operating in Australia. Under a dividend imputation tax system, the return to equity holders is potentially comprised of three components – dividends, capital gains, and imputation credits (i.e. franking credits). Imputation credits can be used by certain investors to off-set their personal income tax. This can be thought of as a prepayment of personal income tax at the firm level. Imputation credits are therefore valuable as they represent a tax saving for certain investors. If a firm fully distributes its imputation credits and these can be fully utilised by investors then the company income tax paid by the firm is effectively merely the withholding of personal income tax at the firm level. The value of imputation credits to investors is referred to as 'gamma' and by definition must equal or fall within the boundaries of zero and one.

Significantly for the required return to equity holders, the value of imputation credits represents that part of the required return that is effectively provided by the government rather than the firm. Accordingly, regulated firms do not need to be compensated for this component in their regulated revenues.

Stock market accumulation indices generally include dividends and capital gains only, and as imputation credits are part of the return to equity holders it could be argued that an MRP based on historical excess returns should be 'grossed up' to incorporate the value of imputation credits in the overall market return.

Gray and Hall derived a deterministic relationship between the gamma, MRP and assumed tax rate. Using this relationship, the authors argue that the standard values adopted by Australian regulators for these parameters of 0.50, 6.0 per cent, and 30.0 per cent, respectively, are inconsistent as these values imply a dividend yield almost twice that observed in the market. [109] Gray and Hall argued the most straightforward and complete way to resolve this inconsistency is to set the value of gamma to zero. If gamma is set to zero, the authors claim the MRP can then be based on historical

[109] Gray, S. and J.Hall (2006), 'Relationship between franking credits and the market risk premium', *Accounting and Finance*, Vol.46, pp.405-428.

capital gains and dividends alone, while maintaining consistency with the CAPM framework.[110]

This assertion has been disputed by Lally, and by Truong and Partington. Lally noted that there is no inconsistency, as amongst other reasons, the observed and implied dividend yields quoted in Gray and Officer are not comparable as the observed yields are based on data that largely predates dividend imputation.[111] Truong and Partington argued that instead of setting the gamma to zero, recognising that retained imputation credits may have a positive value removes the inconsistency.[112]

If the value of imputation credits to an equity holder's total return is to be recognised in the MRP based on historical excess returns, then the excess return from capital gains and dividends should be grossed up to reflect this component of the total expected return. This requires estimates of the value of gamma and an appropriate technique to incorporate this into the historical data, particularly if the data set contains periods before and after the introduction of dividend imputation. This is further complicated as taxation law has also been subject to several adjustments after the introduction of dividend imputation. Gray and Officer have previously argued that the effect of gamma on the MRP is likely to be less than 50 basis points and small relative to both the estimation error and the way other considerations are reflected in the MRP estimate used for regulatory purposes. Gray and Officer did not recommend making any adjustments to an MRP of 6.0 per cent to reflect the value of imputation credits.[113]

Handley and Maheswaran also provided preliminary evidence that historical excess market returns based on Australian accumulation indices over 1958-2005 exclude about 50 basis points of the total return to equity holders that is attributable to imputation credits. Over this period, and relative to bonds, Handley and Maheswaran estimated a mean historical excess return of 6.3 per cent based on dividends and capital gains only, and a mean of 6.8 per cent if the value of imputation credits was included.[114] However, the authors noted that due to the small sample sizes and large standard errors, such estimates of the effect of imputation credits can only be considered preliminary.

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110 Gray, S. and J.Hall (2006),op. cit., pp.405-428.

111 Lally, M. (2008), 'Relationship between franking credits and the market risk premium: a comment', *Accounting and Finance*, Vol.48, pp.143-151.

112 Truong, G. and G. Partington (2008), 'Relation between franking credits and the market risk premium: a comment', *Accounting and Finance*, Vol.48, pp.153-158.

113 Gray, S., and R.R. Officer (2005), *A review of the market risk premium and commentary on two recent papers – a report for the Energy Networks Association*, pp.3-4.

114 Handley, J.C., and K. Maheswaran (2008), 'A measure of the efficacy of the Australian Imputation Tax System', *The Economic Record*, Vol. 84, No. 264, pp.91-93.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

5.13 How should historical excess returns be adjusted, if at all, to reflect the value of imputation credits, if using historical excess returns as a proxy for the MRP?

5.14 Is there an inconsistency between the values of gamma, MRP and the assumed tax rate of 0.50, 6.0 per cent and 30.0 per cent, respectively? If yes, how should this inconsistency be addressed?

5.3.3 Survey measures

Surveys of market practitioners may also be used to estimate the MRP. As participants are generally surveyed on their expectations, surveys have the benefit of being a forward looking measure consistent with the CAPM. However the use of surveys in a regulatory setting involves a number of issues. These issues include:

- lack of replicability and difficulty in determining who to survey including ensuring that survey responses are free of bias, and
- difficulty in weighting results of differing surveys.

Where regulators have used surveys in estimating the MRP, survey results have generally been used as a 'cross-check' of the reasonableness of the estimate rather than as the primary estimate itself.

In the most recent distribution determination, being the ESC gas review 2008[115], the ESC referenced the following survey:

- *KPMG* – Reviewed 118 independent reports on takeovers between 2000-2005 finding that 76 per cent of reports that employed a CAPM framework to estimate the cost of equity adopted a MRP of 6.0 per cent and 97 per cent adopted a MRP of between 6.0 and 7.0 per cent. While KPMG found that none of these reports made an adjustment for the value of imputation credits, neither did any report attribute their choice of value for the MRP to their decision on imputation credits.[116]

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

5.15 What weight should be given to surveys in estimating the MRP?

5.16 Are there particular surveys that should be considered? How should the AER determine which surveys to place greater weight on?

[115] ESC, *Gas access arrangement review 2008-2012 – final decision – public version*, 7 March 2008, p.480.

[116] KPMG (2005), *Cost of capital – market practice in relation to imputation credits*, August, p.15.

5.3.4 Cash flow based measures

The most common cash flow based measure of the MRP uses the dividend growth model (i.e. Gordon growth model or DGM). This model values a stock by estimating the next dividend to be paid and then assumes dividends will increase in perpetuity by a constant growth rate. The stock value is then determined as the next dividend to be paid divided by the difference between the cost of equity and the dividend growth rate. Rearranging the equation and replacing individual stock parameters for market parameters implies that the MRP *equals* the expected market dividend yield *plus* expected market dividend growth rate *minus* the risk free rate.

The merit of this approach then relies on how well these expected parameters can be forecast, and the validity of the underlying model. Typically these forecasts are based on historical averages or trends reducing the extent that the measure is actually forward looking. Additionally, the expected market dividend growth rate is often proxied by analysts' short term forecasts of EPS, or long term expectations of gross domestic product (GDP) growth (or both, where earnings per share forecasts are expected to converge with GDP growth forecasts over a certain time period). [117]

In the most recent distribution determination, being the ESC (2008) gas review[118], the ESC referenced the following cash flow based measure:

- *AMP Capital investors* – Considers the Australian MRP over the next five to ten years to be around 3.50% (and between 2.50% to 3.00% for the US and the world), based on expectations of dividend yields and earnings growth rates less government bond yields.[119]

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

5.17 What weight should be given to cash flow based measures in estimating the MRP?

5.18 Are there particular studies that should be considered? How should the AER determine which studies to place greater weight on?

5.3.5 Weighting different measures

The preceding sections examine issues involved with various individual measures used to estimate the MRP. Regulators often consider these measures in conjunction; sometimes placing implied but unspecified weights on each measure[120] or

[117] For a discussion, see Lally, M. (2002), *The cost of capital under dividend imputation*, Prepared for the ACCC, pp.29.34.

[118] ESC, *Gas access arrangement review 2008-2012 – final decision – public version*, 7 March 2008, p.480.

[119] AMP Capital Investors (2006), *The equity risk premium – is it enough? Oliver's insights*, Ed.13, 4 May.

[120] For example, the ESC recently stated 'The Commission remains of the view that the best estimate of the equity premium will come from having regard to the results of each of the difference methodologies (tempered by an understanding of the strengths and weaknesses of each

alternatively using some measures as 'primary estimates' and other measures as 'cross-checks' on the reasonableness of the primary estimate.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

5.19 What weight should be placed on each measure of the MRP raised in this paper? Should some measures be used as 'primary estimates' with other measures used as 'cross-checks'?

5.20 Are there any other ex post or ex ante measures of the MRP that should be considered?

methodology) rather than placing sole weight on any single methodology. ESC, *Gas access arrangement review 2008-2012 – final decision – public version*, 7 March 2008, p.480.

6 Equity beta

6.1 Introduction

The equity beta measures the standardised correlation between the returns on an individual risky asset or firm with that of the overall market. In essence, it represents the 'riskiness' of the firm's returns compared with that of the market. Risk results from the possibility that returns will differ from expected returns (the greater the uncertainty around the returns of a firm, the greater its level of risk). As it is assumed under the CAPM that investors can diversify away firm-specific risk, investors will only require compensation for bearing non-diversifiable or systematic risk. Non-diversifiable risk may include risk factors such as changes in real GDP, inflation, currency and commodity prices, and real long-term interest rates. A firm's sensitivity or exposure to these risks will depend, among other things, on its business activities and its level of financial leverage.

An equity beta of one implies that the firm's returns are as sensitive to systematic risk as those of the overall market. An equity beta less than one implies the firm's returns are less sensitive to systematic risk than the overall market, and an equity beta greater than one implies the firm's returns are more sensitive.

As with all other components of the CAPM, the equity beta is a forward-looking parameter which should reflect investors' expectations of the future non-diversifiable risk of returns.

6.2 Previously adopted value

Where a parameter cannot be determined with certainty, the NER provides that the AER must have regard to the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it. The AER must also have regard to the need to achieve an outcome that is consistent with the national electricity objective.[121]

This section outlines the value of the equity beta previously adopted in determinations for electricity transmission and distribution service providers.

6.2.1 Transmission

The NER deemed the initial value of the equity beta for electricity transmission to be 1.0.[122]

6.2.2 Distribution

The NER did not deem an initial value of the equity beta for electricity distribution.

When examining a previously adopted value or method for the equity beta, the AER has taken into account the jurisdictional decisions for both electricity and gas distribution, given the similar (or equivalent) nature of the issues involved across the two sectors. Notwithstanding, the AER recognises that there may be differences

[121] NER, cll. 6.5.4(e)(4) and 6A.6.2(j)(4).
[122] NER, cl. 6A.6.2(b).

between the two sectors in relation to the equity beta subject to this review. The equity beta is driven by estimates of the asset beta and gearing, and to a much lesser extent, the debt beta. Jurisdictional regulators have adopted similar ranges or point estimates of the asset beta of between 0.30-0.55 (where an asset beta has been specified), though differing to some degree between decisions. All regulators, since at least 2004, have adopted a 60 percent gearing ratio, and all bar one has adopted a debt beta of either 0.00 or 0.06 (where a debt beta has been specified). This has resulted in equity beta ranges of between 0.50 and 1.11 and point estimates of between 0.70 and 1.10. In the most recent electricity and gas determinations, jurisdictional regulators have all adopted point estimates of the equity beta below 1.00.

Table 4.1 below outlines the equity beta adopted by jurisdictional regulators in the most recent electricity and gas distribution determinations for each jurisdiction.

Table 4.1 Electricity and gas distribution determinations – equity beta

Regulator (year)	Sector	Asset beta	Debt beta	Gearing	Equity beta (range)	Equity beta (final)
ESC (2008)	Gas	N/A	N/A	60.0%	0.50-0.80	0.70[123]
OTTER (2007)	Electricity	N/A	N/A	60.0%	N/A	0.90
ESCOSA (2006)	Gas	N/A	N/A	60.0%	0.80-1.00	0.90
QCA (2006)	Gas	0.55	0.12	60.0%	N/A	1.10
ESC (2006)	Electricity	N/A	0.00	60.0%	N/A	1.00
QCA (2005)	Electricity	0.45	0.10	60.0%	N/A	0.90
ESCOSA (2005)	Electricity	N/A	0.00	60.0%	N/A	0.80
IPART (2005)	Gas	0.30-0.40	0.00	60.0%	0.80-1.00	N/A
ICRC (2004)	Gas	0.40	0.06	60.0%	0.90-1.09	N/A
IPART (2004)	Electricity	0.35-0.45	0.00-0.06	60.0%	0.78-1.11	N/A
ICRC (2004)	Electricity	0.40	0.06	60.0%	N/A	0.90
Estimate (low-high)	**Energy**	**0.30-0.55**	**0.00-0.12**	**60.0%**	**0.50-1.11**	**0.70-1.10**

Source: ESC[124], OTTER[125], ESCOSA[126], QCA[127], IPART[128], ICRC[129].

[123] While the ESC determined the appropriate equity beta to be 0.70, it then provided the distributors with an additional allowance as a transitory measure to reduce the impact of the reduction in the equity beta from the previous value of 1.00. The additional allowance effectively sets the distributors' equity beta at 0.80.

[124] ESC, op. cit., 7 March 2008, p.461-476; ESC, op. cit., October 2006, pp.345-357.

[125] OTTER, op. cit., September 2007, pp.148-151.

[126] ESCOSA, op. cit., June 2006, pp.68-71; ESCOSA, op. cit., April 2005, pp.132-142.

[127] QCA, op. cit., May 2006, p.62; QCA, op. cit., May 2006, p.92; QCA, op. cit.,April 2005, p.129.

[128] IPART, op. cit., November 2005, p.69; IPART, op. cit., April 2005, p.104; IPART, op. cit., June 2004, p.218.

A detailed discussion of the issues raised in the more recent of these decisions is included in the following sections.

6.3 Issues

This section is divided into three parts:

- the first section raises conceptual issues associated with the sensitivity of a regulated firm's asset beta to non-diversifiable risk
- the second section raises empirical issues in the estimation of beta, and
- the third section raises the possibility of other relevant conceptual (or empirical) issues, such as the desirability of regulatory certainty.

6.3.1 Conceptual issues

As noted in chapter one, for both electricity transmission and distribution, the NER provides the following definition of the WACC.[130]

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

That is, the NER provides that the WACC is only to compensate service providers for non-diversifiable risk, also known as systematic risk. It is necessary, therefore, to first understand what non-diversifiable risk is.

An individual risky asset, in this case a firm, can be defined by its expected return and its expected level of risk (i.e. expected variability in returns). Both the return and variability in returns of the firm will be affected by firm-specific and market-wide risk factors. The firm-specific factors may include an acquisition or takeover, an important research discovery, or a change of chief executive. Whereas the market-wide factors may include changes in interest rates, changes in tax laws, and variations in commodity prices. Over a given time period, some firm-specific factors would have a positive impact on the return of the firm, whereas others would have a negative impact. By holding a well-diversified portfolio of risky assets these firm-specific factors are expected to cancel each other out. This is the reason the WACC does not compensate regulated firms (and their investors) for diversifiable or non-systematic risk, whereas the market-wide factors are likely to impact all firms in a similar way and so cannot be eliminated by diversification.

The non-diversifiable or systematic risk of a firm will depend on the sensitivity of its returns to these market-wide factors. The degree of this sensitivity is reflected in the equity beta. An equity beta of one implies that the firm has the same degree of sensitivity to these factors as the overall market (if the leverage of the firm and that of the overall market are the same). An equity beta less than one implies the firm is less sensitive then the overall market to these market-wide factors, and an equity beta

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[129] ICRC, op. cit., October 2004, p.8; ICRC, op. cit., March 2004, p.70.
[130] NER, cll. 6.5.2(b) and 6A.6.2(b).

greater than one implies the firm is more sensitive.[131] A regulated firm's sensitivity to non-diversifiable risk, and therefore the equity beta, will be a function of both financial risk and business risk. The focus in this section is on the degree of non-diversifiable business risk which is capsulated in the firm's asset beta.

The sensitivity of a regulated firm to these market-wide factors may also be influenced by factors including the regulatory regime and the form of control that the firm is under.

The regulatory regime for electricity transmission and distribution network service providers includes design features such as:

- the annual adjustment of a firm's revenue or prices by 'CPI minus X (CPI-X)', where CPI represents actual lagged inflation and X represents a value or values pre-determined and set for the length of the regulatory period

- the rolling forward of the firm's RAB, rather then the re-valuing of the RAB at each reset. Under the ex-ante regime actual capex will be rolled into the RAB. In some regimes a RAB can potentially be re-optimised at each review, such as under a total service long run incremental cost (TSLRIC) approach

- The inclusion of pass-through provisions allowing the firm's regulated revenue or prices to be adjusted for certain unexpected, and generally uncontrollable, changes in costs such as the introduction or a new tax or a change in the tax rate of an existing tax. For TNSPs, contingent project provisions also apply.

The form of control may also influence a regulated firm's sensitivity to market-wide factors. The form of control refers to the particular revenue or price control function that determines a regulated firm's total regulated revenue. All TNSPs are under a revenue cap form of control. Whereas for DNSPs, the form of control is determined as part of the reset process. For DNSPs, the available options for the form of control are:

- a schedule of fixed prices

- caps on the prices of individual services (i.e. a price cap or caps)

- caps on the revenue to be derived from a particular combination of services (i.e. a revenue cap)[132]

- a tariff basket price control (i.e. a weighted average price cap)

- a revenue yield control (i.e. an average revenue cap), or

- a combination of any of the above.[133]

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131 Peirson, G., R. Brown, S. Easton, and P. Howard (2002), *Business Finance*, Ed. 8, McGraw-Hill Australia, Roseville, Australia, pp.197-232.

132 When accompanied by an 'unders and overs' mechanism, as is standard regulatory practice in electricity transmission and distribution, the revenue cap is also the revenue floor.

133 NER, cl. 6.2.5(b)

One of the main differences between the forms of control is the effect of actual demand on the total revenue of the firm. Under a revenue cap the total regulated revenue is invariant to actual demand. Under any of the other forms of control the total revenue of the firm is affected by actual demand to some degree depending on the precise form of the revenue or price control function.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

6.1 What influence does the regulatory regime have on a DNSP's or TNSP's sensitivity to non-diversifiable risk? Has this been increasing or decreasing over time?

6.2 What influence, if at all, does the form of control have on a DNSP's or TNSP's sensitivity to non-diversifiable risk?

6.3 Excluding the effects of financial leverage, on a conceptual basis would a DNSP's or TNSP's sensitivity to non-diversifiable risk be expected to be less than that of the market, equal to that of the market, or greater than that of the market? That is, would the asset beta of a DNSP or TNSP be expected to be less than, equal to, or more than the asset beta of the overall market?

6.3.2 Empirical issues

Some (equity, debt and or asset) betas that have been used in regulatory decisions have been based upon previous regulatory decisions and maintaining regulatory consistency. These betas have typically been greater than those that would have been obtained placing sole weight on empirical estimation. Other regulators, such as the ESC, have given greater weight to findings from empirical market-based estimates conducted by either a consultant working on behalf of the regulator and or stakeholders. This is either directly through a review of the market evidence as part of a regulatory process or indirect reliance on equity beta estimates in decisions made by other regulators who relied upon empirical work. A number of issues have arisen relating to the estimation of the equity beta, these include:

- selection of sample businesses
- frequency and number of observations
- removal of 'unrepresentative events'
- estimation of equity betas and the treatment of outliers
- consideration of foreign comparators
- time varying beta adjustments such as the Blume adjustment, and
- calculation of a portfolio beta.

6.3.2.1 Frequency and number of observations

Once the representative businesses for determining the industry benchmark have been selected (see section 2.2.3), a decision on the length and frequency of observations needs to be considered. The AER recognises that there is a trade off between the potential loss in relevance of data for the current industry and market conditions, and having sufficient observations in order to obtain a robust and statistically reliable equity beta estimate.

A five-year period is usually regarded as an appropriate trade-off between the number of observations and the stability of the equity beta estimate when monthly data is being used.[134] Given this trade-off, the AER observes that it has also been general practice by regulators when examining equity beta estimates to use monthly data over five years. The financial data services use estimation periods ranging from two to five years to estimate equity betas. For example Ibbotson and the London Business School typically use estimates of five years. Using monthly data over weekly or daily data reduces the likelihood of bias. The ACG has noted that the bias generally arises when using higher frequency data (i.e. weekly or daily) for stocks that are infrequently (thinly) traded or frequently (thickly) traded.[135] Using more frequent data usually biases the equity beta estimation downwards or upwards respectively. If the bias is noticeable and less frequent data is unavailable, for thinly traded stocks, the ACG has suggested that leading and lagged market returns be introduced to address this issue.[136]

While the AER notes that although monthly data over five years may be appropriate, other issues may require that a different term and frequency be used to estimate equity betas. These other issues include:

- limited observations due to a low number of sample businesses used in the industry benchmark
- the impact of mergers and acquisition activities (see section 2.2.3.2) and
- the presence of 'unrepresentative events'.

The first issue may be addressed by either increasing the number of observed years or the frequency of the data. However, the second and third issue may result in a number of observations being removed from the sample period as these effects may bias the estimation. An 'unrepresentative event' refers to a period of time in the market that is unlikely to be representative of future conditions in the market. An example of this is argued to have been the 'technology bubble' where market indices were driven upwards by telecommunications, media and technology stock prices from 2000 to 2001. It has been claimed that this resulted in equity beta values relating to energy companies to be historically low and not representative of forward looking estimates post the 'technology bubble'. This may equally apply if the price of utilities was driven by events unique to a specific period but was unlikely to occur again in the

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134 Brailsford, Faff and Oliver, 1996, p.15-17; alo see for example, Black , Jensen and Scholes, 1972 and Fama and McBeth 1973.

135 ACG, *Empirical Evidence on Proxy Beta Values for Regulated Gas Distribution Activities*, Report to the ESC, June 2007, p. 42.

136 ibid.

future. In estimating equity betas, regulators have often removed 'unrepresentative events' (such as the 'technology bubble') from the sample on the basis that this would increase the reliability of estimates. Therefore in the presence of an 'unrepresentative event', measures can be taken by:

- increasing the frequency of observations but using a shorter time period (that is, selecting years after the unrepresentative event), or
- selecting years prior to the event.

The AER considers that both of these measures may be taken for the purposes of cross-checking and to ensure that the equity beta estimate is statistically reliable and robust.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

6.4 What frequency of observations (daily, weekly or monthly) is appropriate to estimate a benchmark beta? Why is this appropriate?

6.5 Is the 'technology bubble' still relevant going forward? If yes, what are the start and end dates of the technology bubble?

6.6 Are there other 'unrepresentative events' that may have biased the estimation of beta? Such events could include mergers and acquisition activity, terrorist acts and natural disasters. How should this issue be addressed (i.e. use weekly data over a shorter period, select years prior to the event, or compare both approaches)?

6.7 What length (in years) is appropriate to estimate a benchmark beta?

6.3.2.2 Estimation techniques and outliers

The purpose of estimating a benchmark equity beta is to ensure that the equity beta represents the non-diversifiable risk faced by a benchmark firm. In estimating the equity beta the ACG has noted that what is of most importance is the statistical precision of the beta estimate.[137] The Ordinary Least Squares (OLS) approach has been most commonly used to estimate relationships between different variables. This approach involves finding a line of best fit to estimate the relationship between the independent variable (the business's returns) and the dependent variable (market's returns). This is achieved by minimising the sum of squared errors between the mean and actual observations. The 'R^2'statistic in beta estimation is a secondary consideration as this statistic represents the percentage of variation in the business's returns that can be explained by variations in market's returns rather than the magnitude of sensitivity of industry returns to variations in market returns.

[137] ACG, *Empirical Evidence on Proxy Beta Values for Regulated Gas Distribution Activities*, Report to the ESC, June 2007, p. 28.

However, under the OLS approach where the number of sample businesses is small it may be more likely that outliers or 'unrepresentative events' may result in biased and/or unreliable estimation. In relation to the estimation of the equity beta, outliers are observations in a sample that are considered to be unrepresentative of forward looking returns in the market. For example a merger announcement may result in the return of a specific stock to be unusually higher or lower than what it other would have been. As a result a number of different estimation techniques have been used to cross-check if the OLS regression provides a robust and statistically reliable estimate of equity beta. These other approaches include:

- applying a re-weighted OLS approach—applies weights to lessen the effect of outliers[138]

- applying a Least Absolute Values (LAV) approach – obtains a line of best fit by using a linear estimation that minimises the sum of absolute errors rather than the sum of squared errors.[139]

- rather than applying weights, removing observations that are greater than a specified number of standard errors (for example 1, 1.5 or 2 standard errors)[140], and

- examining OLS beta estimates provided by private financial data companies, where these companies uses methods other than those already considered.[141]

A limitation common to weighting techiniques (e.g. re-weighted OLS, and LAV) is that they still include outlier observations.

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[138] This is achieved through weighting the sum of squared errors; the weightings are determined by comparing the difference between actual observation and the estimated average to the standard error of the preliminary regression. If the observed error that is greater than 2.7 standard errors then the observation receives a weight of zero and is considered likely to be an outlier. While if the error is less than 1.8 standard errors the observation receives a weight of one and is unlikely to be an outlier. For observations between 1.8 and 2.7 standard errors the weighting continually decreases. See Martin, R. D. and Simin, T. T., 'Outlier-Resistant Estimates of Beta', *Financial Analysis Journal*, Vol. 59, No. 5, September/October 2003, pp. 56-59.

[139] This approach minimises the sum of absolute errors through an iterative process. Therefore greater weight is given to observations with smaller absolute errors.

[140] Gray, S. and Officer, B., *The Equity Beta of an Electricity Distribution Business*, Report on the behalf of ETSA Utillities, 17 April 2005, pp. 36-38.

[141] Noting that most of these services apply adjustments to beta (such as the Blume adjustment) or include outliers and 'unrepresentative events'.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:	
6.8	Should the OLS approach be used as a first step when estimating a benchmark beta?
6.9	Which estimation methods should be used and which should not be used to ensure that the benchmark beta is robust and statically reliable?
6.10	Are there any other estimation methods that could be used to ensure that the benchmark beta is robust and statistically reliable?

6.3.2.3 Blume adjustment

Blume considered that while estimated betas were relatively stationary over time, there was a tendency for estimated betas to regress towards the value weighted average beta of the market, or the 'grand mean' of all betas, being one. For example, a portfolio with either an extremely high or low estimated beta in one period exhibited a tendency to have a less extreme estimated beta in the following period.[142] Blume argued that this tendency was largely caused by real non-stationary movements in the betas of individual securities.[143] Blume concluded:

> In other words, companies of extreme risk – either high or low – tend to have less extreme risk characteristics over time. There are two logical explanations. First, the risk of existing projects may tend to become less extreme over time. This explanation may be plausible for high risk firms, but it would not seem applicable to low risk firms. Second, new projects taken on by firms may tend to have less extreme risk characteristics than existing projects. If this second explanation is correct, it is interesting to speculate on the reasons. For instance, is it a management decision or do limitations on the availability of profitable projects of extreme risk tend to cause the riskiness of firms to regress towards the grand mean over time?[144]

Blume did not propose an answer to this question, instead stating that it was a matter for future research to determine.

Following these findings, an adjustment to the raw data known as the 'Blume adjustment', has been developed. In a general context where equity betas are estimated, and where concerns over estimation errors exist, the Blume adjustment is sometimes applied. The Blume adjustment places a certain weight on the estimated beta from the return data of a particular firm or portfolio of firms and the remaining weight on that of the market (i.e. one). That is, regardless of whether the (pure) beta estimate of a firm is above or below one, applying the Blume adjustment will always bring the beta estimate of the firm closer to one. The underlying premise in this adjustment, as found in the quote above, is that all firms are assumed to exhibit mean reverting risk tendencies.

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142 Blume, M. (1971), 'On the assessment of risk', *Journal of Finance*, March.

143 Blume, M. (1975), 'Betas and their regression tendencies', *Journal of Finance*, Vol.30, No.3, June 1975, p.794.

144 Blume, M., ibid., pp.794-795.

However, the AER is not aware of any economic regulators in Australia accepting the Blume adjustment as concerns have been raised over the use of this adjustment in determining a beta for regulatory purposes. This is because the regulated firm is generally assumed to be 'stand alone', and in a regulatory setting the level of gearing is assumed to be fixed. Therefore the underlying premise behind the Blume adjustment that a firm may diversify its operations across assets of varying riskiness or may change it's gearing to alter its risk profile (if it's operations are currently of extreme high or low risk), does not appear consistent with the underlying regulatory regime.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

6.11 Is there any validity applying the Blume adjustment in estimating an equity beta for regulatory purposes?

6.3.2.4 Portfolio estimation

The term portfolio relates to a group of investments across either (domestic or foreign) markets or industries. In this case the portfolio being estimated is an industry portfolio as the purpose of the equity beta in the WACC is to estimate the systematic risk related to a specific industry (electricity transmission and/or distribution). For further discussion on industry benchmarks refer to section 2.2.3.

If an industry benchmark has been used and the sample businesses representing the portfolio have been selected, the next step involves obtaining a portfolio equity beta. The portfolio equity beta may be an average (equally weighted) equity beta, a value-weighted average or a median equity beta from the set of individual equity betas.

The ACG has noted its preference for adopting a simple average of the portfolio equity beta. In particular, it considered that this will result in a higher degree of precision in the estimate than if the median equity beta is adopted given that outliers are addressed through statistical methods.[145]

A value-weighted equity beta takes into account that the comparable businesses are of different sizes. This recognises that an investor is unlikely to hold even amounts of shares as part of their portfolio. However, in the presence of significant mergers and acquisition activity this may result in an unreliable portfolio outcome when there are a small number of firms in the portfolio. A median equity beta has been used to overcome small sample sizes.

[145] ACG, *Empirical Evidence on Proxy Beta Values for Regulated Gas Distribution Activities*, Report to the ESC, June 2007, p. 34.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

6.12 Should equity betas from sample businesses be value-weighted, equally weighted or should a median value be used?

6.3.3 Other conceptual or empirical issues

Along with the issues already raised in this chapter, there may be other conceptual or empirical issues that are relevant in setting an equity beta for regulatory purposes.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

6.13 Are there any other conceptual or empirical issues that should be considered in determining an equity beta for regulatory purposes?

7 Credit rating level

7.1 Introduction

The credit rating is an input into deriving the DRP which is defined in the NER as the difference between the Australian benchmark corporate bond rate and the risk free rate. The purpose of including a DRP within the expected cost of debt is to fairly compensate a regulated firm for the benchmark cost of debt capital.

The AER considers that both the term structure and the credit rating are important in determining the magnitude of the DRP. The AER is required to examine the benchmark credit rating as part of the WACC review. Given that the NER requires the maturity of the DRP must match the maturity of the nominal risk free rate this chapter only considers issues related to the selection of a benchmark credit rating. As a general rule, the cost of debt is higher (lower) when the credit rating is lower (higher), as investors require compensation from the debt issuer due to the higher (lower) risk of default. Chapter four includes a discussion of issues relating to the selection of the appropriate term to maturity for the risk free rate and by implication the term to maturity used to derive the DRP.

This chapter outlines the NER requirements and the issues relating to the credit rating levels.

7.2 Previously adopted value

Where a parameter cannot be determined with certainty, the NER provides that the AER must have regard to the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it. The AER must also have regard to the need to achieve an outcome that is consistent with the national electricity objective.[146]

This section outlines the credit rating level previously adopted in determinations for electricity transmission and distribution service providers.

7.2.1 Transmission

The NER deemed the initial method for estimating the DRP for electricity transmission. [147]

> The debt risk premium for a *regulatory control period* is the premium determined for that *regulatory control period* by the *AER* as the margin between the nominal risk free rate and the observed annualised Australian benchmark corporate bond rate for corporate bonds which have a BBB+ credit rating from Standard and Poor's and a maturity equal to that used to derive the nominal risk free rate.

[146] NER, cll. 6.5.4(e)(4) and 6A.6.2(j)(4).

[147] NER, cl. 6A.6.2(e). Note that the AEMC has recently amended this rule to reflect the above wording.

7.2.2 Distribution

The NER deemed the initial method for estimating the DRP for electricity distribution.[148] This method is almost identical to electricity transmission and is set out below.

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

The difference between the initial methods set out in the NER for transmission and distribution is that the initial distribution method did not specify an initial credit rating level.

When examining a previously adopted value or method for the credit rating level, the AER has taken into account the jurisdictional decisions for both electricity and gas distribution, given the similar (or equivalent) nature of the issues involved across the two sectors. Notwithstanding, the AER recognises that there may be differences between the two sectors in relation to the credit rating level subject to this review. Jurisdictional regulators have converged towards a credit rating of BBB+, based on other recent regulatory decisions and in some cases based on evidence from capital markets (e.g. the ICRC and IPART).

Table 7.1 below outlines the credit ratings adopted by jurisdictional regulators in the most recent gas and electricity distribution determinations for each jurisdiction.

[148] NER, cl. 6.5.2(e). Note that the AEMC has recently amended this rule to reflect the above wording.

Table 7.1 Gas and Electricity distribution determinations – credit rating

Regulator (year)	Sector	Credit Rating
ESC (2008)	Gas	BBB+
OTTER (2007)	Electricity	BBB+
ESCOSA (2006)	Gas	BBB+
QCA (2006)	Gas	BBB+
ESC (2006)	Electricity	BBB+
QCA (2005)	Electricity	BBB+
ESCOSA (2005)	Electricity	BBB+
IPART (2005)	Gas	BBB/BBB+
ICRC (2004)	Gas	BBB+/A
IPART (2004)	Electricity	N/A[(a)]
ICRC (2004)	Electricity	N/A[(b)]

Source: ESC[149], OTTER[150], ESCOSA[151], QCA[152], IPART[153], ICRC[154].
[(a)] Sample of Australian investment grade bonds (BBB- and above)
[(b)] Regulatory benchmark based on actual DRPs.

A detailed discussion of the issues raised in recent reviews is included in the following sections.

7.3 Issues

The selection of a benchmark credit rating is a key issue for the calculation of the DRP. As noted, the NER provides that the credit rating must be based upon a benchmark[155], and that the maturity of the DRP must match the maturity of the risk free rate.[156]

7.3.1 Benchmark credit rating

For a discussion on general issues relating to benchmarking please refer to section 2.2.2. In recent electricity distribution decisions there has been a convergence by jurisdictional regulators towards a credit rating of BBB+ based upon either a benchmark gearing ratio of 60:40 or by reference to other regulatory decisions. In

149 ESC, op. cit., 7 March 2008, pp. 488; ESC, op. cit.,October 2006, p.367.
150 OTTER, op. cit., September 2007, p.146.
151 ESCOSA, op. cit., June 2006, p.75; ESCOSA, op. cit., April 2005, p.151.
152 QCA, op. cit., May 2006, p.69; QCA, op. cit., May 2006, p.100; QCA, op. cit., April 2005, p.109.
153 IPART, op. cit., November 2005, p.65; IPART, op. cit., April 2005, p.99; IPART, op. cit., June 2004, p.225.
154 ICRC, op. cit., October 2004, p.174; ICRC, op. cit., March 2004, p.67.
155 NER, cll. 6.5.4(e)(3) and 6A.6.2(j)(3)
156 NER, cll. 6.5.2(e) and 6A.6.2(e).

contrast, interested parties to regulatory processes have submitted credit ratings ranging from A to BBB.

In considering a benchmark credit rating for TNSPs the AEMC has noted:

> …that a principle of good regulatory design is that the nature of ownership (i.e., whether public or private) should not affect the outcome of regulatory determinations. The value for the debt risk premium should therefore be established independent of ownership and be consistent with market circumstances for large scale infrastructure assets.
>
> In that context, [the AEMC] considers that the appropriate credit rating for regulated transmission assets is an 'investment grade' rating which includes assets with ratings of between BBB- and AAA. [The AEMC] also notes that there is not a mechanistic relationship between the assumed gearing ratio and the appropriate credit rating for a benchmark transmission business with the latter being influenced by a range of other factors.[157]

The issues that the AER considers to be important in assessing the benchmark credit rating level for distribution and transmission businesses include the:

- selection of benchmark businesses used to estimate or inform the choice of benchmark
- selection of financial measures and qualitative factors, and
- application of analytical methods to determine the benchmark credit rating level.

7.3.1.1 Selection of benchmark businesses

In assessing the benchmark credit rating, the AER has previously noted that the likely upward bias of government businesses may be balanced by the likely downward bias of privately owned subsidiary distribution companies who are on the median credit rating.[158] The ACG has also noted that not only can government behaviour bias the credit rating but also the behaviour of the parent company.[159] Interested parties have also submitted in the past that the relevant benchmark credit rating level should be based on stand-alone private businesses as the credit rating level of a government business will be affected by the Government's credit rating.[160] The AER notes that if only stand alone Australian electricity businesses are considered in determining the benchmark credit rating level to eliminate the impact of ownership on credit ratings, it is likely the sample will be limited to one or two firms. The AER is uncertain whether a sample of this magnitude would be appropriate to set a benchmark credit rating.

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157 AEMC, *Review of the Electricity Transmission and Pricing Rules: Draft National Electricity Amendment (Economic Regulation of Transmission Services) Rule 2006*, Transmission Revenue: Rule Proposal Report, February 2006, p. 64.

158 AER, *Australian Energy Market Commission – Draft National Electricity Amendment(Economic Regulation of Transmission Service) Rule 2006*, Submission, March 2006, p. 27.

159 ACG, *Credit Rating for a Benchmark Electricity Transmission Business*, Report to ETNOF, May 2006, p. vii.

160 ElectraNET SA, *Submission on ACCC Statement of Regulatory Principles Draft Decision (August 2004)*, 12 November 2004, pp. 24-25.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

7.1 To what extent will the inclusion of government owned business or private businesses that are not stand alone businesses bias the estimate of credit ratings? Should this be a concern?

7.3.1.2 Selection of financial measures and qualitative factors

The AER notes that a key issue in setting a benchmark credit rating is the selection of financial measures and qualitative factors, such as financial ratios and management attitudes towards risk. The AER notes a number of regulators have used gearing as an exclusive measure to ensure the benchmark credit ratio is reasonable. In contrast, the ACG noted that gearing is not the main consideration for Standard and Poor's when setting a credit rating. The ACG noted:

> ….we note that rating agencies seldom place substantial weight on total debt to total capital when assigning ratings – but prefer to focus on more direct and cash based measures of the capacity of firms to meet their interest payment and to repay their debts.[161]

The ACG cites other factors such as forecast cash flows, and the impact of parent company and or government behaviour as more important factors in determining credit ratings. In particular, the ACG focus on the following measures in deriving credit ratings for transmission businesses:

- funds from operations (FFO) as a ratio of debt—this represents a cash equivalent measure of gearing which is the cash flow available after paying operating expenses and taxes
- ratio of FFO to interest cover—this represents the degree of security that a firm has to meet its interest payments and
- ratio of net cash flows (FFO after dividends) to the capex requirement.

An examination of Standard and Poor's approach to setting corporate credit ratings indicates that it considers both business risk and financial risk. The factors relating to business risk include:

- country risk—the risk of doing business in a particular country
- industry factors—the industry prospects, as well as identifying the competitive factors, risks, and challenges affecting industry participants
- competitive position—a strong competitive position supports revenue and cash flow stability
- management evaluation—its role in operational success and risk tolerance, and

[161] ACG, *Credit Rating for a Benchmark Electricity Transmission Business*, Report to ETNOF, May 2006, p.17

- profitability/peer group comparisons—the ability to attract capital due to higher profit performance and comparing profit to peer companies. [162]

The factors relating to financial risk include:

- accounting characteristics and information—analysis of financial statements to check whether ratios and statistics derived from the statements can be relied upon
- corporate governance, risk tolerance and or financial policies—examines management's philosophies and policies involving financial risk
- cash flow adequacy—the ability to service debt
- capital structure and or asset protection—the financial flexibility, and how leveraged a business is, and
- liquidity and or short-term factors—sundry considerations and contingencies. [163]

As a guide, the Standard and Poor's Corporate Ratings Criteria report provides the following matrix in Table 7.2 on how it uses financial and business risk to determine credit ratings:

Table 7.2 Standard and Poor's Corporate Ratings Criteria - Business risk/Financial risk

	Financial risk profile				
Business risk profile	**Minimal**	**Modest**	**Intermediate**	**Aggressive**	**Highly Leveraged**
Excellent	AAA	AA	A	BBB	BB
Strong	AA	A	A-	BBB-	BB-
Satisfactory	A	BBB+	BBB	BB+	B+
Weak	BBB	BBB-	BB+	BB-	B
Vulnerable	BB	B+	B+	B	B-

Source: Standard and Poor's[164]

For example, regulated businesses may attract higher credit ratings due to the regulatory regime despite having higher levels of financial gearing than most comparable unregulated businesses. When discussing the use of this above matrix Standard and Poor's note:

[162] Standard and Poor's, *Corporate Ratings Criteria*, Report, 15 April 2008, p. 22.
[163] ibid., p. 21.
[164] ibid.

> We strive for transparency around the rating process. However, it is critical to realize—and it should be apparent—that the ratings process cannot be reduced to a cookbook approach: Ratings incorporate many subjective judgments, and remain as much an art as a science.[165]

Standard and Poor's also provides examples reproduced in Table 7.3 of how it might apply different levels of financial risk.

Table 7.3 Standard and Poor's Corporate Ratings Criteria - Financial risk indicative profiles

Financial risk indicative ratios*	Minimal	Modest	Intermediate	Aggressive	Highly leveraged
FFO/Debt (%)	Over 60	45-60	30-45	15-30	Below 15
Gearing (%)	Below 25	25-35	35-45	45-55	Over 55
Debt/EBITDA[166] (x)	<1.4	1.4-2.0	2.0-3.0	3.0-4.5	>4.5

* Fully adjusted, historically demonstrated, and expected to continue consistently
Source: Standard and Poor's[167]

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

7.2 Which financial measures and qualitative factors should the AER consider when setting a benchmark credit rating?

7.3 How should those financial measures and qualitative factors be applied and what weight should be given to each of these? To what extent should Standard and Poor's rating criteria be applied to set the benchmark credit rating?

7.3.1.3 Analytical methods

The AER considers that the final step in setting a benchmark credit rating, after deciding on the sample businesses, and, financial measures and qualitative characteristics, is to analyse the data. The AER notes that three different approaches have been adopted, these include:

- the selection of the median or average business from the sample
- regression analysis and
- 'best comparators' approach.

[165] ibid., p.20.
[166] This is equivalent to the ratio of FFO to interest cover as described previously by the ACG.
[167] Standard and Poor's, *Corporate Ratings Criteria*, Report, 15 April 2008, p. 21.

The first approach involves selecting the median or average credit rating of the sample of businesses. If an average benchmark credit rating is used it is likely that the average will be substantially impacted by 'outliers' if the sample size is small. The second approach involves applying statistical techniques (such as OLS) to estimate the benchmark credit rating. Lally, for example, has applied this type of analysis to estimate the benchmark credit rating of TNSPs.[168] However, this analysis results in a range of credit ratings and is also likely to be affected by outliers when a sample size is small. Nevertheless, this range could either be used to demonstrate that the selected credit rating is reasonable. The 'best comparators' approach has been used as a cross-check to regression analysis and involves selecting a sample of businesses.[169] This sample is selected based upon businesses with a number of similar characteristics and then the credit metrics of each firm are obtained. These businesses are then compared to a credit metrics benchmark (where ACG used the latest regulatory decision).

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

7.4 What method should be used to set a credit rating benchmark?

7.5 Are there any other methods not mentioned above that could viably be used to set a benchmark credit rating?

7.6 How should a 'best comparators' benchmark be determined?

7.3.2 Refinancing risk

The AER notes the previous NER requirement on the use of a bond maturity of ten years in determining both the risk free rate and the DRP. In gas determinations a ten-year maturity has been adopted for regulatory consistency and as a result of the GasNet decision. Issues in selecting a term structure for the risk free rate and subsequently the DRP are discussed in section 4.3.2.1 (risk free rate). The selection of the appropriate bond maturity in a regulatory setting has possible implications for refinancing risk.

The AER is aware that concerns have been raised in the past about refinancing risk, as businesses are likely to have a number of short-term and long-term debt instruments. In the context of the DRP this issue relates to a firm being unable to refinance at the benchmark credit rating and therefore being exposed to refinancing risk. One suggested approach to overcoming this in the past was for the regulator to adopt the actual credit rating of the firm in its decision. The AER notes that the NER do not allow this as the DRP must be based on a benchmark rather than firm-specific estimate. Further the AER considers that such an approach may create incentives to undertake riskier financial activities.[170] Finally, businesses that are able to refinance at a credit rating above the benchmark should not be penalised for doing so.

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[168] Lally, *The Appropriate Credit Rating for Australian Electricity Transmission Businesses*, Paper in support of AER Submission, March 2006.

[169] ACG, *Credit Rating for a Benchmark Electricity Transmission Business*, Report to ETNOF, May 2006, pp. 20-24.

[170] NER, cll. 6.5.4(e)(3) and 6A.6.2 (j)(3).

8 Assumed utilisation of imputation credits (Gamma)

8.1 Introduction

Under the Australian imputation tax system, domestic investors receive a credit for tax paid at the company level (an 'imputation credit') that offsets part or all of their personal income tax liabilities. For eligible shareholders, imputation credits represent a benefit of the investment in addition to any cash dividend or capital gains received.[171] The gamma value is not included in the WACC as the NER requires the AER to apply a vanilla WACC (i.e. after tax WACC). Standard regulatory practice in Australia is to include the gamma value in determining the appropriate company tax allowance (the 'corporate income tax building block') to include in the required revenues of regulated firms.[172]

The generally accepted regulatory approach in Australia is to define the value of imputation credits – commonly referred to as 'gamma' (γ) – as a product of the 'imputation credit payout ratio' and the 'utilisation rate', where:

- the imputation credit payout ratio (commonly referred to as 'F') is defined as 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.[173]

Gamma has a range of possible values from zero (where imputation credits are not distributed and/or not valued at all by investors) to one (where imputation credits are fully distributed and fully valued by investors).

8.2 Previously adopted value

Where a parameter cannot be determined with certainty, the NER provides that the AER must have regard to the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it. The AER must also have regard to the need to achieve an outcome that is consistent with the national electricity objective.[174]

This section outlines the value of gamma previously adopted in determinations for electricity transmission and distribution service providers, and the use of gamma in the (post-tax) building block framework.

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171 Although foreign investors do not pay Australian personal income taxes, they may receive a credit for company tax paid from their home country government, depending of the inter-country tax arrangements.

172 When deriving a vanilla WACC using the Officer (1994) CAPM in a regulatory context, the gamma will also influence the allowed revenues through the Monkhouse (1997) leveraging formula, which is used to lever and de-lever asset and equity betas.

173 Monkhouse, 'Adapting the APV Valuation Methodology and the Beta Gearing Formula to the Dividend Imputation Tax System', *Accounting and Finance 37*, vol. 1, 1997, pp.69-88

174 NER, cll. 6.5.4(e)(4) and 6A.6.2(j)(4).

The NER prescribe the methodology for estimating the cost of corporate income tax for TNSPs and DNSPs respectively, which is one of the building blocks under a post-tax building block approach.[175] The formula prescribed in the NER includes a parameter referred to as 'the assumed utilisation of imputation credits' (gamma), which differs for transmission and distribution, as illustrated below:

> The estimated cost of corporate income tax of a [Network Service Provider] for each regulatory year (ETC_t) must be calculated in accordance with the following formula:
>
> $$ETC_t = (ETI_t \times r_t)(1 - \gamma)$$
>
> where:
>
> **ETI_t** is an estimate of the taxable income for that regulatory year that would be earned by a benchmark efficient entity as a result of the provision of [prescribed transmission / standard control] services if such an entity, rather than the [Network Service Provider], operated the business of the [Network Service Provider], such estimate being determined in accordance with the post-tax revenue model;
>
> **r_t** is the expected statutory income tax rate for that regulatory year as determined by the AER; and
>
> **Transmission**
>
> **γ** is the assumed utilisation of imputation credits, which is deemed to be 0.5.
>
> **Distribution**
>
> **γ** is the assumed utilisation of imputation credits.

The NER (for both transmission and distribution) allow the AER to review the value of and methodology used to calculate 'the assumed utilisation of imputation credits' (gamma) component of the estimated cost of corporate income tax.[176]

8.2.1 Transmission

The initial value of 0.5 for gamma deemed by the NER reflects the position of the ACCC in its *Statement of Regulatory Principles for the regulation of electricity transmission revenues* (SRP).[177]

In turn, the ACCC's position in the SRP was based on the findings contained in an early empirical study on gamma by Hathaway and Officer (1999), who calculated a payout ratio of around 0.80 and a utilisation rate of around 0.62.[178]

8.2.2 Distribution

The NER did not deem an initial value of gamma for electricity distribution.

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[175] NER, cll. 6A.6.4(a) and 6.5.3(a).

[176] NER, cl. 6A.6.4(d) and 6.5.4(d)(7)

[177] ACCC, *Statement of principles for the regulation of electricity transmission revenues*, December 2004, p.118

[178] Hathaway and Officer, 'The value of imputation tax credits', University of Melbourne, 1999.

Table 8.1 below outlines the gamma values adopted by jurisdictional regulators in the most recent distribution determinations for each jurisdiction. The AER has included both electricity and gas distribution decisions on gamma in table 8.1, due to the equivalence of the issues across the two sectors.

Table 8.1: Electricity and gas distribution determinations – gamma

Regulator (year)	Sector	Payout ratio	Utilisation rate	Gamma (range)	Gamma (final)
ESC (2008)	Gas	1.00	0.72 – 1.00	0.72 – 1.00	0.50
OTTER (2007)	Electricity	N/A	N/A	N/A	0.50
ESCOSA (2006)	Gas	0.71 – 1.00	0.50 – 0.60	0.35 – 0.60	0.48
QCA (2006)	Gas	0.82	0.92 – 1.00	0.50 – 1.00	0.50
ESC (2006)	Electricity	0.80 – 1.00	0.50 – 0.60	N/A	0.50
QCA (2005)	Electricity	0.80	0.625	N/A	0.50
ESCOSA (2005)	Electricity	N/A	N/A	N/A	0.50
IPART (2005)	Gas	N/A	N/A	0.30 – 0.50	0.30 – 0.50
ICRC (2004)	Gas	N/A	N/A	0.30 – 0.50	0.30 – 0.50
IPART (2004)	Electricity	N/A	N/A	0.40 – 0.60	0.50
ICRC (2004)	Electricity	N/A	N/A	N/A	0.50
Estimate (low-high)	**Energy**	**0.71 – 1.00**	**0.50 – 1.00**	**0.30 – 1.00**	**0.30 – 0.50**

Source: ESC[179], OTTER[180], ESCOSA[181], QCA[182], IPART[183], ICRC[184].

As table 8.1 indicates, for both electricity and gas distribution, jurisdictional regulators have consistently adopted a value for gamma of around 0.5 in their most recent decisions. After analysing the empirical data available at the time, jurisdictional regulators have in many cases cited as key reasons for adopting a gamma value of 0.5:

- the complexity of the issues,
- the wide divergence of expert views, and
- the desirability of maintaining consistency with previous decisions.

179 ESC, op. cit., 7 March 2008, pp.499-509; ESC, op. cit., October 2006, pp.400-413.
180 OTTER, op.cit., September 2007, pp.141-143.
181 ESCOSA, op. cit., June 2006, p.79; ESCOSA, op. cit., April 2005, pp.157-160.
182 QCA, op. cit., May 2006, pp.76-77; QCA, op. cit., May 2006, pp.111-112; QCA, op. cit., April 2005, pp.121-122.
183 IPART, op. cit., December 2005; IPART, op. cit., November 2005, p.66; IPART, op. cit., April 2005, pp.99-100; IPART, op. cit., June 2004, p.226-227.
184 ICRC, op. cit., October 2004, p.174-177; ICRC, op. cit., March 2004, p.70.

However, despite the consistency in the final value for gamma adopted by the jurisdictional regulators in past decisions, it is clear from table 8.1 that there are widely divergent views among jurisdictional regulators on the three key variables:

- the payout ratio (ranging from 0.71 to 1.00)
- the utilisation rate (ranging from 0.50 to 1.00), and
- the appropriate range for gamma (ranging from 0.30 to 1.00).

This highlights the complexity of the issues in this area and the ongoing debate in the academic literature regarding the appropriate recognition of the value of imputation credits in the Australian regulatory context.

A detailed discussion of the key issues raised in the distribution reviews listed in table 8.1 is included in the following sections.

8.3 Issues

8.3.1 Estimating gamma

As stated above, it is generally accepted that the gamma parameter can be defined as a product of the imputation credit payout ratio (F) and the utilisation rate (theta).[185]

One alternative approach is to base the estimate of gamma on that implied by market practice. It has been argued by some market practitioners that because imputation credits are not included in investment banking valuations, the appropriate value for gamma is zero.[186] On this point, the AER notes that the omission of imputation credits from a valuation analysis is not necessarily an indication of negligible monetary value but may instead reflect practical constraints on the market practitioners undertaking the valuation, and/or the desirability of using 'conservative' estimates in valuations. Hathaway and Officer made this point:

> We would be the first to admit that the value of imputation credits is not measured with any precision, but neither are many attributes of investment decisions which, by definition, must depend on future outcomes. Notwithstanding this lack of precision, ignoring them is tantamount to assuming a zero value for credits and this certainly is a gross error.[187]

The view that gamma should not be ignored was also supported by Envestra:

> Incorrectly valuing imputation credits can distort the availability of capital, pricing, demand, the level of investment in infrastructure assets and behaviour of the regulated businesses.[188]

Accordingly, the AER intends to continue with the generally accepted approach to estimating the gamma parameter at this time.

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185 Monkhouse, op. cit., 1997, pp.69-88.

186 KPMG, *2008 Gas Access Arrangement Review – Weighted Average Cost of Capital*, Prepared for SP AusNet, March 2007, pp. 47-48

187 Hathaway and Officer, 'The Value of Imputation Tax Credits – Update 2004', Capital Research Pty Ltd, November 2004, p.26

188 Envestra, *The value of imputation credits for regulatory purposes*, Submission to the QCA, September 2005, p.2

The issues discussed in the following sections include:

- estimating the payout ratio
- estimating the utilisation rate and
- consistency with the MRP.

8.3.2 Estimating the payout ratio (F)

The AER recognises that the appropriate methodological approach for estimating the imputation credit payout ratio (F) and its corresponding empirical estimate is a matter of debate in the regulatory literature. Theoretically, F can range between zero (in which none of the imputation credits generated are paid out to shareholders) and one (in which all imputation credits generated are paid out to shareholders).

As table 8.2 below indicates, the most recent estimates of F quoted by Australian energy regulators have ranged between 0.39 and 1.00.

Table 8.2: Recent estimates of the payout ratio (F)

Study	Method	Sample	Study Period	Payout ratio (F)
Lally (2003)[189]	Financial accounts	Large firms	2002	1.00
Hathaway and Officer (2004)[190]	Tax statistics	Market	1988-2002	0.71
Envestra (2006)[191]	Financial accounts	Utilities	2000-2004	0.39[(a)] 0.82[(b)]
ESC (2008)[192]	Forecast revenues	Victorian gas distributors	2008-12	1.00
Estmate (high-low)				**0.39 – 1.00**

(a) based on tax expense
(b) based on tax paid

The key issues surrounding the estimation of F include:

- the appropriate benchmark
- the impact of tax changes, and
- the impact that alternative methods for the distribution of imputation credits may have on F.

189 Lally, 'Regulation and the cost of equity capital in Australia', *Journal of Law and Management*, vol.2, no.1, November 2003, p.33
190 Hathaway and Officer, op. cit., 2004, p.11.
191 Envestra, *Comments on the review of Martin Lally of the 'The value of imputation credits for regulatory purposes'*, Submission to the QCA, February 2006, p.9.
192 ESC, *Gas access arrangement review 2008-2012 – draft decision*, 28 August 2007, pp.427-430.

8.3.2.1 The appropriate benchmark

The feasible options for an appropriate benchmark against which F can be estimated include:

- use of an historical market average
- estimation of a firm-specific forecast, and
- use of an historical industry average.

Market average approach

The most commonly cited estimate of the payout ratio in recent regulatory decisions is that developed by Hathaway and Officer.[193] Making use of Australian Tax Office (ATO) statistics, Hathaway and Officer calculated the aggregate value of imputation credits accrued against the amount of imputation credits distributed for all Australian firms that submitted tax returns over the period 1988-2002. The average value for F calculated over this period was 0.71.

Notwithstanding general acceptance of the validity of the results presented by Hathaway and Officer, the use of a market average value for F may not be an appropriate benchmark for the utilities sector, given that many utilities pay relatively high levels of dividends compared to the market average and therefore may be expected to pay out more of their accumulated imputation credits than the Australian market average.[194]

Firm-specific forecast

Lally has argued that F is in fact a firm-specific parameter, and is defined as such in the Officer (1994) CAPM widely used by Australian utility regulators.[195]

This argument has been given weight by a number of jurisdictional regulators in recent regulatory decisions. For example, the ESC used a direct estimation method to estimate a firm-specific value for F for each of the Victorian gas distributors.[196] Based on an analysis of the tax payments allowed over the five year forecast period, the ESC calculated that the annual dividend yield required for full distribution of imputation credits ranged between 0.7 per cent and 5.1 per cent for the four businesses subject to the review. Given that the average dividend yield for regulated utilities was estimated at 8.1 per cent, the ESC concluded that:

> …a value for F of 1 is appropriate and that a value for F that reflects the status of the average firms (i.e. F = 0.71) [that is, the market-wide average] will understate materially the extent to which the distributors should be expected to distribute imputation credits created over the period.[197]

Lally acknowledged that while a firm-specific estimate of F is consistent with the theoretical underpinnings of the CAPM, there are some practical difficulties associated with this approach. These may include:

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193 Hathaway and Officer, op. cit., 2004
194 ESC, op. cit., 2007, pp.427-430
195 Lally, *The cost of capital under dividend imputation*, Prepared for the ACCC, June 2002, p.18.
196 ESC, op. cit., 2007
197 ibid., p.430

- the added computational burden on the regulator
- the opening of a further area of controversy in estimation, and
- the possibility of creating undesirable incentives for firms with respect to dividend policy.[198]

Further, in line with the NER requirements for other WACC parameters subject to this review, the AER considers that an estimate of the value for gamma should be based on a benchmark estimate rather than a firm-specific estimate. That said, a firm-specific value for F may provide a useful cross-check on the benchmark value determined.

Industry average approach

In light of the practical constraints associated with a firm-specific estimate of F, an appropriate alternative may be to estimate a benchmark industry-average value for F.[199] It also ensures internal consistency in the estimation of the WACC parameters more generally, in that a benchmark industry-average is used in estimating the value of other parameters.

This approach may also have an advantage over using the market average. By excluding firms whose industry, structure, risks and operating environments do not reflect those of an Australian regulated energy utility, it is possible to generate a more accurate and appropriate estimate of F in the current context. There is evidence to suggest that the value of F for large Australian companies may be significantly higher than the market average. For example, Lally examined the financial statements of the eight largest listed firms in Australia at the time, and found that F for 2001 was equal to one.[200] Although the sample does not include any regulated utilities, it is a useful indicator of the expected value of F for a large Australian company.

As part of its 2006 gas distribution decision, ESCOSA considered that the market average value for F of 0.71 estimated by Hathaway and Officer was likely to underestimate F for a benchmark utility, given its view that utilities are more likely to distribute profits via dividends than the average Australian firm. ESCOSA concluded that:

> The Commission does not consider that a 71 percent distribution rate, which applies to companies with significant growth options, is appropriate for a benchmark utility. A more appropriate distribution rate (F) for such a benchmark utility is likely to be close to 100 percent.[201]

In a submission to the QCA for its 2006 gas distribution decision, Envestra, with assistance from Bishop, estimated an historical average value for F for a proxy group

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198 Lally, op. cit., 2003, p.33; and Lally, *Review of 'The Value of Imputation Credits for Regulatory Purposes'*, prepared for the QCA, December 2005, p 7.

199 See: Lally, op. cit., 2003, pp.29-42

200 ibid., p.33. The firms analysed collectively represented around 50% of listed equity in Australia as at December 2001; and comprised Telstra, News Corporation, NAB, Rio Tinto, Westpac, Commonwealth Bank and ANZ.

201 ESCOSA, *Proposed revisions to the access arrangement for the South Australian gas distribution system –draft decision*, March 2006, pp.266-267

of regulated utilities using tax data.[202] Envestra calculated two different figures, 0.82 and 0.39, depending on whether F was calculated against 'tax paid' or 'tax expense'.[203]

In its final decision the QCA (implicitly) accepted the advice from Lally that the appropriate industry-average value for F was closer to 0.82.[204] In support of this outcome, the AER notes that the widely quoted market-average value for F of 0.71 estimated by Hathaway and Officer was based on the assumption that imputation credits are 'created' once company tax is paid.[205]

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

8.1 Do regulated utilities have different characteristics from the 'average firm' in the Australian market which suggests that the use of an industry-average value for F is more appropriate than a market-average?

8.2 What firms should be included in calculating a benchmark industry-average value for F?

8.3 Is it reasonable to use firm-specific estimates of F as a cross-check on the benchmark value for F established?

8.4 In calculating an industry-average value for F, is it more appropriate to assume that imputation credits are generated once tax is paid rather than as tax expense is incurred?

8.3.2.2 The impact of tax changes

In practice, the value that investors place on the imputation credits distributed by Australian firms (the utilisation rate) is likely to have an impact on F.

The most recent change to the Australian tax regime occurred in July 2000, when individuals and superannuation funds were for the first time allowed a cash rebate for unused imputation credits. This implies that the value of the imputation credits is likely to have increased substantially for many investors in the post-2000 period (see sections 8.3.3.3 and 8.3.3.4 below). In their dividend drop-off study on the utilisation rate, Beggs and Skeels analysed the likely impact of the 2000 tax changes:

> While it seems likely that most personal investors would have been using their available franking credits, it is well known that many superannuation

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202 Envestra, *The value of imputation credits for regulatory purposes*, submitted to the QCA, September 2005, p.10; and Envestra, *Comments on the review by Martin Lally of 'The value of imputation credits for regulatory purposes'*, submitted to the QCA, February 2006, p.9. The companies analysed included AGL, Alinta, Australian Pipelines Trust, United Energy, Origin Energy, Envestra, GasNet Australia.

203 Envestra, op. cit., February 2006, pp.8-9.

204 QCA, *Final decision – revised access arrangement for gas distribution networks: Envestra*, May 2006, p.111; and Lally, *Review of 'Comments on the review by Martin Lally of `The value of imputation credits for regulatory purposes'*, April 2006, pp.6-8.

205 Hathaway and Officer, op. cit., 2004, p.9

> funds did not pay tax because they had excess franking credits. The July 2000 changes created real value in previously unused franking credits, creating an incentive for this large class of investors to actively seek franking credits.[206]

In other words, the tax refund allowed by the ATO post-2000 is likely to have exerted further pressure on companies to increase their imputation credit payout ratio – either by an increased dividend payout policy and/or by an increased use of mechanisms such as 'off-market share buybacks' (see section 8.3.2.3 below).

This implies that a value for F based on pre-2000 data may be less relevant in the current context, as it is not reflective of the current tax regime and therefore may not reflect current market practice. In particular, this may imply that estimates using pre-2000 data are less reflective of forward looking expectations, which is an essential characteristic of all WACC parameters.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

8.5 Given the likely impact of the July 2000 tax change, is it more appropriate to focus on the post-2000 period in calculating F?

8.6 Has the July 2000 tax change increased F for regulated utilities?

8.3.2.3 Methods of distribution

The traditional method by which firms distribute their accrued imputation credits is to attach them to dividends in the form of a franked dividend. This approach means that imputation credits are evenly distributed on a pro-rata basis, across all investors. However a firm may not wish to distribute imputation credits in this manner, given that some of its shareholders place value on the credits whereas other shareholders (e.g. foreign shareholders) may not.

There are alternative methods by which firms can distribute imputation credits to those investors who value them – known as 'dividend streaming'.[207] One such dividend streaming mechanism is called an 'off-market share buyback', whereby the firm makes an offer to each of its shareholders to repurchase shares at a discount to the market price. The amount paid by the firm to repurchase shares from those shareholders who decide to sell can be treated by the firm as a franked dividend. The level of discount on the market price influences the attractiveness of the buyback offer to particular types of shareholders.

Although the AER acknowledges that there are other potential motivations for firms to undertake an off-market share buyback (e.g. general capital management), the ability to distribute imputation credits to shareholders in a non-uniform manner is of relevance in this context. As part of its ongoing review of off-market share buybacks in Australia, The Board of Taxation recently commented that:

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[206] Beggs and Skeels, 'Market arbitrage of cash dividends and franking credits', *The Economic Record*, vol.82, no.258, September 2006, p.252

[207] It is noted that under the *Income Tax Assessment Act 1997* the ATO has the discretion to restrict dividend streaming in certain circumstances; and the anti-streaming provisions are currently the subject of a review by the Board of Taxation.

> By facilitating the distribution of franking credits to those shareholders who are able to make the greatest use of them, off-market share buybacks avoid the wastage of franking credits that would otherwise typically occur under equal distribution patterns.[208]

The Board found that over the period 1997-2007 listed companies returned $25.4 billion to shareholders via off-market share buybacks, with $7.3 billion of attached imputation credits.[209] The Board also found that the amount of capital returned to shareholders via buybacks has been growing since 2001.

The increased use of such distribution mechanisms, combined with the traditional method of paying franked dividends, allows firms to more fully distribute accumulated imputation credits and minimise any 'wastage' of credits. This suggests that large firms such as energy utilities may be able to fully distribute accrued imputation credits regardless of the origin of their shareholders.[210] This may result in an artificially low value for F if measured at any one point in time, despite an investor expecting a payout of these accumulated credits in future periods.

The ability of firms to more effectively 'target' the distribution of imputation credits to those investors who value them is also likely to increase the utilisation (value) of imputation credits (see section 8.3.3.4 below).

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

8.7 Are off-market share buybacks prevalent in the utilities sector? Are there other dividend streaming methods utilised in the utilities sector?

8.8 Does the ability of firms to distribute imputation credits via off-market share buybacks suggest a benchmark value for F closer to 100 per cent for utilities for arbitrage reasons?

8.3.3 Estimating the utilisation rate (theta)

The 'value' of imputation credits as a proportion of their face value must be estimated for the Australian economy. The market value of an imputation credit can diverge from its face value, and in some circumstances the imputation credit is not of value to an investor. For example, foreign investors may place little or no value on imputation credits since they cannot be used to offset their (Australian) personal tax liabilities.

Theta can range between zero (in which none of the imputation credits distributed are valued by investors) and one (in which all imputation credits distributed are valued fully by investors).

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208 The Board of Taxation, *Review of the taxation treatment of off-market share buybacks*, Discussion Paper, July 2007, p.48

209 ibid., p.11. The Board also found that 'there are significantly more off-market share buybacks (many thousands) conducted by unlisted companies than by listed companies'.

210 Further, those shareholders who cannot utilise imputation credits (e.g. non-residents) and therefore choose not to sell their shares at the discount price offered will still benefit to the extent that the share buyback raises the market price.

As table 8.3 below indicates, the most recent estimates of theta in the finance literature have ranged between 0 and 0.81.

Table 8.3: Recent estimates of the utilisation rate (theta)*

Study	Method	Study Period	Utilisation rate (theta)
Cannavan, Finn and Gray (2002)[211]	Inference from derivatives	1994-1999	~0.50 (pre 45-day rule) ~0.00 (post 45-day rule)
Hathaway and Officer (2004)[212]	Dividend drop-off	1986-2004	0.50
		post-2000	0.60
	ATO statistics	1988-2002	~0.40
Beggs and Skeels (2006)[213]	Dividend drop-off	1986-2004	0.57 (2001-2004)
SFG (2007)[214]	Dividend drop-off	1998-2006	0.20 - 0.40
Handley and Maheswaran (2008)[215]	ATO statistics	1988-2004	0.81 (2001-2004) 0.71 (1990-2004)
Estimate (high-low)			**0.00 – 0.81**

* The ACG (2006) study prepared for ESCOSA has been excluded as it has not been made public.

The key issues surrounding the estimation of theta include:

- the extent to which foreign investors should be recognised
- the identity of the investor from whom the valuation of imputation credits should be inferred (i.e. marginal or average investor)
- empirical estimates of theta at the margin, and
- empirical estimates of theta for the average investor.

8.3.3.1 Recognition of foreign investors

One of the key areas of debate in the regulatory literature on theta is the extent to which foreign investors should be recognised in the Australian domestic market.

211 Cannavan, Finn and Gray, 'The value of dividend imputation tax credits in Australia', *Journal of Financial Economics*, vol.73, 2004, p.192
212 Hathaway and Officer, op. cit., November 2004, pp.13,24
213 Beggs and Skeels, op. cit., September 2006, p.247
214 SFG, *The impact of franking credits on the cost of capital of Australian companies*, Report prepared for Envestra, Multinet and SP AusNet, 25 October 2007, p.45
215 Handley and Maheswaran, 'A measure of the efficacy of the Australian imputation tax system', *The Economic Record*, vol.84, no.264, March 2008, p.90

As foreign investors do not have Australian personal tax liabilities, in the absence of international tax treaties they may place little or no value on imputation credits. Accordingly it is argued that the presence of foreign investors in the Australian market will have an impact on theta, and this impact should be recognised. Conversely it has been argued by Lally that recognition of foreign investors in the estimation of theta is inconsistent with the assumptions underpinning the standard 'domestic' form of the CAPM such as the Officer (1994) CAPM commonly adopted by Australian regulators. As the Officer version of the CAPM assumes that the capital market is segmented from the rest of the world, it is argued that any recognition of foreign investors will result in an internal inconsistency and a non-equilibrium outcome.

In other words, in estimating theta for the Australian economy, it needs to be established whether it is more appropriate to assume a:

- segmented (domestic) capital market with no foreign investors
- fully integrated (international) capital market, or
- domestic capital market which recognises the presence of foreign investors in the domestic capital market.

Lally stated that the appropriate assumption under a domestic CAPM framework is that capital markets are fully segmented:

> First, regarding the issue of recognizing foreign investors, continued use of a version of the Capital Asset Pricing Model that assumes that national equity markets are segmented rather than integrated (such as the Officer model) is recommended. It follows that foreign investors must be completely disregarded. Consistent with the disregarding of foreign investors, most investors recognized by the model would then be able to fully utilise imputation credits.[216]

Lally stated that the alternative approach to assuming a segmented market is to assume fully integrated markets and utilise an international version of the CAPM. Given that foreign investors are assumed to dominate the domestic market under full integration, the value of theta is negligible in an international CAPM framework. In a more recent paper, Lally examined the likely effects of adopting an international version of the CAPM on the WACC parameters (relative to a domestic CAPM), and found that the current approach of explicitly recognising foreign investors only in the estimation of theta results in inappropriate over-compensation for regulated firms. The implication of this argument is that, for consistency with the model, theta must be either zero (full integration), or one (full segmentation). Lally recommended that if the Officer (1994) CAPM is used to generate the return on equity, the appropriate value of theta is one.[217]

On this key theoretical point, SFG appeared to share the same view – that in defining a 'market' only full segmentation and full integration can be assumed for market equilibrium to occur, and the result is a value for theta of either one or zero depending

[216] Lally, op. cit., November 2003, p.38

[217] Lally, *Review of the parameters in the National Electricity NER*, Prepared for the EUAA, 19 September 2007, pp.16-23

upon which assumption is taken.[218] However SFG rejected the use of the segmented market assumption on the grounds that it is not realistic for a small open economy such as Australia, and advocates instead that foreign investors need to be recognised.

SFG argued that the only way to recognise foreign investors in the Australian market is to assume that the 'marginal price-setting investor' is a foreign investor so as to create a Nash Equilibrium from which a CAPM can be derived.[219] That is, SFG contended that if Australian share prices contain a positive 'value' for imputation credits, foreign investors will not earn their required rate of return and will withdraw from the Australian market. The observed presence of foreign investors in the Australian market requires that the marginal investor is a foreigner such that share prices do not reflect a positive value for theta. Accordingly, the implied value of theta for Nash Equilibrium is zero.

A similar argument has been raised previously by Envestra with assistance from Bishop:

> An outcome of the imputation system is a differential effect across some shareholder groups… As a result, the *dollar return* these different shareholder groups earn after taxes can differ and the *rate of return* on investment may also vary if one group sets the value…
>
> …overseas investors may not earn the cost of capital if the value of the company is set by ARPTS [Australian Resident Personal Taxpaying Shareholders]. Given overseas investors have choices for their investment we would expect to see them withdraw from Australian assets to invest elsewhere where they are able to earn at least their cost of capital.[220]

Lally rejected the theoretical basis for this argument on the grounds that all investors trade-off both expected returns and expected risks in selecting a portfolio. The diversification benefits (i.e. reduced risk) available to foreign investors by including Australian assets in their portfolio may outweigh any reduced returns arising from a positive value for theta embedded in share prices.[221]

The ESC, in its recent final decision for Victorian gas distribution, took a similar view in responding to SFG's arguments:

> …in defining the portfolio choice scenario without the recognition of risk and return, SFG has not recognised the potential value of diversification attributable to a non-resident investor holding Australian stocks within a portfolio.
>
> …Accordingly, contrary to the SFG hypothesis, it is possible and plausible that there is a Nash equilibrium where Australian share prices include a material value for imputation credits but where there is also a material level of foreign investment in Australia and foreign investment by Australians.[222]

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218 SFG, *The impact of franking credits on the cost of capital of Australian companies*, Report prepared for Envestra, Multinet and SP AusNet, 25 October 2007, pp.12-14

219 ibid., pp 14-15

220 Envestra, op. cit., September 2005, p.4

221 Lally, *Review of 'The value of imputation credits for regulatory purposes'*, Prepared for the QCA, December 2005, pp.11-12

222 ESC, *Gas access arrangement review 2008-2012 – final decision – public version*, 7 March 2008, pp.506-507

As discussed in section 2.2.1, the AER proposes to adopt a domestic CAPM framework recognising the presence of foreign investors. Recognition of foreign investors in a domestic capital market seems most appropriate given the significant level of foreign investment observed in Australia. It is noted that, from a practical point of view, foreign investors are recognised elsewhere in the CAPM (e.g. MRP, equity beta) to the extent that foreign investors impact on domestic market data.[223] Further, in relation to the arguments above, this framework does not appear inconsistent with a theoretical Nash Equilibrium outcome. Envestra, with assistance from Bishop, recognised the issue:

> …we do know that foreign investors influence 'domestic' company and market returns through investing and buying behaviour and therefore will influence beta as measured. *That is, there is a natural recognition of foreign investor influence in market parameters as measured* and used by regulatory bodies as opposed to choosing a theoretical model that assumes they either do not exist (domestic CAPM) or do exist (international CAPM).[224]

Notwithstanding this, the claim made by Lally that the current WACC parameters leads to compensation 'outside the bounds' of that which could be expected under either full segmentation or full integration is worthy of consideration.[225]

In sum, it appears inappropriate to exclude foreign investors from the analysis of the appropriate value for theta, given that foreign investors may have an impact on the analysis. However given the significant value that domestic investors place on imputation credits and the potential presence of 'home country bias', it appears equally inappropriate to assume that the presence of foreign investors requires that imputation credits have a zero value (i.e. the marginal investor is a foreign investor).

Moreover, the AER's overriding objective is to estimate a value for theta in the Australian economy based on the best available robust, defensible evidence. Importantly, the impact of foreign investors is evident in all empirical estimates of theta, regardless of whether:

- foreign investors are explicitly recognised (e.g. from studies that utilise ATO statistics), or
- foreign investors are implicitly recognised (e.g. from dividend drop-off studies – see section 8.3.3.3 below).

[223] This point is acknowledged by: Lally, op. cit., 2007; and SFG, op. cit., 2007.
[224] Envestra, op. cit., February 2006, p.11
[225] Lally, op. cit., September 2007, pp.16-23

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

8.9 Is it more appropriate to focus on empirical evidence in estimating theta rather than considering the theoretical values of either one or zero?

8.10 Does the current value for theta adopted in Chapter 6A of the NER (implicitly assumed to be 0.6) lead to over-compensation for regulated firms compared to the full segmentation and full integration scenarios?

8.3.3.2 Average or marginal investor

One of the key questions raised in previous reviews is whether theta should represent the value of imputation credits by the 'average' investor in the Australian market, or whether it should instead represent the valuation of the 'marginal' investor. This assumption may inform which empirical studies and which estimates are given most weight in a comparative analysis, and in turn may ultimately help inform a decision on the most appropriate value for theta. The appropriate assumption is the subject of debate among finance experts.

It is argued by some experts that the appropriate value for theta is that of the average Australian investor – a consequence of using the Australian domestic (Officer) CAPM in the formulation of the WACC. For example, Lally stated that:

> …within the Officer (1994) model, the utilisation rate U is a weighted average across the imputation utilisation rates of all investors in the market rather than only one group, and this remain true even if that one group dominates the ownership of a particular firm or industry… The fact that this utilisation rate is a weighted average across investors implies that it is not the rate for one type of investor.[226]

Lally ties the use of a market average theta to the fundamental assumption of the CAPM:

> This averaging is a consequence of aggregating over investors in order to obtain market equilibrium. In intuitive terms the explanation is that market prices are determined by investors in aggregate.[227]

This view of market equilibrium is supported by Handley:

> ...the equilibrium value of all assets in the "market" are determined jointly relative to all other assets in the "market" by all investors in the "market" i.e. neither individual assets nor individual investors are considered in isolation or equivalently there is no segmentation within the "market" [emphasis added].[228]

The alternative view, held by SFG and others, is that the Officer (1994) CAPM assumes that the value of imputation credits is decided at the margin:

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226 Lally (2005), op. cit., December 2005, p.10

227 ibid., footnote 4

228 Handley, *Estimating the cost of capital using the CAPM*, Melbourne Centre/ACCC Occasional Seminar Series, 16 October 2007, p.10

> The WACC is the cost to the firm of attracting capital – it is the price of capital. Like all prices that are set in competitive markets, the price of capital is set by the marginal price-setting investor… The marginal shareholder may be an investor who values franking credits or they may not.[229]

Further, the relevance of the average investor concept to theta is questioned by Cannavan, Finn and Gray:

> Because different firms have different stockholder bases, an analysis of the average firm is of limited use.[230]

Similarly, Envestra argued that:

> The building block approach should provide investors in the regulated gas and electricity distribution sector with the return required to encourage investment in that sector i.e. it is sector specific and not related to an average Australian investor that does not set prices.[231]

On this point, the AER notes that the objective in the current context is to estimate a value for theta applicable in the Australian market – not to estimate a theta applicable to a particular firm or group of firms. In an open economy such as Australia, investors, both foreign and domestic, are free to invest across the Australia market according to their individual risk and return profiles. Therefore in setting a 'benchmark' theta, it would seem the appropriate benchmark is that for the entire Australian economy.

Envestra raised another criticism of the average investor concept:

> …Lally's comments about the averaging across investors to obtain a utilisation rate appears to be driven by a view derived from a post personal tax CAPM and this may not be consistent with a post corporate, pre personal tax CAPM currently used by most Australian regulators.[232]

This view – that the average investor concept is not compatible with the Officer (1994) CAPM – has also been raised by SFG.[233]

This is an issue that requires further consideration. It is not clear, however, how one can come to a view on the appropriate value for theta without (at least implicitly) considering the effect on personal tax liabilities. It is noted that estimates of theta inferred from dividend drop-off studies also presumably contain information about personal tax rates. Notwithstanding, the changes to the tax regime in 2000 which provided domestic investors with a cash rebate for any unused imputation credits (i.e. the value of the imputation credits received exceeds personal tax liabilities) may render differential personal tax rates largely irrelevant.

Despite the wide divergence of theoretical views on the marginal and average investor concepts, there may in fact be considerable complementarities between the two positions. For example, despite advocating an assumption that the marginal investor is more appropriate in estimating theta, Envestra appear to have acknowledged that there is ambiguity between the average and marginal investor concepts:

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229 SFG, op. cit., March 2007, p.4
230 Cannavan, Finn and Gray, op. cit., 2004, p.192
231 Envestra, op. cit., September 2005, p.9
232 Envestra, op. cit., February 2006, p.7
233 SFG, op. cit., October 2007, p.15

> The Hathaway & Officer findings of a positive value of gamma (but much less than 1) on average across companies is consistent with a mix of marginal investors setting prices across companies or sectors – some that explicitly value FTCs [Franking Tax Credits] and others that don't.[234]

This view – that equilibrium is determined by the average of all investors at the margin – seems to reconcile the two approaches. Handley argued that:

> …it is somewhat misleading, within the CAPM framework, to talk of the marginal investor since all investors collectively determine the prices of all assets and therefore all investors are collectively "the marginal investor".[235]

In summary, it would appear that the average investor assumption is more appropriate under the CAPM framework. However this assumption does not necessarily preclude the use of empirical analyses such as dividend drop-off studies in estimating theta – to the extent that the results provide a reasonable indication of the average valuation of all investors at the margin.

The AER intends to consider the results of all recent studies in coming to an estimate of the appropriate value for theta in the Australian market.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

8.11 Given the differential valuation placed on imputation credits by different groups of investors (i.e. resident / foreign), is it more appropriate (in theory) to place more weight on studies focusing on the valuation of the average investor in the Australian market?

8.12 Is it correct to say that the average investor concept can only apply in a full post-personal tax version of the CAPM? What about if theta is inferred from dividend drop-off studies?

8.3.3.3 Valuation of imputation credits at the margin

This section examines the most commonly cited empirical studies focusing on the value of theta inferred from market prices.

Dividend drop-off analysis

Dividend drop-off analysis is the most common method used to empirically estimate theta. This analysis compares the share price before the dividend issue (i.e. cum dividend share price) with the share price immediately after the dividend issue (i.e. ex-dividend share price). In the absence of any other factors influencing share prices when the dividend is paid, theoretically, the difference in these prices, the 'drop-off' amount, represents the market value of the cash dividend plus the market value of the imputation credit – assuming perfect capital markets (i.e. perfect information and zero transactions costs).[236] Further, these studies attempt to ascertain how much of the total

[234] Envestra, op. cit., September 2005, p.7
[235] Handley, op. cit., 2007, p.10
[236] This is acknowledged by Beggs and Skeels in a recent dividend drop-off study [Beggs and Skeels, op. cit., September 2006, p.239].

drop-off can be attributed to the market's valuation of the imputation credit associated with the dividend. This is accomplished using econometric analysis.

Recent drop-off studies

The dividend drop-off study by Hathaway and Officer is one study that has frequently been cited in the regulatory literature and by jurisdictional regulators in the energy sector. Based on data from 1986 to 2004, Hathaway and Officer estimated a theta of about 0.50 and a value for the cash dividend of 0.80 for large firms. The results also suggest that theta has risen to 0.60 in the later years of the period.[237]

The results from this study have been referenced by jurisdictional distribution regulators in a number of recent decisions, in particular the theta value of 0.60 from the most recent period.[238] It has been argued that the most recent estimate of theta from post-2000 data better reflects the current utilisation rate, due to structural changes to the Australian tax regime in July 2000 that allowed resident investors a rebate for unused imputation credits. However this assertion has been challenged by SFG (2007), who argue that:

- the 2000 tax change has had no appreciable impact on the empirical estimates of Hathaway and Officer, and
- Hathaway and Officer explicitly caution against drawing strong inferences from the most recent estimates, due to the 'inherent noise in the estimation process'.[239]

As a consequence the resulting value of theta to be inferred from the dividend drop-off study by Hathaway and Officer remains a subject of debate; however it appears to range between 0.50 and 0.60.

The most recent available dividend drop-off study examining theta has been undertaken by Beggs and Skeels.[240] Based on a regression analysis, Beggs and Skeels estimated that for the period 2001-2004 the value for theta is 0.57 and the value of the cash dividend is 0.80. This suggests a value for theta of 0.57 (i.e. investors value an imputation credit at around 57 per cent of its full dollar value).

One of the key objectives of the Beggs and Skeels study was to examine the impact on theta of six specific tax regime changes that took place over the period 1984-2004. As the authors explain, the results were somewhat mixed:

> The effects of tax changes were found to be generally consistent with developed theory, but few statistically significant effects could be identified for most of the tax changes. Importantly, the year 2000 tax change that allowed for a tax rebate of unused franking credits was of special interest.

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237 Hathaway and Officer, op. cit., November 2004, p.24

238 For example, see: ESCOSA, *Proposed revisions to the access arrangement for the South Australian gas distribution system – draft decision*, March 2006, p.266; and ESC, *Electricity distribution price review 2006-10 – October 2005 price determination as amended in accordance with a decision of the Appeal Panel dated 17 February 2006 – final decision – volume 1 – statement of purpose and reasons*, October 2006, p.411.

239 SFG, op. cit., October 2007, pp.22-23

240 Beggs and Skeels, op. cit., September 2006, pp.239-52

> This tax regime change permanently increased the value of franking credits to the marginal investor, and raised the gross drop-off ratio.[241]

The inability of the model to accurately depict the expected impacts of each of the tax regime changes analysed has led SFG to criticise the study. Further, SFG rejects the inferred result that theta increased significantly in the post-2000 period:

> Beggs and Skeels have not, at all, found evidence of an increase in the value of franking credits post-2000. They have uncovered a statistical aberration in the 2000 year only that occurs in their data set using their empirical methodology.[242]

In light of the ESC's stated preference for using post-2000 data, SFG undertook a separate dividend drop-off study using data from 1998 to 2006. SFG applied the empirical procedures used in the two key studies mentioned above to its updated data set, with the following overall results:

- a market value for cash dividends in the range between 0.75 and 0.95, and
- conditional on this estimated value for cash dividends, a theta value in the range between 0.20 and 0.40.[243]

However, SFG cautions on the robustness of its results: [244]

> …we note that all the estimates are imprecise (relatively large standard errors) and can vary substantially depending on the methodology that is employed… For this reason, we would caution against placing too much weight on any single piece of evidence, especially if it involves a relatively small sample of data.

These three studies suggest an empirical value for theta as inferred from dividend drop-off studies in the range between 0.20 and 0.60.

Data issues

Caution needs to be taken in interpreting the results of dividend drop-off studies, as they are subject to inherent uncertainties and anomalies. SFG acknowledged this point:

> …the dividend drop-off technique requires a large number of observations to obtain even moderate levels of statistical reliability. This is because the data are noisy in the sense that stock prices can change for many reasons other than the payment of a dividend.[245]

Based on some of the apparent counter-intuitive results of the Beggs and Skeels study and the word of caution from Hathaway and Officer of 'inherent noise' in the estimates, this seems to be a reasonable statement. Despite these disadvantages, dividend drop-off studies may still provide some useful information on the value for theta in the Australian market.

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241 ibid., p.249
242 SFG, op. cit., October 2007, p.26
243 ibid., p.44
244 ibid., p.45
245 ibid., p.19

One of the key advantages of the Beggs and Skeels study is that the authors attempt to address the difficulties with assigning value to the two components of the total dividend (i.e. the cash and imputation credit components). The statistical difficulty occurs because the cash dividend and the imputation credit variables are highly correlated, making it almost impossible to obtain a reliable measure of their individual values.[246] KPMG argued that several important studies – including Hathaway and Officer suffer from this problem and therefore provide unreliable utilisation estimates.[247]

Beggs and Skeels argued that there is no significant problem with the data in their study because:

> …the dataset incorporates information such as the unfranked dividends, observations at different company tax rates, observations where untaxed income is distributed (such as from listed property trusts), and observations where foreign sourced company income does not attract a tax credit...[248]

The authors believe that these variations in the data mitigate some of the problems associated with earlier studies. However it is evident from the critique of the Beggs and Skeels study by SFG that statistical uncertainties may still remain.

Value of the cash dividend

One of the issues of debate surrounding dividend drop-off studies is the appropriate value for the cash component of the dividend. Studies such as Beggs and Skeels and Hathaway and Officer gave an empirical estimate for the value of cash dividends of around 80 per cent. That is, the cash component of a dividend is not fully valued by the market. There are two widely divergent views on how this issue should be addressed.

SFG contended that:

> It is inconsistent and inappropriate to consider dividends to be worth only 80% of capital gains when estimating the value of franking credits, but then to assume that dividends are worth 100% of capital gains when using CAPM to estimate the cost of equity.[249]

According to SFG, in order to restore consistency with the CAPM, in which dividends are assumed to be valued as equally as capital gains, a value of 100 per cent must be 'imposed' on the cash dividend component of the drop-off. The effect of making this assumption is that the value of the imputation credit component of the drop-off (i.e. theta) falls to a level immaterially different from zero.[250]

Conversely, Lally stated that there should be a positive adjustment made to estimates from dividend drop-off studies as a result of this less than full valuation of cash dividends.[251] According to Lally, existing dividend drop-off studies equate the 'franking credit drop-off ratio' with the market value of these credits (i.e. the

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246 This is known in econometric terms as 'multi-colinearity'.

247 KPMG, *2008 Gas Access Arrangement Review – Weighted Average Cost of Capital*, Prepared for SP AusNet, March 2007, p.44

248 ibid., p.243

249 SFG, op. cit., p.30

250 ibid., pp.31-33

251 Lally (2007), op. cit., September 2007, pp.13-16

utilisation rate), and this can only hold if the cash component is fully valued. Given the assumption that the empirical estimate of 0.80 for the cash dividend component from these studies reflects differential tax treatment of dividends vis-à-vis capital gains, a positive adjustment needs to be made to the 'franking credit drop-off ratio' to consistently reflect this tax differential. Lally concludes that the Beggs and Skeels result should be 'scaled up' from 0.57 to 0.72.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

8.13 Does the dividend drop-off methodology provide sufficiently robust empirical evidence of the value for theta in the Australian economy?

8.14 Given the tax changes in July 2000, is it appropriate to place more weight on data from the post-2000 period in estimating theta from dividend drop-off studies?

8.15 Does a cash dividend value of less than 100 per cent necessarily imply that dividends and capital gains are not taxed equally?

8.16 Is the empirical result that cash dividends are not fully valued a valid result in theoretical terms? If an adjustment is required, what is the most appropriate adjustment?

Inference from derivatives

This is a method proposed by Cannavan, Finn and Gray, which compared the difference in the pricing of certain derivative securities and their underlying shares.[252] Cannavan et al infer the value for theta over the period 1994-1999 from the relative prices of share futures and the individual stocks on which those futures are written.

The results of Cannavan et al suggested that market participants place a low value on imputation credits, particularly since the 1997 introduction of the 45-day holding period rule.[253] They state the results as follows:

> …We find that: (i) cash dividends are fully valued relative to futures payoffs, (ii) prior to the 45-day rule, imputation credits were valued up to 50% of face value for high-yielding firms, and (iii) since the 45-day rule, imputation credits are effectively worthless to the marginal investor of ISFs [Individual share futures contracts] and LEPOs [Low exercise price options].[254]

It has been argued in submissions to regulators that this methodology has several advantages over the dividend drop-off regression studies. Firstly, there is a relatively large number of observations for a given company. Secondly, it is argued that as the

[252] Cannavan, Finn and Gray, op. cit., 2004, pp.167-97

[253] The ATO introduced the 45-day rule in 1997 to prevent short-term trading in imputation credits. The rule states that unless a stock is held for 45 days prior to the dividend announcement, investors do not qualify for the imputation credit.

[254] Cannavan, Finn and Gray, op. cit., p.192

derivatives trade well in advance of ex-dividend dates, prices are not contaminated by the activities of short term arbitrage traders.

However there may be a number of limitations to the application of this study in the current context. Firstly, as the period of analysis is from 1994-1999, the results of the study appear less applicable in the current tax regime that has applied since then. Secondly, it is possible that there are significant clientele effects in this kind of study. In particular, those trading in derivative instruments may not value imputation credits in the same manner as the average investor envisaged by the CAPM.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

8.17 Is it possible to infer the value of imputation credits from derivative securities, given the potential for significant clientele effects?

8.3.3.4 Valuation of imputation credits for the average investor

This section examines the empirical studies that focus on the value of imputation credits for the average investor in the Australian economy.

Studies that use tax statistics

Theta can be estimated by examining data from the ATO on the proportion of credits redeemed by taxpayers. This method directly calculates theta for all investors across the Australian market, unlike most of the other methods which attempt to infer a value from statistical analysis.

The first known study was undertaken by Hathaway and Officer, who used tax data to estimate both F and theta over the period 1988-2002. The study generated an estimate for theta of around 0.40 over the period, however it is noted that this is an unreliable estimate:

> The lack of ATO data for Life Office utilisation of credits makes it impossible to reliably estimate the utilisation factor.[255]

On this basis, Hathaway and Officer opted to place most weight on their dividend drop-off study in estimating theta.

There has been some recent academic work undertaken by Handley and Maheswaran on the value of imputation credits derived from ATO statistics.[256] Handley and Maheswaran collected relevant ATO data to estimate theta for three distinct groups of investors in the Australian economy – resident individuals, resident funds, and non-residents. The authors state that:

> We define the utilisation 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 unfranked dividend. This value will vary according to the tax status and domicile of the investor.[257]

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255 Hathaway and Officer, op. cit., November 2004, pp.14-15
256 Handley and Maheswaran, op. cit., March 2008, pp 82-94
257 ibid., p.84

The results of the study are an estimate of theta for 2001-2004 of 0.81, with an estimate over the entire period 1990-2004 of 0.71. These results are summarised in table 8.4 below.[258]

Table 8.4: Average utilisation rate (theta)

Investor type	Average utilisation rate (theta)		
	1990-2000	2001-2004	1990-2004
Resident individuals	0.92	1.00	0.94
Resident funds	0.64	1.00	0.74
Non-residents	0.05	0.07	0.05
Total	**0.67**	**0.81**	**0.71**

Due to data limitations, there are some key assumptions made in order to obtain a reliable estimate of the number of imputation credits received and redeemed by each of the three groups over the period 1988-2004. Most notably, the authors assume that the effect of the July 2000 tax change – which allowed a cash rebate for imputation credits received in excess of personal tax liabilities – was to increase theta to 100 per cent for resident individuals and resident funds 'consistent with investor rationality'.[259]

This aspect of the study has been criticised by SFG:

> The authors provide empirical estimates of the pre-2000 utilisation rate and assumed values for the post-2000 rate, so it would be inappropriate to conclude that there is empirical evidence of an increase in utilization.[260]

The assumption of a 100 per cent utilisation rate for resident investors in the post-2000 period on the grounds of 'investor rationality' appears open to debate.

The AER notes that there are significant strengths inherent in the Handley and Maheswaran study:

- it takes into account foreign investors in the domestic Australian market
- the use of ATO statistics provides a robust basis from which to undertake the analysis of theta, and
- the analysis undertaken can more directly observe the redemption of imputation credits by investors (both domestic and foreign), rather than inferring a value from econometric or other statistical analysis.

258 ibid., p.90
259 ibid., pp.8-9
260 SFG, October 2007, op. cit., p.17

Further, Handley and Maheswaran includes data on all imputation credits received by investors, not just those distributed via franked dividends (unlike dividend drop-off studies). As noted (see section 8.3.2.3 above), the use of off-market share buybacks has likely had a significant impact on theta, allowing for credits to be distributed to those investors that value them the most. The Board of Taxation notes that:

> Clearly, off-market share buybacks have also had some impact on utilisation.[261]

Over the years 2001-2004, the Board of Taxation calculate that imputation credits distributed via this method equates to just over 8 per cent of the credits utilised.

Other issues with estimating the valuation of the average investor

In the context of the QCA decision for gas distribution, Envestra raised an issue with the time value of an imputation credit between creation and redemption:

> It is appropriate therefore to discount any FTC [Franking tax credit] at a discount rate equal to the investors' expected after tax return requirements over the period between when the company pays tax to and when the settlement of the shareholders' income tax liabilities is concluded.[262]

In response, Lally accepted that there may be a lag between the payment of a franked dividend and the shareholder receiving a tax benefit, however this effect is likely to be immaterial. In addition, Lally states that the risk associated with the eventual realisation of the tax benefit is minimal, and therefore the appropriate discount rate is the risk-free rate.[263]

Finally, SFG has criticised estimates of theta for the average investor for reasons of consistency with the post-company pre-personal tax Officer (1994) CAPM.[264] This issue is discussed at section 8.3.3.2 above.

[261] The Board of Taxation, op. cit., July 2007, p.56
[262] Envestra, op. cit., September 2005, p.18
[263] Lally, op. cit., December 2005, p.9
[264] SFG, op. cit., October 2007, pp.15-16

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

8.18 Do the currently available studies that use taxation statistics provide sufficiently robust empirical evidence of the value for theta in the Australian economy?

8.19 Given the most recent changes to the tax regime, is the assumption of 100 per cent utilisation for domestic investors in the post-2000 period reasonable?

8.20 When using tax statistics to estimate theta, should an adjustment be made for the time value of money between when a franked dividend is paid and when the investor receives the associated tax benefit? If so, what is the appropriate discount rate to apply?

8.3.4 Consistency with the MRP

SFG has argued that there is an inconsistency in the Officer (1994) CAPM model when a gamma value of 0.5 is used along with the commonly adopted values for the MRP and tax rate of 6 per cent and 30 per cent, respectively. According to SFG, the return from imputation credits implied in the calculated MRP is not equivalent to the return implied by setting a gamma of 0.5. Setting these two returns to be consistent with one another will substantially increase the overall WACC, as effectively the MRP will be 'grossed-up' by gamma. SFG argues that the inconsistency is removed if the gamma value is set to zero.[265]

It is noted that a gamma value of zero effectively implies a fully integrated capital market assumption (i.e. international CAPM framework), which may have implications for other WACC parameters such as the MRP and the equity beta.

Lally has reviewed this apparent inconsistency and contends that a MRP of six per cent and a gamma value of one does not present any inconsistency. According to Lally, the analysis undertaken by SFG is based on unfounded assumptions about the effective tax rate for Australian firms, and the market portfolio being a 'level perpetuity'.[266]

The issue of consistency between gamma and the estimate of the MRP is discussed further at section 5.3.2.3.

[265] SFG, *Internal consistency in the regulatory estimates of the value of franking credits*, Prepared for Envestra, 22 March 2007, p.18; and SFG, *The relationship between franking credits and the market risk premium: implications for the regulatory cost of capital*, 2005.

[266] Lally, 'Regulatory revenues and the choice of the CAPM: Australia versus New Zealand', *Australian Journal of Management*, vol.31, no.2, December 2006, pp.313-332

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

8.21 Is there an inconsistency between the currently adopted values for gamma and the MRP? If so, can the inconsistency be reliably addressed in the estimate of gamma?

9 Forecast inflation

9.1 Introduction

Forecast inflation is a direct input into both the AER's transmission and distribution post-tax revenue models (PTRMs). The AER considers there is merit in reviewing the method used to forecast inflation at the same time as reviewing the WACC parameters. The AER flagged this intention at the time it released its final decision on the distribution PTRM.[267] This chapter outlines the past regulatory practice and the issues relating to forecasting the consumer price index measured across Australia's eight capital cities (CPI). This review concerns the method of forecasting the CPI, rather than the use of forecast inflation in the PTRM. The AER has already published its PTRM for TNSPs and DNSPs in final form in September 2007 and June 2008, respectively.

CPI forecasts are used in the PTRM to ensure values are in nominal dollars. This is achieved by converting the nominal risk free rate to a real risk free rate for forecast capex and then the RAB (after accounting for depreciation) is adjusted for forecast inflation (when forecast inflation is greater than zero).

9.2 NER requirements

Given that the AER uses a nominal vanilla WACC (which does not require an inflation estimate)[268] the AER is not required to review this parameter for the purposes of the WACC review. However, as for the purposes of the PTRM the NER require a method that the AER determines is likely to result in the best estimates of expected inflation.[269]

9.3 Previously adopted method

As a starting point the AER considers that it is important to recognise recent approaches to estimating inflation in transmission and distribution networks in each jurisdiction.

9.3.1 Application of Fisher equation

This market based method estimates the forecast inflation rate as the difference between the observed yields on indexed linked CGS (as a proxy for the real risk free rate) and nominal CGS (as a proxy for the nominal risk free rate), and applying the Fisher equation as specified in figure 9.1:

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267 AER, Elec*tricity distribution network service providers – Post tax revenue model handbook*, June 2008, p.8. For a discussion about the inflation risk premium in the nominal risk free rate, please refer to section 5.4.2.

268 NER, cll. 6.5.2(b) and 6A.6.2(b).

269 NER, cll. 6.4.2(b)(1) and 6A.5.3(b)(1).

Figure 9.1 Fisher equation

$$f = \frac{(1 + r_f)}{(1 + r_{rf})} - 1$$

where:

f is the forecast inflation rate

r_f is the nominal risk-free rate and

r_{rf} is the real risk-free rate.

Until recently the AER, the ACCC, and jurisdictional regulators all adopted the application of the Fisher equation approach. However concerns were that the Fisher equation may overestimate forecast inflation, due in part to the limited supply of indexed linked government bonds (artificially) increasing the price of these bonds and consequently suppressing their yields, possibly leading to an upwards biased estimate of forecast inflation. Since this time, the AER, ACCC and most jurisdictional regulators have not used the Fisher equation. In the absence of an alternative market based approach, regulators have opted for a general approach to forecasting inflation.

Table 9.1 below outlines the inflation forecasting method adopted by regulators in recent energy determinations.

Table 9.1 Electricity and gas distribution and transmission determinations – CPI forecasting method

Regulator (year)	Sector	Method
AER (2008)	Electicity transmission	General approach – adopting RBA's forecasts for as many years as available, and adopting mid-point of RBA target point (2.5%) thereafter, then averaging individual year forecasts to derive a forecast of the same term as the nominal risk free rate
ESC (2008)	Gas distribution	General approach – used compound average of actual inflation over the five years prior to the start of the next access period (2.70%)
OTTER (2007)	Electricity distribution	General approach – adopting RBA's target band (2-3%) as starting point, then having regard to a range of inflation indicators in determining a point estimate within that band (with options of 2%, 2.5% or 3% most sensible)
ESCOSA (2006)	Gas distribution	Application of Fisher equation
QCA (2006)	Gas distribution	Application of Fisher equation
ESC (2006)	Electricity distribution	Used indexed bonds for real WACC, real dollars used in decision so inflation forecast was not required
QCA (2005)	Electricity distribution	Application of Fisher equation
ESCOSA (2005)	Electricity distribution	Application of Fisher equation
IPART (2005)	Gas distribution	Application of Fisher equation
ICRC (2004)	Gas distribution	Application of Fisher equation
IPART (2004)	Electricity distribution	Application of Fisher equation
ICRC (2004)	Electricity distribution	Application of Fisher equation

Source: AER[270], ESC[271], OTTER[272], ESCOSA[273], QCA[274], IPART[275], ICRC[276].

[270] AER, *ElectraNet Transmission Determination 2008-09 to 2012-13*, Final Decision, 11 April 2008, p. xiii; and AER, *SP AusNet Transmission Determination 2008-09 to 2013-14*, Final Decision, 31 January 2008, p. 103.
[271] ESC, op. cit., 7 March 2008, p. 459; ESC, op. cit., October 2006, p.103.
[272] OTTER, op. cit., September 2007, p.137.
[273] ESCOSA, op. cit., June 2006, p.68; ESCOSA, op. cit., April 2005, p.131.
[274] QCA, op. cit., May 2006, pp. 77-78; QCA, op. cit., May 2006, p.112; QCA, op. cit., April 2005, p.125.
[275] IPART, op. cit., November 2005, p.63; IPART, op. cit., April 2005, p.95-96; IPART, op. cit., June 2004, p.221.
[276] ICRC, op. cit., October 2004, pp.160-162; ICRC, op. cit., March 2004, pp. 68 and 70.

9.3.2 General approaches to forecast inflation

It has been recently argued that there is currently a downward bias on indexed bond CGS yields and subsequently an overestimation in the rate of inflation due to the limited supply of indexed CGS.[277] In response the AER and the ACCC have adopted a general approach using short-term forecasts from the Reserve Bank of Australia's (the RBA) *Statement on Monetary Policy* and the midpoint of its target band.[278] The ESC adopted, in its recent gas determination, a general approach which examined a number of forecasts and historical averages. OTTER adopted the approach which examined inflation forecasts and then selected the top of the RBA's inflation target.

A detailed discussion of the issues raised in the more recent reviews is included in the following sections.

9.4 Issues

9.4.1 Application of Fisher equation

Until recently the AER has adopted and applied the Fisher equation to estimate forecast inflation. The AER achieved this by using government bonds and indexed government bonds to estimate the level of expected inflation. This approach involves:

- obtaining nominal and indexed government bonds
- interpolating both bonds using the two dates closest to the selected term in the regulatory decision (before and after), and
- solving for expected inflation in the Fisher equation by using the effective yields of the nominal and indexed government bonds.

During the SP AusNet revenue reset process, in response to criticisms that there was a downward bias, the AER obtained advice from The Treasury and the RBA that there was a limited supply of indexed linked government bonds which may lead to upwardly biased inflation estimate.[279] Accordingly, the AER considered that there may be an inflation bias and given the uncertainty at this point in time, the application of the Fisher equation may not result in the best estimate of inflation.[280] However, the AER considers that if new indexed government bonds are issued that this would provide the AER with greater certainty that indexed linked bonds provide reliable inflation estimates. If the supply of indexed linked government bonds becomes no longer limited the AER may re-adopt the application of the Fisher equation to estimate forecast inflation.

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277 See generally NERA Economic Consulting, *Bias in Indexed CGS Yields*, op. cit.

278 AER, *SP AusNet Transmission Determination 2008-09 to 2013-14*, Final Decision, 31 January 2008, p. 106.

279 The limited supply of indexed linked government bonds has increased the price of these bonds relative to the nominal government bonds. This results in the yields on indexed linked government bonds to be lower relative to nominal government bonds due to inflation and the limited supply of bonds. For further reasons explaining the price differential in government bond refer to RBA, Letter to ACCC, 9 August 2007, p.3, and Australian Treasury, Letter to ACCC – The Treasury Bond Yield as a Proxy for the CAPM risk-free rate, 7 August 2007, p.5.

280 AER, *SP AusNet Transmission Determination 2008-09 to 2013-14*, Draft Decision, 31 August 2007, p. 119.

9.4.2 General approaches to forecasting inflation

As an alternative approach to measuring inflation, the AER recently adopted a general approach to forecasting inflation. This approach involves:

- adopting a forecast length which matches the maturity with that used to derive the nominal risk free rate (presently ten years)
- using short-term forecasts for the longest term available (usually two to three years) from the RBA's most recent *Statement on Monetary Policy,* and
- for the remaining years where the RBA has not provided a forecast, the midpoint of its target band (usually six to seven years).

Although using an average of forecasts by a number of forecasters was suggested by NERA at the time, the AER noted that: [281]

> …more regard should be given to inflation forecasts from the RBA than those available from the various forecasters cited by SP AusNet and NERA, as the RBA is responsible for monetary policy in Australia, and its control of official interest rates and commentary has a significant impact on both outturn inflation and inflation expectations.

In response to this position a number of New South Wales DNSPs commissioned the Competition Economists Group to analyse the AER's methodology. It submitted that the AER should consider adopting an average of different independent forecasters, noting that: [282]

> the AER's approach is akin to giving 100% weight to the RBA's short term forecasts and zero weight to all other forecasts. It just so happens that the RBA's short term forecasts are the highest of all forecasters surveyed by us. We note that the RBA is well aware that its forecasts of expected inflation are an important signal to the community in general, and policy makers in particular, of the threat of inflation. In particular, the higher is the RBA's short-term inflation forecast the greater is the pressure on Governments to reign in potentially inflationary spending.

The AER is unaware of any evidence supporting a systematic upwards or downwards bias in the RBA's estimates. Further, the current approach draws on publicly available RBA data, which is published on a regular basis. Accordingly, this ensures that inflation forecasts can be updated regularly.

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[281] AER, *SP AusNet Transmission Determination 2008-09 to 2013-14*, Final Decision, 31 January 2008, p. 103.

[282] CEG, *Expected Inflation Estimation Methodology*, Report for Country Energy, April 2008, p. 13.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

9.1 Is there another market-based method that could be used to forecast the CPI (other than the application of the Fisher equation)?

9.2 If a general approach is adopted:

a. should the term of the inflation forecast continue to be matched to the maturity of the risk free rate?

b. should forecasters other than the RBA be considered in determining the forecast CPI for the PTRM?

c. for years where forecast data is unavailable, should the midpoint of the RBA's target be used or another method (such as a shaped CPI)?

d. should weights be placed on different CPI forecasts? How should these weights be objectively determined?

10 Debt and equity raising costs

10.1 Introduction

Debt and equity raising costs relate to transaction costs incurred from raising capital by regulated businesses. Raising equity often incurs an upfront cost with little or no ongoing costs over the life of the assets funded by the equity raising. In contrast, debt raising costs are usually incurred not only when the debt is initially raised, but each time the debt is refinanced over the life of the asset.

The NER do not require the AER to review the methods of compensating for debt and equity raising costs in the regulatory setting, should compensation for these costs be considered appropriate However, the AER considers that given the WACC relates to costs of the ongoing servicing of capital that debt and equity raising costs should be considered in the context of the WACC review. Accordingly, this section examines past regulatory practice and issues relating to the methods of compensating for debt and equity raising costs.

The outcome of this review in relation to debt and equity raising costs will not prevent a service provider from proposing alternative methods in its regulatory proposal, nor does it bind the AER in the method that will be adopted in a particular determination. Compensation for these expenses either through capital expenditure (i.e. through the regulatory asset base (RAB)) or through operating expenditure must be assessed against the relevant objectives, criteria and factors in the NER at the time of each determination. The inclusion of these matters in this review is intended to allow all stakeholders to comment on the issues associated with these matters in one forum, with the outcome providing guidance only as to how the AER may approach these matters in future determinations.

10.2 NER requirements

The NER do not explicitly state that debt or equity raising costs may be included in the building block revenue. In some regulatory decisions pre-dating the NER, debt rasing costs have been included as a part of the WACC. In particular, debt raising costs have been added as a margin to the estimated cost of debt. This approach is not allowed under the NER as the cost of debt is defined as the risk-free rate plus the DRP (excluding transaction costs). However, under the NER to the extent that these costs are efficient costs, debt issuance costs can be recovered as an operating expenditure (opex) allowance. In respect of equity raising costs, the NER allows these costs to be recovered as either part of the initial RAB[283], to be capitalised as part of forecast capital expenditure (capex), or as an opex allowance. When including equity raising costs as forecast capex as part of a determination, the AER must have regard to prudency and efficiency requirements of the NER. [284]

[283] This would occur under infrequent circumstances such as a greenfields transmission or distribution network was created, or an interconnector moved from being unregulated to being regulated.

[284] NER, cll. S6.2.2, S6A.2.2, 6.5.6(a), 6.5.6(c), 6A.6.6(a) and 6A.6.6(c).

10.3 Previously adopted method

10.3.1 Equity raising costs

Regulators have previously included equity raising costs as an allowance in the regulatory asset base (RAB) or as an opex allowance. Table 10.1 outlines the approach adopted by regulators (including the AER) in the most recent electricity and gas determinations.

Table 10.1 Electricity and gas determinations – equity raising costs

Regulator (year)	Energy	Initial RAB/Capital Base	Forecast Capex
ESC (2008)	Gas distribution	Assumed to be included already in the ICB	No allowance
AER (2008)	Electricity transmission (ElectraNet)	Transferred from opex to initial RAB	No allowance
ACCC (2008)	Gas transmission	Opex allowance for RAB at end of previous period	No allowance
AER (2008)	Electricity transmission (SP AusNet)	Opex allowance for initial RAB	No allowance
AER (2008)	Electricity transmission (Powerlink)	No allowance	Allowance given
OTTER (2007) [(a)]	Electricity distribution	N/A	N/A
AER (2005)	Electricity transmission (Directlink)	Included in initial RAB (opening asset value)	No allowance
ESCOSA (2006) [(a)]	Gas distribution	N/A	N/A
ESC (2006) [(a)]	Electricity distribution	N/A	N/A
QCA (2006) [(a)]	Gas distribution	N/A	N/A
ESCOSA (2005)	Electricity distribution	Assumed to be in the initial RAB	No allowance
QCA (2005)	Electricity distribution	N/A	N/A
IPART (2005)[(a)]	Gas distribution	N/A	N/A
IPART (2004) [(a)]	Electricity distribution	N/A	N/A
ICRC (2004) [(a)]	Electricity distribution	N/A	N/A
ICRC (2004)	Gas distribution	No allowance	No allowance

Source: ESC[285], ACCC[286], AER[287], ESCOSA[288], IPART[289], ICRC[290], OTTER[291], QCA[292].
[(a)] Not mentioned in decision document.

[285] The 2008 determination continues the view held in the 2002 determination; refer to ESC, *Review of Gas Access Arrangements*, Final Decision: public version, 3 October 2002, pp.373-374; and ESC, op. cit., 7 March 2008, p. 460; ESC, op. cit., October 2006, p.103.
[286] ACCC, March 2008, op. cit., p. 69.
[287] AER, *ElectraNet Transmission Determination 2008-09 to 2012-13*, Final Decision, 11 April 2008, pp. 88-89; AER, *SP AusNet*, January 2008 , op. cit., pp. 147-148; AER, *Powerlink Queensland Transmission Network Revenue Cap 2007-08 to 2011-12*, Final Decision, 14 June 2008, pp. 98 and 102. AER, *Directlink Joint Venture Application for Conversion and Revenue Cap*, Draft Decision, November 2005, p. 141.
[288] ESCOSA, op. cit., June 2006; and ESCOSA, op. cit., April 2005,, p.155.
[289] IPART, op. cit., November 2005; IPART, op. cit., April 2005; IPART, op. cit., June 2004.
[290] ICRC, op. cit., October 2004, p.189; and ICRC, op. cit., March 2004.
[291] OTTER, op. cit., September 2007.
[292] QCA, op. cit., May 2006; QCA, op. cit., May 2006; QCA, op. cit., April 2005.

The AER notes that the QCA, IPART and OTTER have not explicitly discussed the issue of equity raising costs in their recent regulatory resets. Further, there has been no consistent approach in relation to the regulatory treatment of equity raising costs by regulators. However, there has been a high degree of consistency in terms of the circumstances in which regulated businesses should be compensated for these costs and the method used to recover equity raising costs. In particular, regulators have taken the view that if equity raising costs were not accounted for in the initial regulatory control period (either as an opex or capex allowance), that these costs should not apply in subsequent regulatory control periods. Regulators have based this position on the grounds that:

- there should no adjustments made to the initial RAB to compensate a regulated business for equity raising costs or any other costs
- the initial RAB has been locked in for the purposes of regulatory certainty and/or
- for a new owner that equity raising costs would have previously been included in the initial RAB.

10.3.2 Debt raising costs

The majority of jurisdictional regulators have provided an allowance for debt raising costs in the cash flows as part of opex. In gas transmission and distribution both the jurisdictional regulators and the ACCC have included debt raising costs as part of the cost of debt directly in the WACC. The main point of departure between jurisdictional regulators, and, the ACCC and the AER has been the use of a sliding scale. That is, jurisdictional regulators have fixed debt raising costs at 12.5 basis points while the ACCC and the AER have used a sliding scale of debt raising costs depending on the number of issues required to service the debt component of the RAB. The AER notes that the NER do not recognise debt raising costs as forming part of the cost of debt for the purposes of the WACC. However, as discussed above, the AER considers that these costs are related to raising capital and should be considered in the context of the WACC review in determining the total cost of debt.

10.4 Issues

The AER observes that a number of the issues relating to both debt and equity raising costs are similar. In particular, there has been some debate as to what type of costs should be included in both debt and equity raising costs.

The NER require that a transmission and distribution business should only be compensated for the prudent and efficient costs of operating their networks. Therefore, debt and equity raising costs may be considered by the AER as part of a regulatory determination. The AER considers that using a benchmark approach is likely to ensure that incentives relating to debt and equity raising costs are consistent with the benchmarking approach to estimate the WACC parameters (such as gearing and the DRP). As noted in previous chapters, benchmarks also ensure customers do not bear the costs associated with inefficient financing decisions. The ACG has previously identified two further problems with using actual levels of debt and equity to determine raising costs:

> …for many businesses, it may be difficult to identify the levels of debt and equity that are associated with the regulatory business as opposed to other activities that the businesses may undertake. For such businesses, the use of actual transaction costs would be impracticable…
>
> …for some sources of finance, there is a trade–off between the required return (or margin) on that finance, and the transaction costs incurred. Accordingly, it may be inappropriate even to scale down the costs incurred by the regulated entity to derive an allowance for transaction costs.[293]

10.4.1 Equity raising costs

The AER has previously considered that compensation for equity raising costs may be provided in the following circumstances:

- in setting the initial regulatory asset base and
- where there is a need to raise equity to fund capital expenditure which is determined based on cash flow analysis.

In contrast, jurisdictional regulators have only provided an allowance for equity raising costs as part of setting the initial regulatory asset base.

10.4.1.1 Initial regulatory asset base and forecast capex

Equity-raising typically involves a one-off cash flow linked to the costs of raising finance from the equity offer. The AER notes that equity raising costs may be considered as a setup cost for a new business or for large capex funding requirements. The AER has previously examined whether a transmission business should be compensated for equity raising costs based on benchmark financing requirements on a case-by-case basis.

Initial RAB–the approach taken by the AER to date is where the initial RAB has been previously determined an allowance for equity raising costs should not be subsequently included in the RAB. If on the other hand compensation has previously been provided (through an opex allowance), the AER's position is that equity raising costs will be included as part of the opex allowance over the life of the equity portion of the initial RAB (in the form of an annuity) rather than the first few regulatory periods.[294]

The exception to this approach has been where a RAB adjustment was allowed under the NER under transitional arrangements for the first regulatory control period that the AER has been regulating in transmission, in these circumstances the opex allowance was transferred to the RAB.[295] Using an opex allowance based upon an annuity ensures that NPV equivalence is maintained between including the amount in the RAB or as an opex allowance, consistent with ACG advice.

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[293] ACG, *Debt and Equity Raising Transaction Costs*, Report to the ACCC, December 2004, p. viii.

[294] AER, *SP AusNet Transmission Determination 2008-09 to 2013-14*, Final Decision, 31 January 2008, pp. 146.

[295] NER, cl. 11.6.9. See for example AER, *ElectraNet Transmission Determination 2008-09 to 2012-13*, Final Decision, 11 April 2008, pp. 88-89.

While the initial RAB has been set for most electricity distribution and transmission businesses, there may be electricity interconnectors, where the initial RAB has not been determined. Where the AER determines that a transmission network should be regulated, there may be some scope for including equity raising costs in the initial RAB.

Forecast capex–when the AER determines that an equity raising cost is prudent and efficient, the ACG has suggested that equity raising costs be included part of the capex rather than an opex allowance. The AER considers that is likely that equity raising costs would be required in exceptional circumstances and may involve smaller transaction costs than those required to fund the initial capital base.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

10.1 If equity raising costs are applied to forecast capex, should these costs be treated as:

a. a once off opex expenditure

b. an opex allowance as an annuity

c. part of forecast capex or

d. a cost pass-through.

10.4.1.2 Equity funding of capital expenditure

As a starting point the AER has adopted the pecking order theory in determining whether any equity is required to fund capex. The pecking order theory states that an efficient firm will prefer to finance capital expenditures in a way that minimises transaction costs.[296]

There are a variety of options available to businesses when raising funds to finance capital expenditure. These options include:

- using internal equity finance via retained earnings
- issuing debt, and
- external equity finance by issuing equity through an initial price offering (IPO) or a seasoned equity offering (SEO)[297].

In terms of the cost of raising capital, raising external equity, is the last and least preferred option under the pecking order theory as it is considered the most expensive relative to other methods including issuing debt and using retained earnings.

[296] Myers, S. C., 'The Capital Structure Puzzle', *Journal of Finance*, Vol.39, No.3, July 1984, pp.575-592.

[297] An IPO relates to the issuing of shares to fund a newly formed business while an SEO relates to different forms of raising equity to fund new projects for an already established business.

Therefore, according to this theory and to include equity raising costs as an efficient cost, it must be established that cheaper sources of funds have been exhausted. Further, the ACG has previously advised that IPOs should only be considered in setting the initial RAB and only SEOs for the funding of capex in subsequent regulatory periods.[298]

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

10.2 Is the pecking order theory an appropriate first step in determining equity raising costs?

10.3 Is another approach (such as businesses demonstrating that external equity was required and how the costs are paid for under benchmark financing assumptions) more appropriate?

10.4 Should only SEOs be considered for the funding of capex in determining an allowance for equity raising costs in circumstances where an allowance is appropriate?

10.4.1.3 Cash flow analyses

In determining whether a claim for equity raising costs is prudent and efficient the AER has previously conducted cash flow analyses based upon the benchmark gearing ratio. In particular, the amount of forecast capex in any given year is multiplied by the benchmark gearing ratio to calculate the amount of equity that needs to be raised to fund the project. The next step involves calculating the amount of retained cash flows (revenue less opex, interest on debt, tax payable and dividends) a firm would be expected to earn during the same year as the expected capex. If the expected retained cash flows (and from previous years if applicable) exceed the equity requirement then no allowance for equity raising costs is required. Table 10.2 provides a numerical example of when retained cash flows are less than the equity required to fund the expected capex:

[298] ACG, *Debt and Equity Raising Transaction Costs*, Report to the ACCC, December 2004, p. 61.

Table 10.2 Equity raising costs - cash flow analysis

Item	Amount ($m)
Forecast Capital Expenditure	600
Less debt requirement (60 % gearing)	-360
(A) Equity requirement	**240**
Expected revenue[(a)]	533
Operating expenditure	-150
Interest on debt (0.6 x RAB x r_d)[(b)]	-160
Tax[(c)]	-22
Dividends[(d)]	-53
(B) Retained cash flows	**148**
(A – B)External equity requirement	***92***

(a) Comprises return on capital ($342 m), Opex ($150 m), regulatory depreciation ($30 m) and tax allowance ($11).

(b) Calculated using a RAB of $3 800m, 60 per cent debt and 7 per cent return on debt

(c) Calculated using the expected revenue, less opex, interest on debt and depreciation of $150m and the corporate tax rate of 30 per cent.

(d) Calculated using a RAB of $3 800m, 40 per cent equity and a dividend yield of 3.5 per cent.

As per the example, to derive equity raising costs, the AER has previously applied a percentage amount to the $92 m of external equity required. All variables apart from the dividend are calculated by using figures from the regulatory asset base or building block revenue requirement. The dividend in the above example is calculated using the dividend yield approach which assumes that dividends are based upon a percentage of the equity component of the RAB. This approach can be considered conservative where dividends are calculated using the entire RAB rather than the the equity portion of the RAB, which would increase the amount of dividends paid out. The AER has recently used a dividend yield of 3.5 per cent based on a sample of listed resource and industrial businesses that have large capex requirements.

The AER's assumed dividend yield of 3.5 per cent in the Powerlink decision differed from the ACG suggested yield of 8 per cent[299] has been recently questioned by the ACG on the following grounds:

- the benchmark businesses selected by the AER do not reflect the normal characteristics of regulated utility businesses

[299] AER, *Powerlink Queensland Transmission Network Revenue Cap 2007-08 to 2011-12*, Final Decision, 14 June 2008, p. 100.

- the AER's assumption regarding the dividend payout ratio and therefore its dividend yield under a large capex spend is unrealistic given the expectations of the clientele that invest in these businesses expect high dividends
- dividend policy is an important signalling mechanism and reducing the payout ratio may not be plausible or possible
- there are transaction costs associated with other forms of raising equity such as dividend reinvestment plans
- it is unlikely that funds to pay dividends were set aside in an earlier regulatory period, and
- the AER did not examine whether businesses that faced with high capex reduced their payout ratios.[300]

The AER notes that the dividend yield approach (based on the RAB value) to deriving the need for equity raising costs may result in a regulated businesses borrowing funds or using previous retained earnings to pay dividends to shareholders. Using the same example as above, this is demonstrated in Table 10.3

Table 10.3 Dividend yield analysis

Item	Amount ($m)
(A) Dividends (dividend yield approach)	**53**
Maximum allowed revenue	533
Operating expenditure	-150
Interest on debt	-160
Depreciation	-150
Earnings before tax	73
Tax	-22
(B) Net profit	**51**
Dividend payout ratio(A/B) (%)	***104***

A dividend payout ratio of greater than 100 per cent arises as there is a de-linking between the approach used to estimate dividends payable in the cash flow analysis and the expected net profit of a benchmark regulated business. Further, the dividend yield is estimated using market capitalisation while the estimated dividend payable is calculated using a non-market measure (i.e. the RAB).Although this is an illustrative example cash flow modelling in previous regulatory decisions can be used to replicate

[300] ACG, *Transaction Costs of Raising Equity Finance: the Dividend Yield Assumption*, Report to TransGrid, 9 May 2008, p. iv.

this outcome. Accordingly, the AER considers that the dividend yield approach may either need to be modified or another methodology should be considered (such as a dividend payout ratio on net profit) to avoid the outcome as illustrated above.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

10.5 Should the dividend yield approach be modified or replaced by a different method (such as a dividend payout ratio on net profit)?

10.6 If a dividend yield approach is proposed, which businesses should be considered in the sample to calculate the dividend yield?

10.7 If a payout ratio assumption is proposed, which businesses should be considered in the sample to estimate the benchmark payout ratio?

10.4.1.4 Components of equity raising costs

Once the amount of external equity funding for the forecast capex has been estimated, the cost associated with raising equity needs to be calculated. The costs that have previously been considered by the AER associated with raising equity capital include:

- dividend re-investment or share re-purchase plans (offer shares for dividends)
- private placement (issue shares to institutional investors) and
- rights issues and public offers.[301]

The ACG has noted that the fee structure of SEOs mirrors that of IPOs. This structure includes:

- management fees – paid to lead manager of the float to manage the overall listing process
- underwriting fees – fees paid to brokers to purchase unsold shares at the set price (different to the market price)
- selling fees – paid to other brokers who are engaged by the lead manager to assist with the selling of the shares
- legal and accounting fees – paid to accountants and lawyers to perform due diligence on financial reports
- other consulting fees – export reports on specific topics for inclusion in the prospectus and

[301] ACG, *Debt and Equity Raising Transaction Costs*, Report to the ACCC, December 2004, pp. 63-64.

- other out of pocket fees – the production of promotional material and roadshow costs.

The AER has previously accepted, based on advice from the ACG that the median equity raising cost for SEOs ranged from 1.71 to 2.97 per cent depending on the purpose of the SEO.[302] The AER adopted three per cent in its most recent decision where equity raising costs were included.[303] The ACG had also considered whether the size of the issue had an impact on cost and concluded that the economies of scale associated with fixed costs were offset by an increase in variable costs.[304] The AER considers that it is unclear whether underwriting fees should be compensated for as a transaction cost. For example if the underwriter is unable to sell all of the newly issued shares due to the SEO price being above the market price, the cost of the fee may be offset by the value of being able sell the shares above market value. On the other hand if all shares are sold, the business will not be required to pay underwriting fees.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

10.8 Are there any other transaction costs (other than those costs associated with the SEOs, listed above) that should be included in measuring equity raising costs?

10.9 Should underwriting fees be compensated for in equity raising costs?

10.10 Will the size of the equity issue lead to increased, stable or decreased costs?

10.4.2 Debt raising costs

Similar to raising equity, there are a number of costs associated with raising debt. In general, the steps involved in determining debt raising costs include:

- determining what costs should be included in debt raising costs
- obtaining information on the fees and charges and converting these costs into basis points and
- calculating the amount of debt required to service debt over the next regulatory control period and calculating the associated transaction cost.

10.4.2.1 Components of debt raising costs

The AER notes that debt raising costs are borne as a consequence of promoting and implementing a debt issue. Typically an investment bank or a group of managers from different financing institutions will be responsible for delivering the issue. The bank

302 ACG, *Debt and Equity Raising Transaction Costs*, Report to the ACCC, December 2004, p. 65.
303 AER, *Powerlink Queensland Transmission Network Revenue Cap 2007-08 to 2011-12*, Final Decision, 14 June 2008, p. 100.
304 ACG, *Debt and Equity Raising Transaction Costs*, Report to the ACCC, December 2004, p. 68.

will incur costs associated with the provision of different services related to the overall implementation of the issue. These services include:

- gross underwriting fees—management fees and fees paid to brokers to sell and take up any unsold bonds
- legal (due diligence) and marketing ('road show') costs—legal fees are paid to accountants and lawyers to perform due diligence on financial reports and marketing fees relate to providing prospectuses to investors
- company and credit rating fees—fee for a credit rating business charged for obtaining a credit rating for the business itself
- issue credit rating fees—fee for a credit rating business charged for obtaining a credit rating for the debt issue, and
- registry and the paying fees—incidental costs that arise in the administration of an issue.

The ACG noted that one of the best currently available objective data sources for gross underwriting fees charged by investment banks for Australian bond issues is that provided by Bloomberg[305], whereas, all other fees identified above have been sourced by surveys. In respect of underwriting fees it has been noted that Bloomberg uses private rather than public issues where private issues attract higher interest rates and lower underwriting fees as a trade-off. [306]

Overall the ACG has previously noted that the benchmark reflects bond financing by regulated companies as it was unable to find a robust source for up to date information to benchmark financing costs for bank debt.[307] The AER notes however, that as the benchmark DRP assumes that the regulated businesses debt requirements are financed by bonds, the use of bank debt to derive financing costs would not be consistent with the DRP. The ACG methodology also assumes that the median bond issue is $200m and the median tenor is five years (excluding credit wrapped bonds).[308] Therefore, it is assumed when the term of debt is greater than five years that the debt is rolled over at least once attracting two rounds of debt raising costs (once for the initial issue and then for the roll over).

Table 10.4 shows the ACCC's updated benchmark debt rating costs from the 2008 GasNet final decision and the total benchmark for different bond issues based the ACG's recommended methodology.

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305 ACG, *Debt and Equity Raising Transaction Costs*, Report to the ACCC, December 2004, p. 44.

306 NECG, *2003 Review of the Draft Statement of Principles for the Regulation of Transmission Revenues*, Submission to the ACCC for the electricity TNSPs from Network Economics Consulting Group, November 2003, pp. 64-65.

307 ACG, *Debt and Equity Raising Transaction Costs*, Report to the ACCC, December 2004, p. xiv.

308 ACG, *Debt and Equity Raising Transaction Costs*, Report to the ACCC, December 2004, p. 53.

Table 10.4 Benchmark debt raising costs for bond issues

Fee	Explanation/source	1 issue	2 issues	3 issues	6 issues	7 issues
Amount raised	Multiples of median bond issue size	$200m	$400m	$600m	$1 200m	$1 400m
		bp	bp	bp	bp	bp
Gross underwriting fee	Bloomberg for Australian internal issues, term adjusted	6.0	6.0	6.0	6.0	6.0
Legal and roadshow	$75k–$100k (industry sources)	1.0	1.0	1.0	1.0	1.0
Company credit rating	$30k–$50k: S&P ratings	2.5	1.3	0.8	0.4	0.4
Issue credit rating	3.5 (2–5)bps up-front: S&P ratings	0.7	0.7	0.7	0.7	0.7
Registry fees	$3k per issue: Osborne Associates	0.2	0.2	0.2	0.2	0.2
Paying fees	$1/$m quarterly: Osborne Associates	0.0	0.0	0.0	0.0	0.0
Total	**Basis points per annum**	**10.4**	**9.2**	**8.7**	**8.3**	**8.3**

Source: Based upon advice provided by ACG[309], figures updated by the ACCC.[310]

The AER notes that the economies of scale from debt raising costs are minimal when compared to equity raising costs given most costs (with the exception of a company credit rating) increase proportionally with the number of debt issues.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

10.11 Are there any other transaction costs (other than those listed above) that should be included in measuring debt raising costs?

10.12 Should any of the above transaction costs be excluded in measuring debt raising costs?

10.13 Should transaction costs relating to the raising and servicing of debt capital be assumed to be incurred more than once during a regulatory period?

10.14 To what extent do regulated businesses utilise private issues and are there any substantial differences in the fees between private and public issues?

The AER notes that the benchmark for fees other than gross underwriting fees has involved:

- legal and roadshow fees from industry sources (such as Australian banks)

309 ACG, *Debt and Equity Raising Transaction Costs*, Report to the ACCC, December 2004, updated by the ACCC November 2007.

310 ACCC, *Revised Access Arrangement by GasNet Australia Ltd for the Principal Transmission System*, Draft Decision, 14 November 2007, p. 12.

- company and credit fees from Standard and Poor's
- issue credit rating fees from Standard and Poor's and
- registry and the paying fees from a survey conducted by Obsorne Associates.

Issues for consideration

The AER is seeking views and supporting information from interested parties on the following:

10.15 Is there any other data available to calculating these fees?

10.16 Should another amount (other than $200 m) be used to determine the number of issues?

Appendix A: Compiled questions

Multi-parameter considerations

Consistency between parameters in estimation – Form of the CAPM (domestic or international)

2.1 Given that foreign investors are likely to influence the market data upon which the estimates of a number of WACC parameters are based, is it appropriate, feasible and practical to adopt either a fully segmented or a fully integrated version of the CAPM?

2.2 Is the AER's proposed approach to adopt a domestic form of the CAPM with foreign investors recognised appropriate from a theoretical and practical point of view? If not, what are the alternatives?

Consistency between parameters in estimation – definition of the benchmark efficient service provider

2.3 Is it appropriate that the businesses included in the sample to obtain a WACC parameter for a benchmark efficient service provider may vary depending on the parameter being considered? For example, is it appropriate to use an energy industry benchmark to estimate the equity beta, but to use a broader benchmark which includes non-energy businesses to estimate the gearing and credit rating levels?

Consistency between parameters in estimation – nature of industry benchmarks: selecting businesses with similar characteristics

2.4 Which characteristics should be considered and what amount of weight to particular characteristics should be given when selecting sample businesses?

2.5 Is it appropriate to pool electricity and gas distribution and transmission businesses in selecting the sample of businesses for some of the WACC parameters? For which parameters is it appropriate?

2.6 Should a hierarchical approach or another approach be used to select benchmark businesses?

Consistency between parameters in estimation – nature of industry benchmarks: unregulated activities and mergers and acquisitions

2.7 Should businesses with significant unregulated activities be included in the sample used to obtain an industry benchmark?

2.8 If businesses with significant unregulated activities are included as part of the industry benchmark, should specific observations be removed or should specific adjustments be made?

Consistency between parameters in estimation – nature of industry benchmarks: foreign comparators

2.9 Which foreign businesses could be considered for the purposes of cross-checking WACC parameters estimated based on domestic data?

2.10 Which criteria (i.e. similar markets and legal systems) should be used to pool foreign comparator businesses?

2.11 Other than the use of direct estimation and foreign comparators, is there another method that could be used to check the reasonableness of WACC parameters?

Gearing

Data availability

3.1 What is an appropriate time period and frequency for estimating the benchmark gearing ratio from available market data?

Measurement of gearing – valuation methodologies

3.2 Are objective market valuations for debt and equity available to estimate gearing ratios?

3.3 If an objective market valuation measure does not exist, then should the percentage of debt be measured relative to the value of the RAB be applied or book values of debt to debt and equity?

Measurement of gearing – definition of debt and equity

3.4 What definition of debt and equity should be applied where data is available?

3.5 Which items should be excluded and or included when measuring an industry benchmark gearing ratio?

3.6 If hybrid securities and other forms of quasi debt are included in the measurement of the benchmark gearing ratio, how should specific types of hybrid securities be classified in terms of debt or equity?

Nominal risk free rate

Proxy for the risk free asset

4.1 Are there any viable alternatives to Commonwealth Government Securities (excluding using Credit Default Swaps) as an appropriate proxy for the nominal risk-free asset in the context of a domestic Australian CAPM?

Term of the risk free proxy – matching the term with asset lives and the 'present value principle'

4.2 What is the typical term over which a regulated network business in Australia refinances its debt? How relevant is this term in a regulatory setting?

4.3 What is the true extent of interest rate and refinancing risk faced by regulated network businesses as a result of the regulatory regime? Can regulated network businesses manage their refinancing risk via swaps and other financial instruments?

4.4 As the nominal risk free rate is reset at the commencement of each regulatory period, should the term of the nominal risk free proxy (all else equal) be the same as the term of the regulatory period?

Term of the risk free proxy – maintaining consistency with the market risk premium

4.5 What is the significance of consistency between the risk free rate proxy and the MRP from both a theoretical and a practical point of view?

4.6 How does the objective of maintaining consistency with the MRP interact with the 'present value principle' in determining an appropriate term for the risk free rate in the CAPM?

Measuring the risk free rate of return – averaging period

4.7 Does the current regulatory practice of effectively accepting any averaging period to calculate the nominal risk free rate of between 5 and 40 days in length (and commencing as close as possible to the start of the regulatory period) require re-consideration?

4.8 In determining an appropriate averaging period, are there certain times of the year (e.g. the Christmas period) that should be excluded?

Measuring the risk free rate of return – method of interpolation from published data

4.9 In calculating the nominal risk-free rate over the agreed averaging period, are there any alternative methodologies (other than linear interpolation) that should be considered?

Market risk premium

Historical measures – selection of the appropriate proxy for the market portfolio

5.1 Is the data source for Australian historical market returns an issue of contention? Are there certain data sources that should be preferred over others?

5.2 Should foreign stock market data be used as a 'cross-check' on the use of Australian excess market returns as a proxy for the domestic MRP? Are there particular foreign studies that should be considered? What characteristics should be considered in selecting foreign countries as a cross-check?

Historical measures – length of estimation period

5.3 What factors should be considered in determining the length of the estimation period?

5.4 Should a shorter term or longer term data series be considered?

5.5 What start and end dates should be considered?

Historical measures – method of averaging returns over multiple periods (arithmetic or geometric)

5.6 Is an arithmetic or geometric average of historical excess returns more appropriate as an estimate of a forward looking MRP?

Historical measures – interaction between MRP and term of the risk free rate

5.7 Could the MRP be estimated for different terms? For example, could a distinct forward-looking MRP for 1, 5, and 10 year terms be determined? Or do the various estimation difficulties limit the precision of estimates to a 'current' MRP?

5.8 Should the term of the risk free rate proxy used in estimating the historical excess returns must be consistent with the term of the 'first' risk free rate? What other considerations are relevant in determining the risk free rate proxy used in estimating historical excess returns?

Adjusted historical measures – treatment of unexpected returns or one-off events in historical data: arguments against adjustments to historical estimates

5.9 Should adjustments be made to historical excess returns to account for significant unexpected or one-off events?

5.10 If yes, are the adjustments proposed by Hathaway and by Hancock appropriate? If no, why? Are there any other relevant adjustments?

Adjusted historical measures – evidence of a declining MRP

5.11 Is the MRP declining? What quantitative data or qualitative factors suggest that the MRP is, or is not, declining?

5.12 How should any decline affect the MRP the AER adopts?

Adjusted historical measures – interaction between MRP and gamma

5.13 How should historical excess returns be adjusted, if at all, to reflect the value of imputation credits, if using historical excess returns as a proxy for the MRP?

5.14 Is there an inconsistency between the values of gamma, MRP and the assumed tax rate of 0.50, 6.0 per cent and 30.0 per cent, respectively? If yes, how should this inconsistency be addressed?

Survey measures

5.15 What weight should be given to surveys in estimating the MRP?

5.16 Are there particular surveys that should be considered? How should the AER determine which surveys to place greater weight on?

Cash flow based measures

5.17 What weight should be given to cash flow based measures in estimating the MRP?

5.18 Are there particular studies that should be considered? How should the AER determine which studies to place greater weight on?

Weighting different measures

5.19 What weight should be placed on each measure of the MRP raised in this paper? Should some measures be used as 'primary estimates' with other measures used as 'cross-checks'?

5.20 Are there any other ex post or ex ante measures of the MRP that should be considered?

Equity beta

Conceptual issues

6.1 What influence does the regulatory regime have on a DNSP's or TNSP's sensitivity to non-diversifiable risk? Has this been increasing or decreasing over time?

6.2 What influence, if at all, does the form of control have on a DNSP's or TNSP's sensitivity to non-diversifiable risk?

6.3 Excluding the effects of financial leverage, on a conceptual basis would a DNSP's or TNSP's sensitivity to non-diversifiable risk be expected to be less than that of the market, equal to that of the market, or greater than that of the market? That is, would the asset beta of a DNSP or TNSP be expected to be less than, equal to, or more than the asset beta of the overall market?

Empirical issues – frequency and number of observations

6.4 What frequency of observations (daily, weekly or monthly) is appropriate to estimate a benchmark beta? Why is this appropriate?

6.5 Is the 'technology bubble' still relevant going forward? If yes, what are the start and end dates of the technology bubble?

6.6 Are there other 'unrepresentative events' that may have biased the estimation of beta? Such events could include mergers and acquisition activity, terrorist acts and natural disasters. How should this issue be addressed (i.e. use weekly data over a shorter period, select years prior to the event, or compare both approaches)?

6.7 What length (in years) is appropriate to estimate a benchmark beta?

Empirical issues – estimation techniques and outliers

6.8 Should the OLS approach be used as a first step when estimating a benchmark beta?

6.9 Which estimation methods should be used and which should not be used to ensure that the benchmark beta is robust and statically reliable?

6.10 Are there any other estimation methods that could be used to ensure that the benchmark beta is robust and statistically reliable?

Empirical issues – Blume adjustment

6.11 Is there any validity applying the Blume adjustment in estimating an equity beta for regulatory purposes?

Empirical issues – portfolio estimation

6.12 Should equity betas from sample businesses be value-weighted, equally weighted or should a median value be used?

Empirical issues – other conceptual or empirical issues

6.13 Are there any other conceptual or empirical issues that should be considered in determining an equity beta for regulatory purposes?

Credit rating level

Benchmark credit rating – selection of benchmark businesses

7.1 To what extent will the inclusion of government owned business or private businesses that are not stand alone businesses bias the estimate of credit ratings? Should this be a concern?

Benchmark credit rating – selection of financial measures and qualitative factors

7.2 Which financial measures and qualitative factors should the AER consider when setting a benchmark credit rating?

7.3 How should those financial measures and qualitative factors be applied and what weight should be given to each of these? To what extent should Standard and Poor's rating criteria be applied to set the benchmark credit rating?

Benchmark credit rating – analytical methods

7.4 What method should be used to set a credit rating benchmark?

7.5 Are there any other methods not mentioned above that could viably be used to set a benchmark credit rating?

7.6 How should a 'best comparators' benchmark be determined?

Assumed utilisation of imputation credits (Gamma)

The appropriate benchmark – industry average approach

8.1 Do regulated utilities have different characteristics from the 'average firm' in the Australian market which suggests that the use of an industry-average value for F is more appropriate than a market-average?

8.2 What firms should be included in calculating a benchmark industry-average value for F?

8.3 Is it reasonable to use firm-specific estimates of F as a cross-check on the benchmark value for F established?

8.4 In calculating an industry-average value for F, is it more appropriate to assume that imputation credits are generated once tax is paid rather than as tax expense is incurred?

The appropriate benchmark – the impact of tax changes

8.5 Given the likely impact of the July 2000 tax change, is it more appropriate to focus on the post-2000 period in calculating F?

8.6 Has the July 2000 tax change increased F for regulated utilities?

The appropriate benchmark – methods of distribution

8.7 Are off-market share buybacks prevalent in the utilities sector? Are there other dividend streaming methods utilised in the utilities sector?

8.8 Does the ability of firms to distribute imputation credits via off-market share buybacks suggest a benchmark value for F closer to 100 per cent for utilities for arbitrage reasons?

Estimating the utilisation rate (theta) – recognition of foreign investors

8.9 Is it more appropriate to focus on empirical evidence in estimating theta rather than considering the theoretical values of either one or zero?

8.10 Does the current value for theta adopted in Chapter 6A of the NER (implicitly assumed to be 0.6) lead to over-compensation for regulated firms compared to the full segmentation and full integration scenarios?

Estimating the utilisation rate (theta) – average or marginal investor

8.11 Given the differential valuation placed on imputation credits by different groups of investors (i.e. resident / foreign), is it more appropriate (in theory) to place more weight on studies focusing on the valuation of the average investor in the Australian market?

8.12 Is it correct to say that the average investor concept can only apply in a full post-personal tax version of the CAPM? What about if theta is inferred from dividend drop-off studies?

Estimating the utilisation rate (theta) – valuation of imputation credits at the margin

8.13 Does the dividend drop-off methodology provide sufficiently robust empirical evidence of the value for theta in the Australian economy?

8.14 Given the tax changes in July 2000, is it appropriate to place more weight on data from the post-2000 period in estimating theta from dividend drop-off studies?

8.15 Does a cash dividend value of less than 100 per cent necessarily imply that dividends and capital gains are not taxed equally?

8.16 Is the empirical result that cash dividends are not fully valued a valid result in theoretical terms? If an adjustment is required, what is the most appropriate adjustment?

Estimating the utilisation rate (theta) – valuation of imputation credits at the margin: inference from derivatives

8.17 Is it possible to infer the value of imputation credits from derivative securities, given the potential for significant clientele effects?

Estimating the utilisation rate (theta) – valuation of imputation credits for the average investor: other issues with estimating the valuation of the average investor

8.18 Do the currently available studies that use taxation statistics provide sufficiently robust empirical evidence of the value for theta in the Australian economy?

8.19 Given the most recent changes to the tax regime, is the assumption of 100 per cent utilisation for domestic investors in the post-2000 period reasonable?

8.20 When using tax statistics to estimate theta, should an adjustment be made for the time value of money between when a franked dividend is paid and when the investor receives the associated tax benefit? If so, what is the appropriate discount rate to apply?

Consistency with the MRP

8.21 Is there an inconsistency between the currently adopted values for gamma and the MRP? If so, can the inconsistency be reliably addressed in the estimate of gamma?

Forecast inflation

General approaches to forecasting inflation

9.1 Is there another market-based method that could be used to forecast the CPI (other than the application of the Fisher equation)?

9.2 If a general approach is adopted:

a. should the term of the inflation forecast continue to be matched to the maturity of the risk free rate?

b. should forecasters other than the RBA be considered in determining the forecast CPI for the PTRM?

c. for years where forecast data is unavailable, should the midpoint of the RBA's target be used or another method (such as a shaped CPI)?

d. should weights be placed on different CPI forecasts? How should these weights be objectively determined?

Debt and equity raising costs

Equity raising costs – initial regulatory asset base and forecast capex

10.1 If equity raising costs are applied to forecast capex, should these costs be treated as:

a. a once off opex expenditure

b. an opex allowance as an annuity

c. part of forecast capex or

d. a cost pass-through.

Equity raising costs – equity funding of capital expenditure

10.2 Is the pecking order theory an appropriate first step in determining equity raising costs?

10.3 Is another approach (such as businesses demonstrating that external equity was required and how the costs are paid for under benchmark financing assumptions) more appropriate?

10.4 Should only SEOs be considered for the funding of capex in determining an allowance for equity raising costs in circumstances where an allowance is appropriate?

Equity raising costs – cash flow analyses

10.5 Should the dividend yield approach be modified or replaced by a different method (such as a dividend payout ratio on net profit)?

10.6 If a dividend yield approach is proposed, which businesses should be considered in the sample to calculate the dividend yield?

10.7 If a payout ratio assumption is proposed, which businesses should be considered in the sample to estimate the benchmark payout ratio?

Equity raising costs – components of equity raising costs

10.8 Are there any other transaction costs (other than those costs associated with the SEOs, listed above) that should be included in measuring equity raising costs?

10.9 Should underwriting fees be compensated for in equity raising costs?

10.10 Will the size of the equity issue lead to increased, stable or decreased costs?

Debt raising costs – components of debt raising costs

10.11 Are there any other transaction costs (other than those listed above) that should be included in measuring debt raising costs?

10.12 Should any of the above transaction costs be excluded in measuring debt raising costs?

10.13 Should transaction costs relating to the raising and servicing of debt capital be assumed to be incurred more than once during a regulatory period?

10.14 To what extent do regulated businesses utilise private issues and are there any substantial differences in the fees between private and public issues?

10.15 Is there any other data available to calculating these fees?

10.16 Should another amount (other than $200 m) be used to determine the number of issues?

Glossary

ACG	Allen Consulting Group
ACCC	Australian Competition and Consumer Commission
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
ATO	Australian Tax Office
capex	capital expenditure
CAPM	capital asset pricing model
CGS	Commonwealth Government Securities
CPI-X	CPI minus X
DNSP	distribution network service provider
DRP	debt risk premium
DGM	dividend growth model
EPS	earnings per share
ESC	Essential Services Commission of Victoria
ESCOSA	Essential Services Commission of South Australia
EUAA	Energy Users Association of Australia
FFO	funds from operations
Gamma (γ)	value of imputation credits
GDP	gross domestic product
ICRC	Independent Competition and Regulatory Commission

IPART	Independent Pricing and Regulatory Tribunal
IPO	initial price offering
m	million
MRP	market risk premium
NEL	National Electricity Law
NEM	national electricity market
NER	National Electricity Rules
NGL	National Gas Law
NGR	National Gas Rules
OLS	ordinary least squares
opex	operating expenditure
OTTER	Office of the Tasmanian Energy Regulator
PER	price earnings ratio
F	imputation credit payout ratio
PTRM	post-tax revenue model
QCA	Queensland Competition Authority
RAB	regulatory asset base
RBA	Reserve Bank of Australia
RFM	roll-forward model
SEO	seasoned equity offering
SFG	Strategic Finance Group

SRI	statement of regulatory intent
term	term to maturity
Theta (θ)	imputation credit utilisation rate
TNSP	transmission network service provider
TSLRIC	total service long run incremental cost
WACC	weighted average cost of capital