Explanatory Statement

# Electricity transmission and distribution network service providers

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

December 2008

AUSTRALIAN ENERGY REGULATOR

# Overview

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

For transmission determinations, the outcomes of this review are 'locked-in' for all determinations where the regulatory proposal is submitted after 31 March 2009 and prior to the next review being completed. For distribution determinations, the outcomes of this review also apply to all determinations where the regulatory proposal is submitted after 31 March 2009 and prior to the next review being completed, unless there is persuasive evidence to depart from the outcomes of this review at the time of the determination.

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

On 6 August 2008, the AER released an issues paper seeking comments on a range of issues relevant to this review. Fourteen submissions were received in response to the issues paper. On 10 October 2008, the AER held a 'round table' of finance experts to seek clarification on specific matters in the consultant reports submitted by the industry associations. The AER has had regard to the submissions received and comments at the round table in forming its proposed WACC parameter values and methods.

In the issues paper, the AER also proposed to provide guidance, as part of this review, on how the AER may approach the matters of forecast inflation and transactions costs for both debt and equity in future determinations. The inclusion of these matters was not required by the NER, and the AER has decided not to include these matters in the review to focus on those matters that must be included. The AER's current views on forecast inflation and transaction costs are set out in the AER's recently released draft decisions on the NSW and ACT transmission and distribution determinations.

Among other requirements, the NER provide that where a parameter cannot be determined with certainty, the AER must have regard to the need for persuasive evidence before adopting a value or method that differs from the previously adopted value or method.

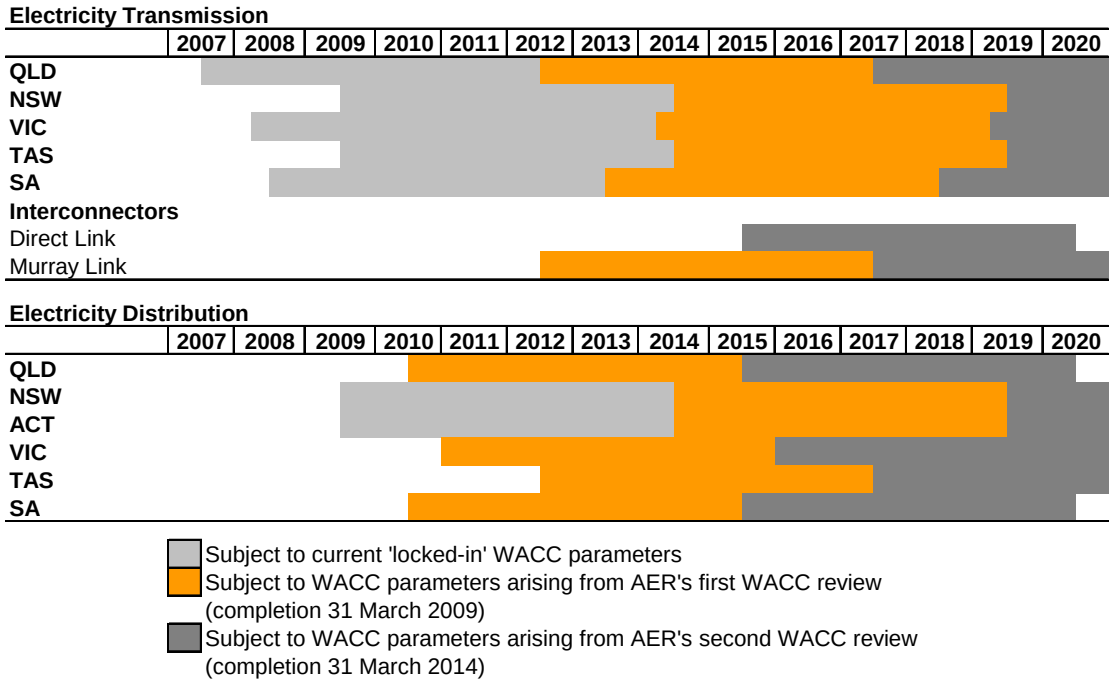
A number of submissions to the issues paper also highlighted several broader challenges that stakeholders consider must be taken into account when determining the overall rate of return as part of this review. Most notably, submissions from the sector raised concerns about the current state of financial markets, and in particular the current lack of access to corporate debt funding. As part of its review the AER has received advice from finance practitioners regarding the current lack of liquidity in corporate bond markets and the impacts of the 'credit crisis' more generally. Overall, while it is

clear that the current conditions in financial (particularly debt) markets are far from favourable, market-based evidence from a number of sources strongly suggests that, rather than creating risks, the regulatory regime insulates energy network businesses from market volatility. Importantly, it is evident that regulated energy network businesses can still gain access to finance in the current market via bank debt, and there appears to be an appetite for investment in regulated energy network businesses.

It is also important to note that, for the majority of electricity network service providers (NSPs), the outcomes of this review will not apply until after 2011, and the last year in which the outcomes will apply will be 2019.[1] Accordingly, while cognisant of the current volatility in financial markets, the AER considers it important to take a long term perspective in setting rates of return applicable over the 2010 to 2019 period.

Figure A.1 illustrates determinations in which the outcomes of this review will apply to. Also illustrated are the determinations in which the current 'locked-in' WACC parameters apply to, and which determinations the outcomes of the AER's second review, to be completed in 2014, will apply to.

**Figure A.1 Applicability of this review to forthcoming determinations[2]**




In conducting its review the AER has undertaken a detailed analysis of all the available evidence from submissions and expert consultants, and generated a 'best estimate' or a range of estimates for each of the individual WACC parameters subject to review,

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

2 Assumes five year regulatory control period for all future determinations. Under the NER, five years is the minimum length of a regulatory control period, however service providers may propose a longer period.

taking into account both conceptual considerations and empirical evidence. In considering the empirical evidence the AER's approach in reviewing each WACC parameter is to take a balanced approach to the application and interpretation of the evidence from market data by having regard to the strengths and weaknesses of the market data. This may involve:

- not changing a parameter where the market data is not materially different to the previously adopted value, and

- not moving a parameter as far as the market data would suggest (or not relying solely on the market data) even where the market data is substantially different to the previously adopted value.

In a practical sense, this means that in reviewing the WACC parameters, the AER has not 'mechanistically' determined the WACC parameters solely on the basis of empirical estimates. Importantly, this approach has been consistently adopted across the various WACC parameters subject to review. For example, the AER has not mechanistically adopted a point estimate for the equity beta consistent with the recent available market data. In reviewing the equity beta, as for the other parameters, the AER has given consideration to other relevant factors, such as the importance of regulatory stability and the current financial market environment in order to achieve an outcome that is consistent with the National Electricity Objective. Consequently, the AER has not revised the WACC parameters from their previously adopted values to the extent that the market data would suggest.

In the context of the AER's approach to the review this means that the AER has had regard to the need to achieve an outcome which is consistent with the National Electricity Objective in determining the extent to which the proposed values and methods for each of the WACC parameters are to be relied upon in generating the overall regulatory rate of return. Specifically, the AER considers that the proposed values and methods for each WACC parameter in this explanatory statement provide an overall regulatory rate of return that is expected to induce efficient investment for the long term interests of customers. Accordingly, the AER also believes it has exercised its power in a manner that has or is likely to contribute to the achievement of the National Electricity Objective and takes into account the revenue and pricing principles.

For each parameter, table A.1 sets out the previously adopted value or method, along with that proposed in submissions, and that proposed by the AER in this explanatory statement.

**Table A.1: WACC parameters – previously adopted, proposed in submissions and proposed by AER**

| Parameter | Previously adopted (TNSPs – all) (DNSPs – NSW, ACT, VIC) | Previously adopted (DNSPs – QLD, TAS, SA) | MEU and Energy Round Table | Joint Industry Associations | AER proposed |
|---|---|---|---|---|---|
| Gearing | 60 % | 60 % | 70 % | 60 % | 60 % |
| Nominal risk free rate | 10 year CGS | 10 year CGS | 10 year CGS | 10 year CGS | CGS (Term matching the regulatory period) |
| Market risk premium | 6.0 % | 6.0 % | 5.5 % | 7.0 % | 6.0 % |
| Equity beta | 1.0 | 0.90 | 0.70 | 1.0 | 0.8 |
| Credit rating | BBB+ | BBB+ | A+ | BBB+ | A- |
| Gamma[3] | 0.50 | 0.50 | 0.85 | 0.20 | 0.65 |
| **Nominal 'vanilla' WACC[4]** | **9.56 %** | **9.32 %** | **8.48 %** | **9.96 %** | **8.60 %** |

Source: NER, MEU, JIA, AER analysis

Based on current market conditions, the previously adopted parameters would have led to a nominal 'vanilla' WACC of 9.32 per cent with an equity beta of 0.9 or 9.56 per cent with an equity beta of 1.0. Under the same market conditions, the AER's proposed parameters would lead to a nominal 'vanilla' WACC of 8.60 per cent.

The AER considers that this rate of return is reflective of a forward looking rate of return for a benchmark efficient service provider that is commensurate with prevailing conditions in the market for funds and the risk involved in providing regulated electricity network services. The AER also considers the revised parameters will result in an allowance for the cost of debt that is reflective of the cost of borrowing, at the time of the determination, for comparable debt.

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

[4] These rates of returns have been calculated over a three month period, constituting the 66 business days between 25 August 2008 and 25 November 2008.

Submissions on the AER's explanatory statement are to be received by **COB Wednesday 28 January 2009**. The process for lodging submissions is outlined in section 1.6. The NER provides that the AER may, but is not required to consider any submission received after the time for making submissions has expired. Because the NER requires the AER to release its statement of the revised WACC parameters (transmission) and final statement of regulatory intent (distribution) by 31 March 2009, the AER notes that it is unlikely to be able to fully consider or give full weight to any submission received after this date.

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# Summary

This section outlines the AER's proposed positions on each of the WACC parameters. Before doing so, however, a number of broader issues raised in submissions to the issues paper are first discussed.

## Broader issues – new investment, climate change and current financial markets

A number of submissions to the issues paper highlighted several broader challenges that stakeholders consider must be taken into account when determining the overall rate of return as part of this review. These include the:

- need for new investment
- response to climate change concerns, and
- current state of financial markets.

After considering these specific issues and the overall rate of return provided by this proposed statement, the AER considers that the outcomes of this review adequately reflect the balance between security and the efficient cost of supply as required by the National Electricity Objective (NEO) in the National Electricity Law. On the specific issues raised, the AER observes the following:

- Electricity NSPs are adequately compensated through the regulatory regime for the scope and costs of new investment driven by demand growth, ageing assets, and other factors impacting on their expenditure requirements. The AER notes there are a number of features of the regulatory regime which minimise the risks associated with long lived assets (e.g. there is no asset stranding risk, the regulated cost of debt reflects market conditions and the asset base is not periodically revalued). It is expected that the outcomes of this review will continue to provide returns for NSPs which are sufficient to attract and compensate for both equity and debt funding.
- The AER is not convinced that the Australian Government's response to climate change concerns will require any increase in the required rate of return for electricity NSPs.
- While it is clear that the current conditions in financial (particularly debt) markets are far from favourable, market-based evidence from a number of sources strongly suggests that, rather than creating risks, the regulatory regime insulates energy network businesses from market volatility.

In sum, based on detailed analysis of the available evidence from submissions and expert consultants, considered in the context of all the relevant issues facing electricity NSPs, the AER expects that the outcomes of this review will continue to provide incentives for efficient network investment in the long term interests of electricity consumers.

## Previously adopted values, methods and credit rating

The NER provides that where a value, method or credit rating level cannot be determined with certainty, the AER must have regard to the need for persuasive evidence before departing from the value, method or credit rating level that has previously been adopted for it.

Table A.2 outlines what the AER considers to be the previously adopted value, method or credit rating. As is illustrated the previously adopted value, method or credit rating is the same for all services providers, across all parameters, with the exception of the equity beta.

**Table A.2: Previously adopted values, methodologies and credit rating**

| Parameter | TNSPs (all jurisdictions) | DNSPs (QLD, TAS, SA) | DNSPs (NSW, ACT, VIC) |
|---|---|---|---|
| Gearing | 60 % | 60 % | 60 % |
| Nominal risk free rate | 10 year CGS | 10 year CGS | 10 year CGS |
| Market risk premium | 6 % | 6 % | 6 % |
| Equity beta | 1.0 | 0.9 | 1.0 |
| Credit rating | BBB+ | BBB+ | BBB+ |
| Gamma | 0.5 | 0.5 | 0.5 |

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

## Gearing

The AER has examined empirical evidence of gearing ratios over a period 2002-2007. The AER observes that:

- The average level of gearing across a number of different methods of calculating the gearing ratio ranges from 60.5 to 76.8 per cent over 2002-2006.
- The generally accepted approach uses the book value of debt as a proxy for the market value of debt and uses the market value of equity (Bloomberg 'market value' approach).
- The Allen Consulting Group's (the ACG) approach adjusts the Bloomberg 'market valuation' approach to gearing for 'double leveraging' and stapled securities. The ACG approach results in an average level of gearing in the range of 60.3 to 65.0 per cent over 2002 to 2007.
- In contrast, the Bloomberg measure of book gearing (i.e. book value of debt and equity) provides a higher average level of gearing. The AER considers that this

approach is likely to be an upper bound on the estimate as no adjustments have been made for market valuations, stapled securities or double leveraging.

- In addition, the Standard and Poor's measure of gearing (book value of debt and book value of equity) provides an average gearing ratio of 64.7 per cent from 2002 to 2006, which supports the conclusion that a 60 per cent gearing is an appropriate benchmark for an efficient service provider.

The AER will update its analysis for its final statement to include the latest gearing data. However, based upon current analysis, the AER does not consider there is persuasive evidence to depart from the currently adopted benchmark efficient level of gearing of 60 per cent.

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

- is supported by the most recent available and reliable empirical evidence, which the AER considers is persuasive in support of no change to the existing value, and

- generates a forward looking rate of return that is commensurate with prevailing conditions in the market for funds.

On this basis, the AER considers that its proposed value would achieve an outcome that is consistent with the National Electricity Objective.[5]

## Nominal risk free rate

The basis for the current NER methodology – in particular the use of the yield on 10 year CGS as the risk free proxy – was largely established by the Australian Competition Tribunal (the Tribunal) in its 2003 GasNet decision. Based upon the most current available evidence the AER makes the following observations in relation to some of the Tribunal's key reasons for adopting a 10 year term assumption:

- The issue of consistency between the risk free rate terms in the CAPM equation is recognised as important as part of this review.

- The Tribunal in its GasNet decision did not specifically discuss or address the possibility of over-compensation resulting from the use of a term for the risk free rate that exceeds the length of the regulatory period.

- Given that energy network businesses are estimated to have a weighted average debt maturity profile of around five years or less, there is no evidence to suggest that network businesses will seek to issue long term debt as a matter of preference. It appears that the evidence upon which this current assessment has been made was not available to the Tribunal at the time of making its conclusions in the GasNet decision.

The AER's conclusions on the methodology for estimating the nominal risk free rate are as follows:

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5 NER, cls. 6A.6.2(j) and 6.5.4(e).

- There is insufficient persuasive evidence to justify the use of an alternative to CGS as the appropriate risk free rate proxy.

- While it is clear that the current conditions in debt markets are far from favourable, market-based evidence from a number of sources strongly suggests that, rather than create risks, the regulatory regime insulates energy network businesses from market volatility.

- A term of the risk free proxy which matches the length of the regulatory period (i.e. 5 years) better reflects the financing strategies of regulated energy network businesses.

- The current 10 year term to maturity assumption will on average violate the 'present value principle' as it compensates regulated businesses for risks they do not face over the regulatory period. The empirical evidence indicates that the extent of over-compensation on the cost of debt has been around 40 basis points on average.

- A forward-looking MRP of 6 per cent is consistent with a 5 year term assumption for the risk free rate.

- The current NER methodology for calculating the risk free rate will be retained, with one exception – the AER will only accept an averaging period commencing as close as practically possible to the start of the regulatory control period. An averaging period of between 10 and 40 business days in length will be accepted as reasonable.

The AER proposes that the methodology for estimating the risk free rate is based upon the yield on CGS with a maturity matching the length of the regulatory period, calculated over a 10-40 business day period commencing as close as possible to the start of the regulatory control period.

Overall, the AER considers there is sufficient persuasive evidence to depart from the previously adopted methodology for estimating the nominal risk free rate, in relation to the term of the risk free rate and considers it is appropriate to do so.

In accordance with the NER, the AER considers that the methodology for estimating the nominal risk free rate:

- is supported by the most recent available and reliable empirical evidence, which the AER considers is persuasive in support of a change to the existing method, and

- generates a forward looking rate of return that is commensurate with prevailing conditions in the market for funds.

On this basis the AER considers that its proposed method achieves an outcome that is consistent with the National Electricity Objective.[6]

## Market risk premium

The premise of the Joint Industry Association's (JIA) submission on the MRP (market risk premium) seems to be an assertion that the previously adopted MRP of 6 per cent was initially determined by Australian regulators having no regard to the value of imputation credits. Therefore it was 'incorrect' and needs to be 'corrected'. The JIA considers, having had regard to the value of imputation credits, that the MRP should be corrected from the previously adopted 6 per cent to 7 per cent.

The AER accepts the legitimacy of the value of imputation credits forming part of the MRP. However, after examining regulatory determinations from the time 6 per cent was adopted in regulatory practice, the AER considers it is clear that the previously adopted MRP of 6 per cent does not need to be 'corrected' to incorporate the value of imputation credits. Regard was had by Australian regulators to the value of imputation credits in establishing the previously and consistently adopted MRP of 6 per cent. Accordingly, the issue is not whether a 6 per cent MRP needs to be 'corrected' for imputation credits, but rather, after 'grossing-up' historical excess returns for the value of imputation credits, among other measures and matters considered, whether or not 6 per cent remains a reasonable estimate of the MRP having had regard to the relevant factors.

The AER has examined issues involved with the various individual measures used to estimate the MRP. Rather than placing sole weight on any particular measure of the MRP, it is common practice to have regard to each measure, tempered by an understanding of the strengths and weaknesses of each measure, in determining a 'final' MRP. The AER considers this is an appropriate approach in the context of applying the relevant considerations listed in the NER, and is consistent with past regulatory practice.[7]

Historical excess market returns, without a 'gross-up' for imputation credits, results in an arithmetic average of between 5.6 and 6.1 per cent, for estimation periods commencing between 1883 and 1958 and finishing in 2008. Historical excess market returns 'grossed-up' for a assumed utilisation rate of 0.65, consistent with the AER's proposed utilisation rate component of the gamma, results in a arithmetic average of between 5.9 and 6.5 per cent for estimation periods commencing between 1883 and 1958 and finishing in 2008.

As noted above, the AER is proposing a term of the risk free rate that matches the term of the standard regulatory control period, which in general is five years. As historical returns relative to 5 year CGS are not, at present, statistically significant,

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[6] NER, cls. 6A.6.2(j) and 6.5.4(e).

[7] 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 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.

the AER is not advocating historical estimates be estimated in this manner. Rather, following Officer and Bishop's estimate of the difference between 10 and 5 year CGS yields, the AER considers that historical estimates should continue to be estimated relative to 10 year CGS, but interpreted with the understanding that these estimates may underestimate historical estimates relative to 5 year CGS by approximately 20 basis points.

The AER notes that historical excess returns:

- 'grossed-up' for a utilisation rate of 0.65
- interpreted in view of the 20 basis points as the likely difference if they had been estimated relative to 5 year CGS, and
- over a range of estimation periods that the AER considers appropriate (1883-2008, 1937-2008, 1958-2008)

fall within the 6 to 7 per cent range (specifically, 6.1 to 6.7 per cent), with some more recent estimates below this range.

The AER also notes the reasons outlined elsewhere in this explanatory statement as to why historical estimates are more likely to overstate forward looking expectations of the MRP, rather than understate it. These include:

- Brailsford et al identify a number of data quality issues with the pre-1958 data that the authors consider likely to bias up estimates using data from this period. This means the above estimates over the 1883-onwards and 1937 onwards periods are more likely to overstate, than understate, a forward-looking MRP
- the use of historical equity returns will bias upwards the return on the CAPM market portfolio, which includes all assets in the economy and is not limited to equities. This means that the above estimates for any period are more likely to overstate, than understate, a forward looking MRP, and
- these estimates include several significant and positive one-off or unexpected events that are unlikely to be repeated. That means historical estimates over the periods considered are more likely to overstate, than understate, a forward looking MRP.

In addition:

- surveys measures indicate that a MRP of 6 per cent is the most commonly adopted value of market practitioners, and
- cash flow measures generally support a MRP of around or below 6 per cent.

**Table A.3: Measures used to estimate the market risk premium**

| Measure | Support MRP |
|---|---|
| Historical estimates (grossed-up for imputation credits, relative to a 5 year risk free rate) | 6.1 to 6.7 per cent |
| Surveys | Consistently 6 per cent |
| Cash flow based measures | Around or lower than 6 per cent |

Source: AER analysis

Based on this information, the AER does not consider there is sufficient persuasive evidence to justify a departure from the previously adopted MRP of 6 per cent, and that this figure is likely to be a reasonable estimate of a forward looking rate of return commensurate with prevailing conditions in the market for funds.

On the basis, the AER considers that there is no sufficient persuasive evidence to depart from a MRP of 6 per cent, and that a MRP of 6 per cent is consistent with the National Electricity Objective.

## Equity beta

Taking into account the nature of the industry and key features of the ex ante regulatory regime under the NER, the AER considers that the exposure of a benchmark efficient service provider to the systematic risk components of business risk and financial risk is, overall, less than that of the market. That is, that the equity beta is likely to be less than one.

The AER also considers that there is not compelling evidence to suggest that the equity beta should differ based on the form of control (revenue cap vs. price cap). The MEU and JIA agree on this position.

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

- Given the differences between estimating equity betas using discrete and continuous returns are minimal, it is appropriate to use the standard approach, which is to use continuous returns.
- It is appropriate to examine Australian data from the post 'technology bubble' period onwards.
- It is also appropriate to examine equity beta estimates using weekly observations as well as equity beta estimates that use monthly observations.
- Regard should be had to foreign estimates of equity betas as a cross check on the estimate of the domestic beta.

- Individual equity beta estimates should not be used to inform a forward looking equity beta for a benchmark efficient network service provider. Rather, primary weight should be placed on portfolio estimates of equity betas.

- If confidence intervals were to be considered it would be appropriate to consider both the lower and upper bounds generated by the estimation as it is equally likely that a 'true' equity beta point estimate may be observed at the lower or upper bound. Given that the point estimates generated by regressions are more likely to represent the 'true' point estimate the AER has given greater weight to point estimates than confidence intervals.

- Neither the Blume nor Vasicek adjustments (assuming a 'prior belief' of one) should be applied in a regulatory context as either adjustment is likely to introduce an upwards bias in the beta estimates.

- The AER does not consider that having regard to the need for persuasive evidence translates into a specific statistical hypothesis that would require the selection of a particular set of standard errors to create confidence intervals for the equity beta point estimates.

- The empirical evidence considered by the AER suggests that the equity beta of a benchmark efficient service provider is in the range of 0.44 (i.e. the average portfolio estimated by the AER for Australian businesses post 'technology bubble') to 0.68 (i.e. the average portfolio estimated by the ACG for the JIA using a five-year estimation period).

- In considering the empirical evidence, the AER's approach to reviewing the equity beta is to take a balanced approach to the application and interpretation of market data by having regard to the strengths and weaknesses of the market data available. In a practical sense this means that the AER does not propose to change the equity beta value as far as the market data would suggest, even though the market data suggests the value is substantially different to the previously adopted value(s). In reviewing the equity beta, as for the other parameters, the AER has given consideration to other factors, such as the importance of regulatory stability in order to promote efficient investment, so as to contribute to the National Electricity Objective. Consequently, whilst the market data in isolation presents a strong case for establishing an equity beta at a point consistent with the above range, the AER has taken a broader view in the context of the National Electricity Objective and having regard to the current financial environment.

- Finally, the AER notes the JIA submits that the use of the Sharpe Lintner CAPM may understate an equity beta which less than one. While, the AER has concerns over some of this analysis on the alleged biases of the Sharpe CAPM, the AER considers that even if these biases are valid, the AER has not adopted a 'mechanical' approach in applying the empirical beta estimates derived from regression analysis using the Sharpe CAPM.

Accordingly, the AER considers that there is persuasive evidence to depart from either the previously adopted equity beta of 1.00 or 0.90. In accordance with the NER, the AER considers that an equity beta of 0.80:

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

On this basis the AER considers the proposed value is consistent with the National Electricity Objective.[8]

## Credit rating

The AER has examined median credit ratings using a period consistent with the equity beta (2002 to 2008) The AER observes that:

- Irrespective of the period selected the median credit rating for energy networks remains at a credit rating of A-.
- Examining the regression results and simple averages of credit ratings the AER observes that a credit rating of A- is at the lower end of the range of estimates representing a credit rating for a benchmark efficient service provider (A- to A+ for energy network businesses).

Based on submissions, available data, the AER's analysis and the considerations and conclusions made in sections 9.5.1 to 9.5.4 the AER considers that there is sufficient persuasive evidence to depart from the previously adopted credit rating of BBB+ for a benchmark efficient service provider and proposes a credit rating of A-.

In accordance with the NER, the AER considers that a credit rating of A-:

- is supported by the most recent available and reliable empirical evidence, which the AER considers is persuasive in support of a change to the existing value
- generates a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and
- generate a return on debt that reflects the current cost of borrowings for comparable debt.

On this basis the AER considers that its proposed credit rating achieves an outcome that is consistent with the National Electricity Objective.[9]

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8 NER, cls. 6A.6.2(j) and 6.5.4(e).

9 NER, cls. 6A.6.2(j) and 6.5.4(e).

## Assumed utilisation of imputation credits (gamma)

Based on the detailed analysis in chapter 10 the AER makes the following conclusions on the gamma parameter:

- A payout ratio of 1.0 should be adopted in the assessment of gamma, which is consistent with the standard approach to valuation as well as the Officer (1994) WACC framework. This represents a departure from current regulatory practice, which is based on the 'Monkhouse approach'.

- The AER will adopt a conceptual framework of a domestic market of assets with foreign investors recognised to the extent they invest domestically. This conceptual framework recognises the realities implicit in domestic market data, and ensures consistency with the other WACC parameters.

- The AER intends to estimate the utilisation rate (i.e. theta) based on post-2000 data only, given the July 2000 tax changes that allowed a full rebate of unused credits.

- A reasonable estimate of theta inferred from market prices is 0.57, based on the Beggs and Skeels (2006) study. The results of the most recent SFG (2008) study have been given limited weight given that the reliability of the results cannot be verified on the information presented to date by SFG.

- A reasonable estimate of theta from tax statistics in the post-2000 period is 0.74, based on the results from the Handley and Maheswaran (2008) study. This study has a sound conceptual basis and provides a direct (rather than inferred) estimate of the value of imputation credits across the Australian economy.

- The issue of consistency between the gamma and the MRP is considered important as part of this review. Accordingly, the AER has estimated an appropriately 'grossed-up' historical estimate of the MRP for consideration.

- The empirical results from dividend drop-off studies do not need to be adjusted based on CAPM consistency considerations, and the standard CAPM will continue to be used for the purposes of this review.

On this basis, and after considering the most recent available and reliable empirical evidence, the AER considers that there is persuasive evidence to depart from the previously adopted 'assumed utilisation of imputation credits' (i.e. gamma) of 0.5. Based on the evidence considered most relevant, reliable, comprehensive and theoretically appropriate, the AER considers that a reasonable range for gamma lies between 0.57 and 0.74.

Based upon an equal weighting of the two available methodologies, the AER proposes to adopt an 'assumed utilisation of imputation credits' (i.e. gamma) of 0.65.

In accordance with the NER, the AER considers that an assumed value of imputation credits:

- is supported by the most recent available and reliable empirical evidence, which the AER considers is persuasive in support of a change to the existing value and
- generates a forward looking rate of return that is commensurate with prevailing conditions in the market for funds.

On this basis the AER considers that its proposed value achieves an outcome that is consistent with the National Electricity Objective.[10]

## AER's proposed values, methodologies and credit rating

Table A.4 sets out the AER's proposed value or method for each WACC parameter in this explanatory statement.

**Table A.4: AER's proposed values, methodologies and credit rating**

| Parameter | AER proposed |
|---|---|
| Gearing | 60 % |
| Nominal risk free rate (government bond) | CGS (Term matching the regulatory period) |
| Market risk premium | 6.0 % |
| Equity beta | 0.8 |
| Credit rating | A- |
| Gamma[11] | 0.65 |
| **Nominal 'vanilla' WACC[12]** | **8.60 %** |

Based on current market conditions, the AER's proposed parameters would lead to a nominal 'vanilla' WACC of 8.60 per cent.

In accordance with the NER,[13] the AER considers that this rate of return:

- is supported by the AER's analysis of the most recent available and reliable empirical evidence, which the AER considers is persuasive in support of a change to the existing set of WACC parameters

10 NER, cls. 6A.6.2(j) and 6.5.4(e).

11 As the rates of return displayed in table A are post-tax WACCs they do not incorporate the effect of gamma. However a generic pre-tax WACC cannot be determined because it depends on tax related-statistics specific to an individual service provider. Accordingly a pre-tax WACC, that would illustrate the effect of the change in gamma, is not displayed in table A.

12 These rates of returns have been calculated over a three month period, constituting the 66 business days between [25][August] 2008 and [25] November 2008.

13 NER, cls. 6.5.4(e) and 6A.6.2(j).

- is reflective of a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing regulated services

- contains a return on debt that reflects the current cost of borrowings for comparable debt, and

- reflects, where applicable, parameter inputs that are based on a benchmark efficient electricity network service provider.

# 1 Introduction

## 1.1 Background to review

The National Electricity Rules (NER) provide that the Australian Energy Regulator (AER) must review the weighted average cost of capital (WACC) parameters to be adopted in determinations for electricity transmission and distribution network service providers (TNSPs and DNSPs). Reviews are to be conducted every five years, for transmission and at least every five years for distribution. The first review must be completed by 31 March 2009, at which time the AER will release a final decision for both transmission and distribution.[14]

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 the completion of the next review, 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.[15] In the case of electricity transmission however, the AER's statement 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 completion of the next review.

The AER's review is limited to the individual WACC parameters rather than a review of the overarching framework in which the WACC is applied. For example, neither the use of the nominal post-tax framework or the use of the capital asset pricing model (CAPM) for calculating the cost of equity are subject to review by the AER.

## 1.2 Definition of the WACC

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

> The rate of return for a [Network Service Provider] for a regulatory control period is the cost of capital as measured by the return required by investors in a commercial enterprise with a similar nature and degree of non-diversifiable risk as that faced by the [network] business of the provider…[16]

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

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

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14 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.

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

16 NER, cls. 6.5.2(b) and 6A.6.2(b).

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.[17]

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

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

where:

$r_f$ = the nominal risk free rate of return

$\beta_e$ = the equity beta

MRP = the expected market risk premium.[18]

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.[19]

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 following formula:

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17 NER, cls. 6.5.2(b) and 6A.6.2(b).

18 NER, cls. 6.5.2(b) and 6A.6.2(b).

19 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.

$$k_d = r_f + DRP$$

where:

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

DRP = the debt risk premium.[20]

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

The NER also allow the AER to review the assumed value of imputation credits (referred to as 'gamma'), which is an input to determining the estimated cost of corporate income tax. Under the imputation tax system in Australia, imputation credits attached to dividends have a value to investors in that they represent a saving in personal tax liabilities (or a cash rebate in some circumstances). This tax saving or cash rebate amount is quantified by the gamma value which measures the extent to which imputation credits are 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.[21]

## 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)

[20] NER, cls. 6.5.2(b) and 6A.6.2(b).

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

- 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.

In the issues paper, the AER also proposed to provide guidance, as part of this review, on how the AER may approach the matters of forecast inflation and transactions costs (debt and equity) in future determinations. The inclusion of these matters is not required by the NER, and the AER has decided not to include these matters in the review in order to focus on those matters that must be included. The AER's current views on forecast inflation and transaction costs are set out in the AER's recently released draft determinations on the NSW and ACT transmission and distribution resets.

## 1.4 Applicability of this review to forthcoming regulatory determinations

### 1.4.1 Electricity transmission

The NER provides that the AER may, as a consequence of this review, adopt revised values, 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).[22]

### 1.4.2 Electricity distribution

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

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

[22] NER, cl. 6A.6.2(h).

(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.[23]

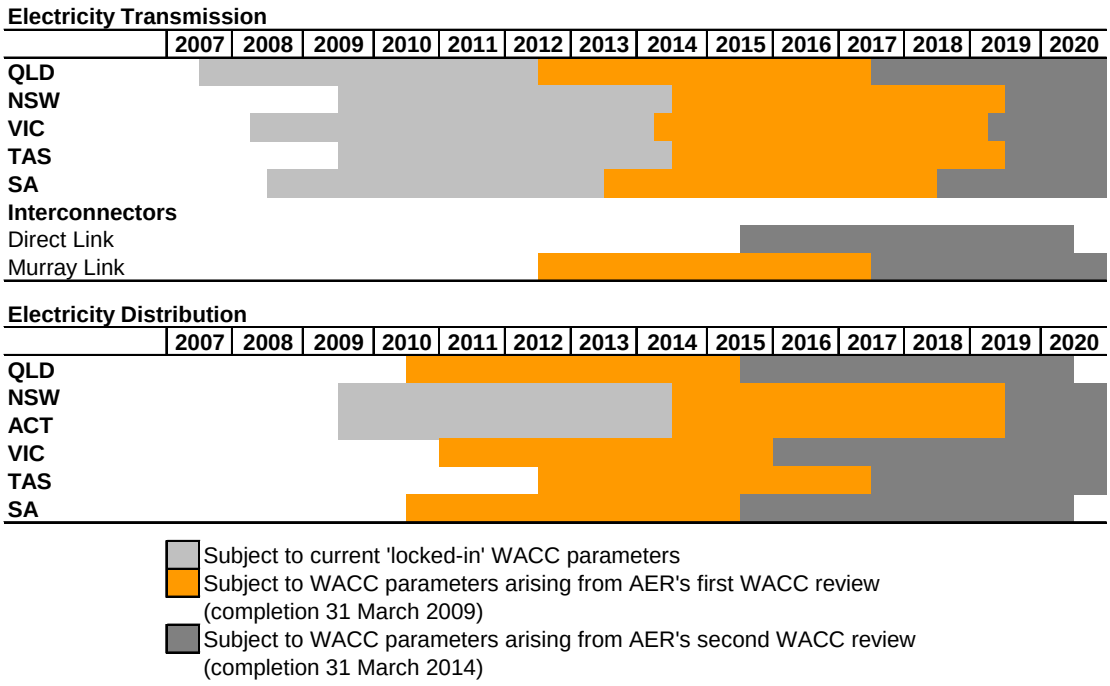
The outcomes of this review will only apply to electricity transmission and distribution determinations where the proposal is submitted after 31 March 2009 and before completion of the next review.[24]

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
- NSW and Tasmanian transmission determinations.

The applicability of this review to forthcoming determinations is illustrated in table 1.1.

**Figure 1.1: Applicability of the review to TNSP and DNSP determinations[25]**




23 NER, cl. 6.5.4.

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

25 Assumes five year regulatory control period for all future determinations. Under the NER, five years is the minimum length of a regulatory control period, however service providers may propose a longer period.

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.

### 1.4.3 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 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.[26]

## 1.5 Timelines

For both electricity transmission and distribution, the AER must complete its review of WACC parameters by 31 March 2009.[27]

In conducting its review the AER must follow the transmission consultation procedures and distribution consultation procedures.[28] These procedures effectively require the AER to publish a draft decision, allowing for no less than 30 business days for the making of submissions. The AER may, but is not required to consider any submissions received after the close date for submissions has expired. Within 80 business days of the proposed statement of revised WACC parameters (transmission) and proposed statement of regulatory intent (distribution), the AER must publish its final statement of revised WACC parameters (transmission) and statement of regulatory intent (distribution), respectively.[29]

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.[30]

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

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26 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.

27 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.

28 NER, cls. 6.5.4(a), 6A.6.2(f) and 6A.6.4(b).

29 NER, cls. 6.16 and 6A.20.

30 NER, cls. 6.16 and 6A.20.

**Table 1.1: Consultation process**

| Date | Action |
|---|---|
| 6 August 2008 | Publish issues paper and invite written submissions |
| 17 September 2008 | Close of written submissions on issues paper |
| 11 December 2008 | Publish proposed statement of revised WACC parameters (transmission) and proposed statement of regulatory intent (distribution) and invite written submissions |
| 17 December 2008 | Host public forum on proposed statement of revised WACC parameters (transmission) and proposed statement of regulatory intent (distribution) and invite oral submissions |
| 28 January 2009 | Close of written submissions on proposed revised statements |
| 31 March 2009 | Publish statement of revised WACC parameters (transmission) and statement of regulatory intent (distribution) |

## 1.6 Request for submissions

Interested parties are invited to make written submissions to the AER on the explanatory statement and proposed statements by the close of business Wednesday, 28 January 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 explanatory statement, 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.

Please note the AER will treat information contained in submissions in accordance with the ACCC/AER Information Policy, a copy of which can be downloaded from the publications section of the AER's website.

## 1.7 Structure of this explanatory statement

The remainder of this explanatory statement is structured as follows:

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

# 2 Broader issues – new investment, climate change and current financial market conditions

## 2.1 Introduction

As the AER's review is limited to a review of individual WACC parameters, the issues paper released by the AER focused on matters specific to each WACC parameter, as well as multi-parameter considerations (e.g. the approach to benchmarking and the form of the CAPM). A number of submissions to the issues paper also highlighted several broader challenges that stakeholders consider must be taken into account when determining the overall rate of return as part of this review.

## 2.2 Summary of submissions in response to issues paper

In their submission, the JIA specifically highlight three broad challenges that the JIA consider are important. These challenges are:

- *the need for new investment* – the JIA consider that all parts of the national grid need new investment. Some of this investment is driven by growing energy growth, whereas other investment is driven by the need to replace ageing infrastructure

- *the response to climate change concerns* – the JIA consider that investors may consider there are increased risks from investing in the energy industry due to the policy uncertainty surrounding the response to climate change concerns by Australian governments. This would lead to a higher required rate of return for these investors. The JIA further consider that addressing the impact of the Carbon Pollution Reduction Scheme is likely to require significant new investment in energy networks as the sources of energy generation alter, and

- *the current state of financial markets* – the JIA consider that the world economy is entering a period of uncertainty, with risk continuing to be re-priced, and consequent increases in the hurdle rates for infrastructure investment.

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

The JIA submit that regulatory rate of return needs to be sufficient in order to attract sufficient capital to the sector, in the light of both the large forward capital expenditure programs and higher required rates of returns.[31]

The sentiments raised in the JIA's submission are echoed in a number of other submissions from industry stakeholders, in particular the submissions from:

- the Australian Pipeline Industry Association (APIA)
- Cheung Kong Infrastructure Holdings (CKI)
- the Energy Networks Association (ENA)
- EnergyAustralia
- ETSA Utilities, CitiPower and Powercor
- Grid Australia
- Integral Energy, and
- SP AusNet.

The AER has had regard to all the matters raised in all of these submissions. However, given the similarity of the broader issues raised in these submissions, the AER has focused on responding most directly to the JIA's submission. The JIA represent, among other members, all of the industry stakeholders listed above.

## 2.3 Need for new investment

The JIA state in their submission that:

> Australia is experiencing increased demand for energy infrastructure investment to replace ageing assets and expand capacity in many locations. The Review must allow capital to be attracted to this investment at a time when many other parts of the world are also competing to attract funds for their infrastructure needs.[32]

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

The AER acknowledges that new investment in network assets is required in many areas of the National Electricity Market (NEM), to address, among other matters,

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

32 ibid., p.8.

network expansion due to growing energy demand (particularly peak demand), and network replacement due to ageing assets. However, the AER considers that these issues are adequately addressed through the existing regulatory regime.

Under the NER, Network Service Providers (NSPs) propose forecast capital expenditure for a regulatory control period. The AER must accept this forecast if it is satisfied the forecast reasonably reflects the relevant requirements, being:

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

Table 2.1 illustrates the capital expenditure allowances approved, or proposed to be approved, by the AER in its recent decisions for electricity NSPs.

**Table 2.1: Capital expenditure – recent AER draft and final decisions**

| Service provider | Date of decision | Capital expenditure proposed[(a)] | Capital expenditure allowed[(a)] | Allowed capex as % of RAB |
|---|---|---|---|---|
| Powerlink (QLD transmission) | June 2007 (final decision) | $2.92b | $2.63b | 70% |
| SP AusNet (VIC transmission) | January 2008 (final decision) | $0.86b | $0.77b | 35% |
| VENCorp (VIC transmission) | April 2008 (final decision) | $0.29b | $0.20b | N/A |
| ElectraNet (SA transmission)[(b)] | April 2008 (final decision) | $0.72b | $0.65b | 50% |
| Transend (TAS transmission) | November 2008 (draft decision) | $0.68b | $0.62b | 62% |
| TransGrid (NSW transmission) | November 2008 (draft decision) | $2.55b | $2.38b | 56% |
| EnergyAustralia (NSW transmission and distribution) | November 2008 (draft decision) | $8.66b | $8.43b | 103% |
| Country Energy (NSW distribution) | November 2008 (draft decision) | $4.00b | $3.95b | 93% |
| Integral Energy (NSW distribution) | November 2008 (draft decision) | $2.95b | $2.91b | 79% |
| ActewAGL (ACT distribution) | November 2008 (draft decision) | $0.29b | $0.28b | 48% |
| **Total / Average** | | **$23.92b** | **$22.81b** | **60%** |

Source: AER[33]
(a) $real, at the time of the decision. Amounts exclude capex for contingent projects.
(b) These numbers reflect the Tribunal's findings in relation to the ElectraNet appeal.[34]

[33] AER, *Decision: Powerlink Queensland transmission network revenue cap 2007-08 to 2011-12*, Final decision, 14 June 2007, pp. v-vi; AER, *SP AusNet transmission determination – 2008-09 to 2013-14*, Final decision, 31 January 2008, p. 1; AER, *Victorian Energy Networks Corporation (VENCorp) transmission determination – 2008-09 to 2013-14*, Final decision, 11 April 2008, p. 6; AER, *ElectraNet transmission determination 2008-09 to 2012-13*, 11 April 2008, p. xi; AER, *Transend transmission determination 2009-10 to 2013-14*, Draft decision, 28 November 2008, p. 4 (a); AER, *TransGrid transmission determination 2009-10 to 2013-14*, Draft decision, 28 November 2008(b), p. x; AER, *New South Wales draft distribution determination 2009-10 to 2013-14*, Draft decision, 28 November 2008(c), pp. xxxiv-xxxvii; AER, *Australian Capital Territory distribution determination 2009-10 to 2013-14*, 28 November 2008(d), p. xxi

As table 2.1 demonstrates, the AER has approved or proposed to approve a significant amount of new investment in electricity networks in its recent decisions. Since June 2007, the AER has approved (or proposed to approve) $22.81 billion worth of capital investment compared to a proposed total of $23.92 billion, with investment forecast to take place over the period 2007 to 2014.[35] On average, the approved (or proposed to be approved) capital investment in table 2.1 represents around 60 per cent of the regulatory asset base (RAB) of each business at the time of the reset.

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

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

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

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

Accordingly, the AER considers that NSPs are adequately compensated for the scope and costs of new investment driven by demand growth, ageing assets, and other reasons. Some other elements of the regulatory regime are discussed in section 2.3.

The other component of addressing the need for new investment is that the return on that allowed capex is adequate to attract funding, both debt and equity. The AER notes the following:

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[34] Australian Competition Tribunal, Application by ElectraNet Pty Limited (No 3) [2008] ACompT3, 30 September 2008.

[35] Note that the approved amounts for NSW, ACT and Tasmania are based on the AER's draft decisions only.

- The regulatory rate of return is comprised of the weighted average of the allowed cost of equity and cost of debt. Under this proposed statement, this weighting (i.e. gearing) would be 60 per cent, which is supported by the JIA.

- The cost of equity would be set at 480 basis points (4.8 per cent) above the prevailing yield on 5 year Commonwealth Government Securities (CGS).

- The cost of debt would be set at the prevailing benchmark yield on 5 year Australian corporate bonds with a credit rating of A-.

Based upon a detailed analysis of all the available information received from submissions and expert consultants, the AER considers that the outcomes of this review will continue to provide returns for NSPs which are sufficient to attract and compensate for both equity and debt funding.

## 2.4 Response to climate change concerns

The JIA state in its submission that:

> The Review must recognise that, because of the increased uncertainty for the industry brought about by government policies to address climate change, the cost of capital allowance will need to increase.[36]

The JIA quote a section of the Australian Government's green paper on the Carbon Pollution Reduction Scheme (CPRS) that suggests that the policy uncertainty in this area might cause the required rates of return in the energy industry to increase. However as acknowledged by the JIA, this quote from the green paper was specifically related to investment in generation assets. The JIA do not provide evidence that the risks of investing in network assets has increased.

The JIA also consider that the introduction of the CPRS and expanded Renewable Energy Target Scheme (RETS) are likely to increase network investment.

The previous section outlined some of the elements of the regulatory regime in relation to the recovery of capex. Other elements include:

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

- Transmission NSPs (TNSPs) may propose 'contingent projects' such that if the appropriate 'trigger event' occurs, the regulated revenue is increased

- TNSPs and distribution NSPs (DNSPs) are provided with 'cost pass-through' provisions including 'service standard event' and 'regulatory change event' provisions. For example, if an NSP's service performance standards increase, the NSP may apply for an increase in allowed revenues or prices. NSPs are also

[36] JIA, *Submission in response*, op. cit., September 2008, p.10.

provided with 'tax change event' cost pass-through provisions. These provisions apply symmetrically.

- DNSPs can propose other cost pass-through events, in addition to the prescribed list in the NER

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

Additionally, as a WACC which is set too high encourages service providers to 'build-out' constraints rather than finding non-network solutions, climate change concerns have arguably increased the economic costs and risks of overinvestment.

## 2.5 Current state of financial markets

The AER recognises that the current state of financial markets, characterised by tight credit conditions, will have economy-wide impacts.

This section examines, at a high level, the likely impact of the current market conditions on regulated energy network businesses.

**Submissions in response to the issues paper**

The JIA state in its submission that:

> The AER should recognise that the re-pricing of risk and reduced availability of funding in financial markets requires a higher cost of capital allowance to attract finance for the new investment needed by the community. Also the recent volatility in financial markets demonstrates that the rate of return required by regulated entities in the longer term must be sufficient to enable the business to manage the ongoing volatility inherent in financial markets.[37]

The JIA submit that the negative outlook for financial markets will inhibit the ability of regulated energy network businesses to access debt and equity finance to fund expanding capital investment programs. So that businesses are able to compete for scarce funds, the appropriate investment incentives must be provided as part of this review. On this point the JIA state that:

> On the one hand, the fundamentals of the Australian energy industry are sound (which enhances its prospects of attracting investment funds). On the other hand, the long term settled gearing ratio is 60 per cent compared with a market average of 30-35 per cent (this makes it more difficult to raise investment funds).
>
> Clearly if this industry is to attract the capital required for necessary infrastructure investment, the returns on capital must remain competitive.[38]

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37 JIA, *Submission in response*, op. cit., September 2008, p.11

38 ibid., p.10.

The APIA submits that the outcomes of the review should be based upon current capital market data which recognises that the world economy has entered a period of instability. The APIA states that:

> …these issues are best addressed by determining a reasonable range for variables and selecting an estimate at the higher end of the range to allow flexibility if markets change.[39]

Submissions received from the ENA, the APIA, Grid Australia, Energy Australia, ETSA, Citipower and Powercor, Integral Energy, and SP AusNet support the JIA submission on the need for the AER to recognise the challenges in the current capital market.

**Consultant's review**

As part of its review the AER engaged Deloitte to provide advice on issues associated with refinancing risk, debt market liquidity and hedging instruments, both in the current market and historically.[40]

Deloitte states that the current corporate bond market in Australia has very limited liquidity, and is likely to remain illiquid for the next 1-2 years. As discussed at section 6.5.2, the impact of the credit crisis on bond yields is indeed material, particularly with respect to corporate bonds.

As a result it is expected that in the current market regulated energy network businesses will need to raise finance via bank debt:

> Bank loans have become increasingly attractive because they offer; a) potentially the only available market and b) significantly lower rates than bonds, despite a sharp increase since the credit crisis as banks themselves face higher funding costs.[41]

However despite the volatility and lack of liquidity in credit markets currently, Deloitte advises that:

> Market makers perceive that there is still an appetite for investment in regulated businesses in the current market.[42]

Finally, Deloitte advises that a prudent financing strategy will seek to have a maturity profile that is spread over time, so that at no one time is a significant portion of the portfolio in need of refinancing. This is needed to mitigate exposure to refinancing risk and to enable an averaging of credit spreads over time.[43]

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39 APIA, *APIA Response to the Australian Energy Regulator's Review of the weighted average cost of capital (WACC) parameters for electricity transmission and distribution*, Submission in response, September 2008, p.4.

40 Deloitte, *Australian Energy Regulator – Refinancing, debt markets and liquidity*, Report to the AER, 12 November 2008.

41 Deloitte, *Report to the AER*, op. cit., November 2008, p.9.

42 Deloitte, *Report to the AER*, op. cit., November 2008, p.12.

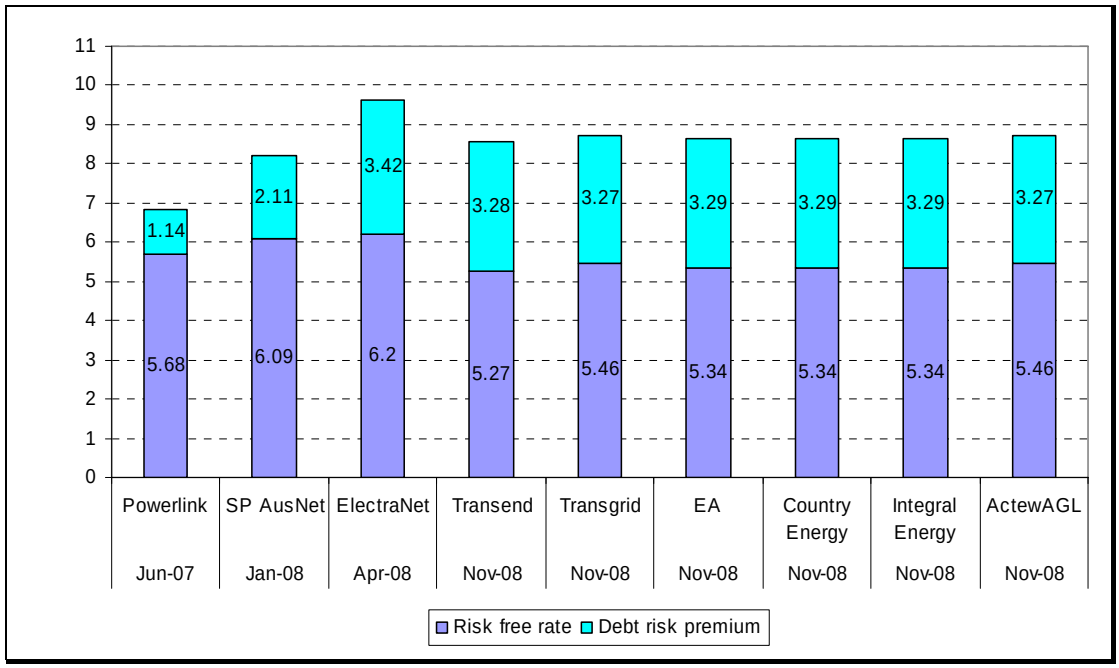
43 Deloitte, *Report to the AER*, op. cit., November 2008, p.30.

**Issues and AER's considerations**

The AER understands that the current market volatility – particularly in debt markets – has likely had an impact on the ability of a firm to raise capital. However there are good reasons to suggest that, at least in a relative sense, regulated NSPs are well-placed to cope with the current market conditions.

It is important to reiterate upfront that the current NER methodology for calculating the debt risk premium allows for regulated businesses to be fully compensated for prevailing market conditions at the time of the reset. This is illustrated in figure 2.1, which contains the AER's approved cost of debt from recent decisions.

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




Source: AER[44]

As discussed at section 6.5.2 , it is important to note that regulated energy network businesses can still gain access to finance in the current market via bank debt, and there still appears to be a strong appetite for investment in regulated energy network businesses.

The AER acknowledges that the current market volatility may create risks for regulated businesses in raising debt finance, particularly for businesses that:

- had regulatory resets prior to the onset of the credit crisis, and

[44] AER, *Final decision*, op. cit., 14 June 2007, p. 106; AER, *Final decision*, op. cit., 31 January 2008, p. 107; AER, *Final decision*, 11 April 2008, p. 71; AER, *Draft decision*, 28 November 2008(a), pp. 154-155; AER, *Draft decision*, 28 November 2008(b), p. 97; AER, *Draft decision*, 28 November 2008(c), p. 229; AER, *Draft decision*, 28 November 2008(d), p. 141.

- need to raise debt finance to fund new capex in the current market.

As Deloitte notes in its report, despite the current turbulence in financial markets the outlook appears positive for regulated energy network businesses. This sentiment is also evident in a number of financial analyst's reports. For example, Macquarie Research states, in relation to a recent refinancing undertaken by SP AusNet, that:

> SPN noted that the order book was almost two times oversubscribed. This issue along with it's A$1.55bn bank debt facility which was refinanced in Feb 08 again clearly demonstrates that these type of regulated utility businesses are not experiencing significant difficulties raising capital.[45]

Also, ABN Amro has stated recently that:

> SPN and SKI are THE places to park your money, in our view. Not only does SPN have almost a 12% cashflow-backed yield that is going to look even more attractive as the RBA cuts rates again next month, in our view, but the stock also has conservative gearing in-line with its regulatory benchmarks.
>
> This means that any blow-out in credit spreads can largely be passed through at each regulatory reset. In our view, this is about as bullet proof as you can get in this market…[46]

Further, Macquarie Research examines the impact of the regulatory regime on the ability of regulated businesses to cope with the current volatility:

> Despite being highly geared relative to the market, the listed distribution networks are in a strong position to cope with tight, volatile credit markets.
>
> The safety net is twofold. Firstly, the majority of the asset debt exposure is hedged, typically above 90%. Secondly, the regulated returns from the assets are calculated based on the same cost of debt as the regulator uses in his WACC assumptions thereby reducing the effects of rising debt costs on the asset owners.[47]

The nature of these sentiments expressed recently by finance practitioners indicates that the underlying fundamentals of regulated NSPs are sound such that they are well-placed to cope with the current market conditions. On this basis the AER considers that similar sentiments are likely to apply on the equity side. Based on all the available evidence, the AER expects that the outcomes of this review will continue to provide adequate returns to equity for regulated NSPs.

Overall, while it is clear that the current conditions in financial (particularly debt) markets are far from favourable, market-based evidence from a number of sources strongly suggests that, rather than creating risks, the regulatory regime insulates energy network businesses from market volatility.

Finally, it is important to reiterate that, for the majority of NSPs, the outcomes of this review will not apply until after 2011 (see table 1.1 – applicability), and the last year

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45 Macquarie Research, *SP AusNet – Upgrading to outperform*, 19 September 2008, p.3.

46 ABN Amro, *SP AusNet – The place to hide*, 30 September 2008.

47 Macquarie Research, *DUET Group: FY08 – another excellent year*, 1 September 2008, p.19.

in which the outcomes will apply will be 2018. Even the first NSPs affected (Energex, Ergon and ETSA Utilities) will not be officially subject to the outcomes of this review until the commencement of their respective regulatory control periods, on 1 July 2010.

Therefore while it is obviously important to be cognisant of the current volatility in financial markets, the AER considers it equally important not to over-react to current market conditions in setting rates of return applicable over the period 2010-18. Rather, the AER intends to take a longer term perspective in setting rates of return for energy network businesses over the period 2010-2019.

## 2.6 AER's conclusion

The JIA submit that the regulatory rate of return needs to be sufficient in order to attract sufficient capital to the sector, in the light of both the large forward capital expenditure programs and higher required rates of returns. The AER has considered the impact of three broad issues as raised by the JIA, as follows:

- need for new investment
- response to climate change concerns, and
- current state of financial markets.

In considering these specific issues and the overall rate of return provided by this review more generally, the overall guiding objective of the AER is the National Electricity Objective (NEO). The NEO is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:

- price, quality, safety, reliability and security of electricity, and
- the reliability, safety and security of the national electricity system.[48]

The regulatory framework is discussed in chapter three.

The JIA state that:

> The particular challenge for the AER is to balance the different aspects of the electricity market objective so that customers are delivered long term security of supply at a reasonable cost. That, in turn, requires network operators to be recompensed in an adequate and timely way for their investments.[49]

The AER considers that the outcomes of this review adequately reflect the balance between security and the efficient cost of supply as correctly identified by the JIA. On the specific issues raised, the AER observes the following:

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48 NEL, s.7

49 JIA, *Submission in response*, op. cit., September 2008, p.6.

- Electricity NSPs are adequately compensated through the regulatory regime for the scope and costs of new investment driven by demand growth, ageing assets, and other reasons. It is expected that the outcomes of this review will continue to provide returns for NSPs which are sufficient to attract and compensate for both equity and debt funding.

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

- While it is clear that the current conditions in financial (particularly debt) markets are far from favourable, market-based evidence from a number of sources strongly suggests that, rather than creating risks, the regulatory regime insulates energy network businesses from market volatility.

In sum, based on detailed analysis of the available evidence from submissions and expert consultants, considered in the context of all the relevant issues facing electricity NSPs, the AER expects that the outcomes of this review will continue to provide incentives for efficient network investment in the long term interests of electricity consumers.

# 3 Regulatory framework

## 3.1 Introduction

This section sets out the regulatory framework in the National Electricity Law (NEL) and National Electricity Rules (NER) under which the AER is conducting this review. It also contains the AER's interpretation of the relevant provisions in the NEL and NER, and on a more practical level, the AER's approach to this review in implementing the relevant NEL and NER provisions.

As part of its submission on the issues paper, the JIA submitted legal advice from Gilbert and Tobin, set out in two documents, on its interpretation of the relevant NEL and NER provisions.[50] The AER notes Gilbert and Tobin's advice on various issues in section 3.3, in the context of each particular provision, and notes where the AER agrees and disagrees with Gilbert and Tobin, and the reasons for this.

## 3.2 National Electricity Law

The NEL provides that the AER must, in performing or exercising an AER economic regulatory function or power perform that function or power in a manner that will or is likely to contribute to the achievement of the National Electricity Objective.[51]

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

- price, quality, safety, reliability and security of electricity, and
- the reliability, safety and security of the national electricity system.[52]

In addition, the NEL provides that the AER:

- must take into account the revenue and pricing principles when exercising a discretion in making those parts of a distribution determination or transmission determination relating to direct control network services, and
- may take into account the revenue and pricing principles when performing or exercising any other AER economic function or power, if the AER considers it appropriate to do so.[53]

The revenue and pricing principles are:

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50 Gilbert and Tobin, *Legal opinion 1*, 22 September 2008(a); Gilbert and Tobin, *Legal opinion 2*, 22 September 2008(b).

51 NEL, s.16(1).

52 NEL, s.7.

53 NEL, s. 16(2).

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

- regard should be had to the economic costs and risks of the potential for under and over utilisation of a distribution system or transmission system with which a regulated network service provider provides direct control network services.[54]

## 3.3 National Electricity Rules

The NER provide that the rate of return for a TNSP or DNSP for a regulatory control period is the cost of capital as measured by the return required by investors in a commercial enterprise with a similar nature and degree of non-diversifiable risk as that faced by the transmission or distribution business of the provider (as the case may be).[55]

The NER also provide that the rate of return is to be calculated as a nominal post-tax WACC (of a specified formula), and that the return on equity is to be determined using the CAPM (also of a specified formula).[56]

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

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

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

- the need for the credit rating levels or the values attributable to, or the methods of calculating, the parameters that vary according to the efficiency of the transmission or distribution network service provider to be based on a benchmark efficient transmission or distribution network service provider (as the case may be), and[57]

- where a value, method or credit rating level cannot be determined with certainty:

    - the need to achieve an outcome that is consistent with the National Electricity Objective, and

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54 NEL, s. 7A.

55 NER, cls. 6.5.2(b) and 6A.6.2(b).

56 NER, cls. 6.5.2(b) and 6A.6.2(b).

57 In relation to TNSPs, cl. 6A.6.2(j)(3) of the NER specifically lists the parameters for which this factor is relevant. Those parameters are the equity beta, the market value of debt as a proportion of the marker value of debt and equity, the maturity period and bond rates of the nominal risk free rate, and the credit rating level. In relation to DNSPs, cl. 6.5.4(e)(3) does not list specific parameters but rather states that this factor is relevant to parameters that vary accordingly to the efficiency of the DNSP.

- the need for persuasive evidence before adopting a value, method or credit rating level that differs from the value, method or credit rating level that has previously been adopted for it.[58]

## 3.4 Interpretation of NEL and NER provisions

### 3.4.1 National Electricity Objective

As noted above, the NEL provides that the AER must, in performing or exercising an AER economic regulatory function or power perform that function or power in a manner that will or is likely to contribute to the achievement of the National Electricity Objective.[59] The AER considers that its review of the WACC parameters is an AER economic regulatory function or power, for the purposes of the NEL, and accordingly this provision of the NEL applies.

As also noted above, the NER also provides that where a parameter cannot be determined with certainty, the AER must have regard to the need to achieve an outcome that is consistent with the National Electricity Objective.

The focus of the National Electricity Objective is on efficiency. In particular, the promotion of the efficient investment in, and efficient operation and use of, electricity services in the long term interests of end consumers.

As the WACC is the allowed rate of return on capital employed, the WACC pertains more to promoting the efficient investment in electricity services, rather than the efficient operation of electricity services. This position is supported by Gilbert and Tobin who state:

> Because the WACC concerns the return on capital employed, of the various aspects of the objective the WACC parameters most directly affect the issue of whether efficient investment is promoted. In exercising its functions and powers, the AER should "be guided by an objective of efficiency that is in the long term interests of consumers".[60]

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

In reviewing the WACC parameters, the AER has had regard to a range of theoretical and empirical considerations and evidence, including that presented in submissions to

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58 NER, cls. 6.5.4(e) and 6A.6.2(j).

59 NEL, s. 16(1).

60 Gilbert and Tobin, op. cit., 22 September 2008(a), pp.6-7.

the issues paper, and contained in expert reports commissioned by stakeholders and the AER. By having had regard to these range of considerations and evidence in reviewing the WACC parameters, the AER considers it has achieved the appropriate balance discussed above.

### 3.4.2 Revenue and pricing principles

As noted above, the NEL provides that the AER:

- must take into account the revenue and pricing principles when exercising a discretion in making those parts of a distribution determination or transmission determination relating to direct control network services, and

- may take into account the revenue and pricing principles when performing or exercising any other AER economic function or power, if the AER considers it appropriate to do so.

As the WACC review is not a distribution or transmission determination, it is arguable that the first clause does not apply. That is, the AER may not be required to take into account the revenue and pricing principles.

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

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

Three of the remaining principles, which all appear directly relevant to this review, can be summarised as follows:

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

- providing a service provider with effective incentives to invest efficiently (principle 7A(3))[61], and

- regard should be had to the economic costs and risk of under and over investment (principle 7A(6)).

Consistent with its stated view above in relation to the National Electricity Objective, the AER considers that it will have taken into account these principles if it determines

[61] The efficient utilisation aspect of this principles is less relevant to the WACC, for the same reasons as given regarding principle 7A(7).

values and methods for individual WACC parameters that produce an overall regulatory rate of return that is expected to be set at a level sufficient to induce the efficient investment in electricity network infrastructure, while not set too high so as to induce the inefficient overinvestment in electricity network infrastructure.

The remaining principle is that regulated prices should allow for a return that is commensurate with the regulatory and commercial risks of providing regulated services (principle 7A(5)). Of relevance to the WACC, is that the WACC only compensates for the non-diversifiable element of these regulatory and commercial risks. To the extent that compensation for the diversifiable element of these risks is appropriate, if at all, this compensation should not be provided through the WACC but through other mechanisms.

### 3.4.3 Use of the Sharpe CAPM

Whilst the NER does not 'name' the version of the CAPM that is to be used to determine the cost of equity, the formula specified in the NER is that of the version known as the Sharpe-Lintner CAPM (or simply, the Sharpe CAPM). This is acknowledged by Gilbert and Tobin.[62]

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

The AER acknowledges that use of the Sharpe CAPM could be problematic if this requirement was in conflict with other requirements of the NEL or NER. In assessing the submission from the JIA the AER does not consider the JIA have provided sufficient persuasive evidence to convince it that there is a conflict with the use of the Sharpe CAPM and the other requirements of the regulatory framework. This issue is further discussed in section 8.5.5.1.

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

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

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

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

- the need for the credit rating levels or the values attributable to, or the methods of calculating, the parameters that vary according to the efficiency of the transmission or distribution network service provider to be based on a benchmark

[62] Gilbert and Tobin, 22 September 2008(a), op. cit., p.13.

efficient transmission or distribution network service provider (as the case may be), and[63]

- where a value, method or credit rating level cannot be determined with certainty:
  - the need to achieve an outcome that is consistent with the National Electricity Objective, and
  - the need for persuasive evidence before adopting a value, method or credit rating level that differs from the value, method or credit rating level that has previously been adopted for it[64].

With one qualification, the AER agrees with Gilbert and Tobin that the first and fourth factors are relevant to all of the parameters.[65] As the AER must have regard to the need for overall rate of return to be forward looking and commensurate with prevailing conditions in the market for funds, the AER should have regard to the need for each of the individual parameters to be forward looking and commensurate with prevailing conditions to achieve this outcome. However having regard to the need for the overall rate of return to be commensurate with the risk of providing regulated services would relate only to the equity beta and market risk premium (which combined comprise the risk premium component of the regulatory return on equity), rather than apply to all the WACC parameters as implied by Gilbert and Tobin. As no parameter can be observed, and must be estimated, it is unlikely that any parameter can be determined with certainty, and so the forth factor applies to all parameters as well.

The AER also agrees with Gilbert and Tobin's opinion on the applicability of the second factor. Gilbert and Tobin consider this factor emphasises the need for a risk free rate method, bond maturity and credit rating parameters in the debt risk premium which is capable of reflecting current conditions at the time of each determination.[66]

On the third factor, the AER agrees with Gilbert and Tobin's general interpretation of the provision, but does not completely agree with Gilbert and Tobin's application of the provision. That is, the AER does not completely agree with Gilbert and Tobin's opinion on which parameters the provision applies to. Gilbert and Tobin's general interpretation is:

> The third factor, that is the need for the credit rating levels, values attributable to or the methods of calculating the rate of return parameters that vary according to the efficiency of the service provider, be based on a benchmark efficient service provider, applies in all situations where the relevant input value may be influenced by a service provider's decisions, and

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

64 NER, cls. 6.5.4(e) and 6A.6.2(j).

65 Gilbert and Tobin, op. cit., 22 September 2008(a), p.5.

66 ibid., p.5.

> requires that in these situations the effect of the service provider's actual decisions should not be decisive and instead the parameter or method for deriving a parameter that results in an input value that is consistent with the decisions of a 'benchmark efficient' service provider should be used.[67]

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

However, Gilbert and Tobin consider that this provision also applies to the assumed utilisation of imputation credits, particularly the payout ratio of imputation credits.[68] The AER considers that the other aspect of this parameter, that is the utilisation rate, is a market-wide parameter and so this provision does not apply. It appears that Gilbert and Tobin may agree with this view. In a general case, the payout ratio for an individual business is influenced by that business, in any one year. However, for consistency with the Officer (1994) framework, which is embodied in the building block and rate of return framework in the NER, the AER considers the payout ratio should not be considered to be influenced by an individual service provider. Accordingly, the AER does not consider that this provision applies to either element of the assumed utilisation of imputation credits. This position is further explained in chapter ten. Additionally, chapter 6A explicitly lists the parameters for which the AER, in reviewing the parameter, must have regard to the need to base the parameter on a benchmark efficient service provider. The assumed utilisation of imputation credits is not one of the listed parameters.

As noted, chapter 6A explicitly lists the parameters for which the AER must have regard to the need to base the parameter on a benchmark efficient service provider in reviewing the parameter, whereas chapter 6 states that the AER must have regard to this factor only for those parameters that vary according to the efficiency of the service provider. Three of the parameters explicitly listed in chapter 6A are the equity beta, level of gearing and the credit rating. The AER considers that the equity beta, level of gearing and credit rating of an actual service provider can vary according to the efficiency of the service provider. Therefore, in reviewing these parameters, the AER must have regard to the need to base these parameters on a benchmark efficient service provider factor, under both chapter 6 and 6A.

Chapter 6A lists the maturity period and bond rates for particular circumstances (cl. 6A.6.2(d)) as parameters for which the AER must, in reviewing them, have regard to the need to base such parameters on a benchmark efficient service provider.[69] The

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67 ibid., p.5.

68 ibid., p.6.

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

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

### 3.4.5 Persuasive evidence

As also noted above, the NER provide that where a parameter cannot be determined with certainty, the AER must have regard to the need for persuasive evidence before adopting a value, method or credit rating level that differs from the value, method or credit rating level previously adopted.

Gilbert and Tobin state that this provision is sometimes referred to as incorporating an 'inertia principle', to reflect the proposition that an existing value, method or credit rating that has been adopted should not be departed from unless there is persuasive evidence.[70]

Gilbert and Tobin consider that the practical application of this provision requires consideration of the following:

- whether the relevant WACC parameter can or cannot be determined with certainty
- when a relevant WACC parameter will have been 'previously adopted'
- the meaning of the concept of 'persuasive evidence', and
- the standard against which the decision maker must be persuaded.[71]

The AER considers the matters and order of considerations set out by Gilbert and Tobin to be logical, and an appropriate approach to interpreting this clause.

As each of the 'true' WACC parameters are unobservable, and therefore must be estimated, the AER considers it is unlikely that any parameter can be determined with certainty. Accordingly the persuasive evidence test applies to each parameter. Gilbert and Tobin and the AER agree on this point.

Following Gilbert and Tobin's order, the next step is identifying the previously adopted value, method or credit rating. For the most part, the AER and Gilbert and Tobin agree on what constitutes the 'previously adopted' parameter. However there is one significant difference, in relation to equity beta, and a minor difference in relation to the nominal risk free rate method. This is discussed in section 3.4.6.

Next is consideration of the concept of persuasive evidence. Gilbert and Tobin note that the term 'persuasive evidence' has not generally been judicially considered. However, Gilbert and Tobin consider that:

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70 Gilbert and Tobin, op. cit., 22 September 2008(a), p.3.

71 ibid., pp.15-16.

> In this context the evidence would need to establish, more likely than not, that a previously adopted value was incorrect.[72]

The AER is not aware of the term persuasive evidence being interpreted in case law. Accordingly the AER considers an ordinary plain English meaning is appropriate. In this respect, the AER does not consider that Gilbert and Tobin's relatively narrow interpretation of the term persuasive evidence appears appropriate in this context. That is, Gilbert and Tobin's view that persuasive evidence should be limited to evidence that proves a previously adopted parameter was 'incorrect'.

The AER considers that persuasive evidence is likely to include objective and verifiable empirical market evidence and theoretical reasons, so long as they are well founded, which when relied upon suggest one particular conclusion should be adopted over other competing conclusions. This may include expert empirical analysis, and expert theoretical reasoning, so long as any expertise given is not outside the expert's areas of expertise. However, persuasive evidence is not limited to evidence presented by experts, in this sense referring to academics and economic consultants. Persuasive evidence can also be presented by industry stakeholders, consumer stakeholders and the regulator. It is the quality of the evidence not the source which is of relevance.

### 3.4.6 Previously adopted value, method or credit rating

As noted above, the NER provides that where a value, method or credit rating level cannot be determined with certainty, the AER must have regard to the need for persuasive evidence before departing from the value, method or credit rating level that has previously been adopted for it.

Each of the 'true' WACC parameters is unobservable, and therefore must be estimated. Accordingly, it is unlikely that any of the WACC parameters can be determined with certainty. Correctly identifying the previously adopted value, method or credit rating is therefore important.

The AER agrees with the opinion of Gilbert and Tobin that:

- for TNSPs in all jurisdictions, the previously adopted value, method or credit rating, for the purposes of the AER's first review, are those set out in chapter 6A of the NER, and

- for DNSPs in NSW and ACT, the previously adopted value, method or credit rating, for the purposes of the AER's first review, are those set out in the transitional provisions in chapter 11 of the NER.

The previously adopted parameters for the above service providers are identifiable as they are fully specified in the NER.

Identifying the previously adopted parameters for the remaining DNSPs, being those in Queensland, Victoria, Tasmania and South Australia, is more difficult. This difficulty arises from, apart from the method for the nominal risk free rate, for the

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72 ibid., p.18.

parameters that the AER may review, a previous method, value and credit rating level is not set out in chapter 6 of the NER.

Gilbert and Tobin's preferred opinion (what they refer to as 'interpretation 2') appears to be that the previously adopted value, method or credit rating is that adopted in the previous jurisdictional determinations. The AER agrees with this approach with one exception. As noted, a method for the nominal risk free rate already appears in chapter 6 of the NER. Accordingly, the AER considers this method should be taken as the previously adopted nominal risk free rate method. With a minor exception, this method is the same as that currently set out in chapter 6A of the NER, and is substantially the same as that adopted in previous jurisdictional determinations, meaning the AER's and Gilbert and Tobin's difference in opinion on this point is of little material importance.

The previous jurisdictional determinations for DNSPs in Queensland, Victoria, Tasmania and South Australia adopt the same value for the gearing, market risk premium, credit rating level and gamma. Gilbert and Tobin and the AER both agree that these values should therefore be considered to be the previously adopted value. These parameters are also the same as those currently set out in chapter 6A for TNSPs, and set out in chapter 11 for the DNSPs in NSW and ACT.

In contrast, there is a difference in the equity beta adopted in previous jurisdictional determinations. The previous determination for DNSPs in Queensland, Tasmania and South Australia adopted an equity beta of 0.9, whereas the previous determination for the Victorian DNSPs adopted a value of 1.0. A value of 1.0 is also the equity beta currently set out in chapter 6A for TNSPs, and set out in chapter 11 for the DNSPs in NSW and ACT.

Gilbert and Tobin argue that to have different previously adopted values is inappropriate, and considers that the most common equity beta, which it considers to 1.0, should be taken as the previously adopted equity beta for all DNSPs. The AER does not consider this position is justified, and considers that the previously adopted value for each of the DNSPs in Queensland, Victoria, Tasmania and South Australia should be as set out in the previous jurisdictional determination.

The table 3.1 outlines what the AER considers to be the previously adopted value, method or credit rating. As is illustrated the previously adopted value, method or credit rating is the same for all services providers, across all parameters, with the exception of the equity beta.

**Table 3.1: WACC parameters – previously adopted value, method or credit rating**

| Parameter | TNSPs (all jurisdictions) | DNSPs (QLD, TAS, SA) | DNSPs (NSW, ACT, VIC) |
|---|---|---|---|
| Gearing | 60 % | 60 % | 60 % |
| Nominal risk free rate | 10 year CGS | 10 year CGS | 10 year CGS |
| Market risk premium | 6 % | 6 % | 6 % |
| Equity beta | 1.0 | 0.9 | 1.0 |
| Credit rating | BBB+ | BBB+ | BBB+ |
| Gamma | 0.5 | 0.5 | 0.5 |

Source: NER,[73] OTTER,[74] ESC,[75] QCA,[76] ESCOSA[77]

## 3.5 AER's approach to review

The JIA submit that the AER's review should give full weight to the following:

- the National Electricity Objective
- the relationship between the parameters
- the economic theory and empirical evidence
- the market expectations of the return on equity, and
- the prevailing market conditions for raising debt and equity.[78]

The AER supports these criteria established by the JIA (in no particular order). Expanding on this, 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

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73 NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

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

75 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.

76 QCA, *Final determination – regulation of electricity distribution*, April 2005, p.106.

77 ESCOSA, *2005-2010 electricity distribution price determination – part A – statement of reasons*, April 2005, p.55.

78 JIA, *Submission in response*, op. cit., September 2008, p.16

- 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, and[79]
- regard to the latest academic empirical research and theory, particularly research conducted in an Australian regulatory context.

The AER notes that the use of empirical information in estimating WACC parameters was discussed at some length at the AER's WACC review expert's group round-table discussion.[80] At the forum, Professor Stephen Gray (of SFG), representing the JIA, outlined a number of key criteria for empirically estimating WACC parameters in a consistent manner. At a high level Professor Gray stated that it was important to consider:

- all relevant data
- different econometric techniques, and
- market practice.

It was argued that a considered approach, taking into account all of these aspects, will inevitably apply different weights to the various pieces of empirical evidence available. In doing so, Professor Gray stated as relevant considerations:

- statistical precision and reliability of the empirical estimates
- availability of data (cross-sectional and across time)
- consistency of empirical estimates (over time, across businesses, across empirical methods)
- internal consistency within an economic framework
- market practice, and
- economic reasonableness or the plausibility of the estimates.

The AER supports these key objective criteria for estimating WACC parameters as outlined by Professor Gray. The AER's application of these criteria is parameter-specific and detailed considerations are contained in the chapters discussing individual WACC parameters.

That said, the AER's approach in reviewing each WACC parameter is to take a balanced approach to the application and interpretation of evidence from market data. This may involve:

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79 Robust in this context refers to statistically stable.

80 AER, *Australian Energy Regulator review of WACC parameters for electricity transmission and distribution*, Transcript of proceedings, Melbourne, 10 October 2008, pp.3-9

- not changing a parameter where the market data is not materially different to the previously adopted value, and

- not moving as far as the market data would suggest (or not relying solely on the market data) even where the market data is substantially different to the previously adopted value.

In a practical sense, this means that WACC parameters should not be 'mechanistically' derived from empirical estimates. Importantly, this approach will be consistently adopted across the various WACC parameters subject to review. For example, the AER does not intend to mechanistically adopt a point estimate for the equity beta consistent with the recent market data. Likewise, the AER will be cautious in adopting a point estimate for the MRP and, in particular, in interpreting the results from long-term historical estimates when generating a forward-looking MRP estimate.

The AER notes that this approach is supported in principle by Grid Australia in its submission, with three key reasons cited:

- WACC parameters cannot be determined with certainty.

- Statistical analysis of historical capital market data can only reasonably be used to inform judgements on the forward-looking WACC parameter values rather than be determinative.

- The linkages between WACC parameters must be recognised.[81]

The Major Energy Users Inc. (in conjunction with some members of the National Consumers Roundtable on Energy) (MEU) submit that:

> …the AER's analysis needs to be more than purely a mechanistic exercise in assessing each element in isolation. It needs to take a holistic approach. To assess the parameters in isolation has the potential (and risk) of building into the outworkings of the WACC multiple conservative factors.[82]

The AER considers that its approach to using market data balances the views raised in all submissions to the issues paper. While caution has been exercised with respect to market data, the AER has undertaken a detailed analysis of all the available evidence from submissions and expert consultants, and generated a 'best estimate' or range of estimates for each of the individual WACC parameters subject to review, taking into account conceptual considerations. Consideration is then given to broader issues (e.g. efficient investment incentives, regulatory certainty, etc.) in determining the extent to which these individual estimates for each of the WACC parameters are relied upon in generating the overall rate of return.

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81 Grid Australia, *Review of the WACC parameters for electricity transmission and distribution – Response to AER issues paper*, Submission in response, 24 September 2008, p.5

82 MEU, *AER Review of Parameters for Weighted Average Cost of Capital – AER Issues Paper – A submission from Major Energy Users Inc in conjunction with some members of National Consumers Roundtable on Energy*, Submission in response, September 2008, p.7

In sum, the AER's approach to this review will lead to a departure from a previously adopted value where there is sufficient persuasive evidence to justify doing so. This approach also has regard to the desirability of regulatory certainty, which the AER considers is an important factor in achieving an outcome which is consistent with the National Electricity Objective.

# 4 Multi-parameter considerations

## 4.1 Introduction

A particular feature and advantage of conducting a full review of all WACC parameters simultaneously is that the linkages and inter-relationships between each WACC parameter can be considered. In particular, 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.

This section discusses a number of broad issues related to consistency across WACC parameters, as follows:

- consistency between parameters in estimation
- form of the CAPM (domestic or international), and
- definition of the benchmark efficient service provider.

## 4.2 Consistency between parameters in estimation

The JIA highlight that a number of the WACC parameters subject to review are inter-related, including:

- the assumed utilisation of imputation credits (gamma) affects the estimate of the MRP
- the gearing ratio adopted affects the credit rating and the equity beta and
- the term of the risk free rate affects the term of the debt risk premium and the estimate of the MRP.

The AER has taken each of these consistency issues into account in the relevant chapters discussing individual WACC parameters.

## 4.3 Form of the CAPM (domestic or international)

The issues paper acknowledged that one of the key areas of debate in the Australian regulatory literature is the extent to which foreign investors should be recognised 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).[83]

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 underpinning the standard 'domestic' form of the CAPM such as the Officer WACC framework commonly adopted by Australian regulators.[84]

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 AER noted in its issues paper that the NER does not specify the form of CAPM that should be used by the AER in the conduct of its review.[85] The AER proposed to continue with the Officer WACC 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.[86] This would also mean, for consistency, that it is appropriate to recognise the presence of foreign investors in the estimation of the gamma parameter

The AER proposed to continue with the Officer WACC framework as the underlying CAPM framework, with foreign investors recognised consistent with their presence in the Australian domestic capital market.

**Submissions in response to issues paper**

In response to the issues paper the JIA submit that:

> It would not be appropriate, feasible or practical for regulators to adopt a fully segmented version of the CAPM, because it would ignore the strong

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83 The assumptions underpinning the use of a fully segmented (domestic) CAPM is that the domestic capital markets completely segregated from international capital markets, and therefore domestic investors hold a combination of the domestic risk free rate and domestic market portfolio. Under this framework, only domestic systematic risk is priced for determining the WACC and the appropriate measure of an asset's non-diversifiable risk is the beta of the asset to the domestic portfolio. In contrast, the fully integrated (international) CAPM assumes that global capital markets are fully integrated, and that therefore investors hold a fully diversified global portfolio of assets. Under this approach, the non-diversifiable risk is the beta of the asset to the global market portfolio and the appropriate market risk premium and risk free rate will be that which is relevant to the global market portfolio.

84 R. R. Officer, 'The cost of capital under an imputation tax system', *Accounting and Finance*, Vol.34, 1994, pp.1-17.

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

86 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.

> evidence that Australian equity markets are, to a significant degree, integrated with world equity markets. To assume a fully segmented CAPM would prohibit the use of any empirical evidence as it would not be possible to observe the behaviour of domestic investors independent of international investors.
>
> It is also not appropriate, feasible or practical for regulators to adopt a fully integrated model of the CAPM (international CAPM).[87]

The JIA also refer to the views of the ACCC that the use of the international CAPM tends to be more complex and consequently more difficult to implement.

In addition, the JIA submit that the appropriate perspective from which to view the market for funds is the domestic capital market. This approach recognises that domestic data reflects the influence of domestic and international investors on capital markets in Australia. The JIA state that this implies that the CAPM currently applied by regulators does not presuppose either a fully segmented or a fully integrated capital market:

> That is, any empirical domestic data on the risk-free rate, MRP, equity beta and gamma parameters have, or will certainly continue to be influenced by, both domestic and international investors.[88]

**Issues and AER's considerations**

The AER proposes to continue with the Officer WACC framework as it is consistent with past regulatory practice and the WACC formulae prescribed in the NER. The JIA and its consultants support the use of domestic market data to estimate the WACC parameters, and understand that this approach explicitly recognises the presence of foreign investors to the extent they invest domestically.

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

**AER's conclusion**

The AER agrees with the JIA that the CAPM adopted for regulatory purposes is neither a fully segmented or fully integrated CAPM. This has important implications for the estimation of the WACC parameters from domestic market data, in particular the assumed utilisation of imputation credits (gamma) – see section 10.

The AER proposes to continue with the Officer WACC framework as the underlying CAPM framework, with foreign investors recognised consistent with their presence in the Australian domestic capital market.

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87 JIA, *Submission in response*, op. cit., September 2008, p.28

88 ibid., p.24

## 4.4 Definition of the benchmark efficient service provider

The definition of a benchmark efficient service provider is an important issue as it will inform the AER of the businesses used to provide guidance on the level of gearing, equity beta and credit rating for a benchmark efficient service provider. The NER (cls. 6.5.4(e)(3) and 6A.6.2(j)(3)) 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)[89]
- means that customers are less likely to bear the cost associated with inefficient decisions (e.g. financing structures), and
- improves the comparability of regulatory decisions.

As noted in the issues paper the AER also considers that the same sample of businesses may not be used to estimate each parameter (e.g. an industry specific sample is commonly used to estimate the equity beta, while a market wide sample is used to measure the utilisation rate of imputation credits).

In its submission the JIA argue that the benchmark efficient service provider is a conceptual construction which is a standalone electricity network.[90] However, the JIA consider that the most appropriate sample of firms will vary with the WACC parameters.[91] The MEU argue that the focus should be on energy transport monopolies.[92]

**Submissions in response to the issues paper**

The APIA believes that gas infrastructure businesses can be reasonable comparators for electricity businesses in some circumstances. However this data should not be viewed as a perfect comparator as the circumstances applying to the gas transmission industry often differ from the electricity transmission industry. For example, many gas transmission pipelines are not price regulated, or they serve end use markets with distinctive characteristics such as power generation or mining sites.[93]

The APIA also states that, equity betas for gas transmission pipelines should be considered, having regard to the relevant gas industry regulatory framework

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89 This is required under the capital expenditure (capex) and operating expenditure (opex) criteria under the NER cls. 6.5.6(c), 6.5.7(c), 6A.6.6(c), and 6A.6.7(c)).

90 JIA, *Submission in response*, op. cit., September 2008, p. 26.

91 ibid. p. 29.

92 MEU, *Submission in response*, op. cit., September 2008, p. 33.

93 APIA, *Submission in response*, op. cit., Septmber 2008, p. 7.

(including but not limited to the NGL), the physical and commercial differences between electricity and gas and the individual assets themselves.[94]

The JIA argue that a benchmark efficient firm is a conceptual construction and represents an efficient standalone business that provides prescribed transmission or distribution services. However, as a conceptual construction no actual business will perfectly reflect a benchmark efficient regulated electricity network service provider.[95]

The JIA also submit that there is no definitive rule for the selection of businesses to be used in the sample to estimate the efficient benchmark for a particular parameter. The JIA consider that the selection of the sample of businesses requires the weighing up of:

- the underlying quality of the data sources, i.e., if the data or its source is of uncertain quality, more firms may need to be included in the sample to improve the statistical precision of the estimated values

- how closely the selected firms resemble the hypothetical [efficient] benchmark, i.e., the inclusion of firms that have features which differ from the features of the hypothetical benchmark firm are less persuasive, and

- estimates derived from a small sample group of firms are more likely to be influenced by firm specific factors.[96]

The JIA conclude that developing a robust sample of firms will involve weighing up of these factors to provide the 'best' estimate of the benchmark regulated electricity network service provider. Further, the most appropriate sample of firms will vary with the [WACC] parameters being considered. As a result there is no reason to resume that a unique group of firms will provide the best estimate of all cost of capital parameters.[97]

The JIA submit that the NER requires that when setting the cost of capital the AER must have regard to a benchmark efficient TNSP and DNSP. The JIA argues that the AER, in its issues paper, confuses the meaning of a benchmark efficient regulated electricity network service provider and the use of market data to estimate firm specific WACC parameters.[98]

The JIA argue that there is a degree of arbitrariness to the distinction between electricity transmission and distribution businesses particularly when considering infrastructure that operates between or near 66kV and 220kV.[99]

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94 ibid., p. 6.

95 JIA, *Submission in response*, op. cit., September 2008, p. 26.

96 JIA, *Submission in response*, op. cit., September 2008, p. 27.

97 ibid., p.29

98 JIA, *Submission in response*, op. cit.,September 2008, p.31

99 ibid., p. 138.

The MEU argue that it is important that the 'notional business' has some relevance to the market. In this way, issues such as being regulated, having certainty of cash flows, a monopoly position, etc are recognised. Further, there is a relationship between the various inputs (e.g. gearing, debt rating, equity beta, etc) that can only be captured for the business sector. It argues to attempt to 'mix and match' from specific sources in some aspects and from general aspects for another, has the potential to create distortions.[100]

The MEU also argue that the focus should be on regulated energy transport monopolies rather than on the electricity or gas sectors.[101]

**Issues and AER's considerations**

***Conceptual definition of a benchmark efficient network service provider***

The JIA argue that the AER confuses the meaning of a benchmark efficient regulated electricity network service provider and the use of market data to estimate firm specific WACC parameters.[102] To clarify the AER's position from the issues paper, the AER considers that WACC parameter estimates of the benchmark efficient TNSP and DNSP could be derived from a first principles approach (i.e. from a theoretical perspective where no reliance is placed on market evidence) and/or the use of market evidence which can be either industry specific or market wide.

The AER agrees with the JIA that there is a degree of arbitrariness between electricity transmission and distribution networks and that for the purposes of a conceptual benchmark that no distinction is necessary. The AER considers that the efficient benchmark is a 'pure play' electricity network business rather than a standalone network[103] and agrees with the JIA that there are no businesses that will perfectly reflect this benchmark.

***Practical application of a benchmark efficient network service provider***

The AER agrees with the JIA that there are no actual businesses that will perfectly reflect the benchmark efficient TNSP and DNSP. The AER also agrees with the JIA that the selection of sample businesses used to inform the estimated WACC parameters will depend on judgement as to how closely the selected businesses reflect the efficient benchmark business. The AER considers that ideally for the purposes of examining WACC parameters that the same sample businesses would be preferable. However, the MEU's position is not practical given the nature of the data required to obtain reliable estimates of the different WACC parameters differs. For example, equity beta estimates use stock prices and therefore cannot use unlisted businesses (resulting in the number of the businesses in the sample being limited) while credit rating data is available for unlisted businesses.

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100 MEU, *Submission in response*, op. cit., September 2008, p. 32.

101 ibid., p. 33.

102 JIA, *Submission in response*, op. cit., September 2008, p.31

103 The term standalone relates to an economic concept of providing a specific service within a suite of services provided by a multi-product business. It ignores efficiencies gained by economies of scope (e.g. providing multiple services such as meter reading, transport of electricity to large and small customers) which the AER considers are important within the regulatory framework.

The AER agrees with the JIA that the inclusion of sample businesses will depend on the nature of the WACC parameter being considered and may be informed by businesses with similar financial and operating characteristics. Further, the AER considers that there is a need to weigh up several factors when considering the selection of sample businesses, such as:

- the nature of the WACC parameter (i.e. market wide or industry specific)
- the size of the sample businesses and the likelihood that a robust estimate can be obtained
- how closely the selected firms resemble the conceptual definition of hypothetical efficient benchmark service provider (i.e. operational and ownership differences)
- the availability of data (i.e. historical data, market and book valuations, unlisted businesses, etc), and
- the reliability of data (i.e. presence of outliers observations and unrepresentative events).

The AER will be applying the above factors to select the sample businesses. The AER considers 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 businesses, in most circumstances, 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 AER considers that in some circumstances where the primary sample is small, the sample could be expanded (e.g. to include gas network businesses) and a secondary sample (foreign network businesses)) could be selected for the purposes of checking the reliability of the estimates obtained using the primary sample.[104] In general, the nature of the businesses in the secondary sample is likely to differ considerably from the primary sample and therefore the two samples should not be pooled.

In estimating the equity beta for the benchmark efficient service provider, if there are an insufficient number of listed businesses, examining foreign businesses for the purposes of a cross check may be appropriate. Given that data is available for listed and unlisted network businesses in estimating the gearing and credit rating levels, the AER considers there is no need to have regard to foreign comparators as a cross

[104] For the purposes of the WACC review the AER has not used non-energy businesses in its sample of comparator businesses on the basis that the sample size of energy businesses is considered to be adequate.

check. As previously discussed, the inclusion of gas network businesses are considered to be a sufficiently close comparator, as these businesses exhibit:

- stable cash flows
- natural monopoly elements, and
- inelastic demand with respect to price..

***Gas transmission and distribution***

The AER observes that regulators in the past have included gas businesses when examining WACC parameters. In response to the issues paper the APIA submitted that there should not be a simplistic or mechanistic transfer of cost of capital variables between industries without consideration of the differences between the electricity infrastructure industry and the gas pipeline industry.[105] These differences include fundamental policy, market, financing and economic differences which impact on the risks faced by each industry. The APIA also notes other differences include:

- physical differences
- locational differences
- market operations and arrangements differences
- investment differences
- end use markets, and
- investment recovery and stranding.

On this basis, the APIA submits that these differences warrant certain values for certain parameters for gas transmission pipelines.

The AER recognises that there are differences between gas and electricity networks. However, the AER considers that electricity networks operating in Australia may be subject to some of these differences as well. It should be noted that to some extent the differences or factors identified by the APIA may not impact on the required cost of funds. That said, the AER recognises that gas networks are likely to have differences that may affect their underlying business risks compared to individual electricity networks (including government and privately owned electricity networks). Ideally for the purposes of estimating WACC parameters it may be preferable to examine the same sample businesses that are very similar in terms of business and financial risks. However, the AER recognises that this position is likely to be impractical given the combination of the:

- limited number of electricity networks that do not also include gas networks in Australia

[105] APIA, *Submission in response*, op. cit., Septmber 2008, p. 7.

- nature of the WACC parameters (i.e. industry specific or market wide), and
- differing operating environments of the Australian energy networks.

Given the limitations of Australian data, the AER considers that gas networks could be considered as a reasonable but not perfect comparator to electricity network business given the similarity in the purpose of gas network to electricity network (transporting energy).

As discussed in the issues paper the outcome of the AER's WACC review applies only to electricity determinations, and has no direct or formal applicability to gas access arrangements. While the AER's current WACC review will be informative to its future consideration of gas WACC matters the determination of the WACC for access arrangements is subject to requirements under the National Gas Law (NGL) and National Gas Rules (NGR), which are not being considered in this review.

When considering issues relating to gas access arrangements the AER will continue to examine all available information, including any differences between gas and electricity networks and the samples used to inform the AER on its consideration of WACC issues in future gas access arrangement reviews.[106]

**AER's conclusions**

***Conceptual definition of a benchmark efficient network service provider***

The AER considers that the efficient benchmark is a 'pure play' electricity network business and agrees with the JIA that there are no businesses that will perfectly reflect this benchmark.

***Practical application of a benchmark efficient network service provider***

The AER considers that ideally for the purposes of estimating WACC parameters that the same sample businesses would be preferable. However, the MEU's position is not practical given the nature of the data required to obtain reliable estimates of the different WACC parameters differs.

The AER will be considering the following factors when selecting sample businesses:

- the nature of the WACC parameter (i.e. market wide or industry specific)
- the size of the sample businesses and the likelihood that a robust estimate can be obtained
- how closely the selected firms resemble the conceptual definition of hypothetical efficient benchmark service provider (e.g. operational and ownership differences)
- the availability of data (e.g. historical data, market and book valuations, unlisted businesses), and

[106] 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.

- the reliability of data (i.e. presence of outliers observations and events).

The AER considers that in some circumstances where the primary sample is small, a secondary sample (e.g. foreign comparators) or an expanded sample may be required (e.g. gas businesses) for the purposes of checking the reliability of the estimates obtained using the primary sample.

***Gas transmission and distribution***

The AER recognises that gas networks are likely to have some differences that may affect their underlying business risks compared to individual electricity networks (including government and privately owned electricity networks). Ideally for the purposes of estimating the WACC parameters it is preferable to examine the same sample businesses that have similar business risks. However, the AER realises that this position is likely to be impractical given the combination of:

- the limited number of electricity networks that do not also include gas networks in Australia
- the nature of the WACC parameters (i.e. industry specific or market wide), and
- the differing operating environments of the Australian energy networks.

Given the limitations of Australian data, the AER considers that gas networks could be considered as a reasonable but not perfect comparator to electricity network business given that both industries involve the transportation of energy.

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

# 5 Gearing

## 5.1 Introduction

Gearing is defined as the ratio of the value of debt to total capital (i.e. debt and equity), and is used to weight the costs of debt and equity when formulating a WACC. A business' gearing also generally referred to as capital structure will have a significant bearing on the expected required return on debt and the expected required return on equity (although in theory it is unlikely to affect the cost of capital).[107] In theory, there is no optimal range for gearing as there is a trade off between the tax benefits from debt financing and the risk of bankruptcy as the proportion of debt to total capital rises (transaction costs), and, the relative costs of debt and equity changes over time (dynamic costs). The contemporary view of the finance literature is that:

> …there is no universal theory of an optimal capital structure and no reason to expect one.[108]

Apart from being used to weight the expected 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 comparing the level of systematic risk across businesses, and
- as a factor in determining a credit rating for deriving the debt risk premium (DRP).

The equity beta and credit rating are discussed in chapters eight and nine, respectively. This chapter outlines the NER requirements, past regulatory practice, the issues raised in responses to the issues paper and the AER's conclusions.

## 5.2 Regulatory requirements

### 5.2.1 National Electricity Rules

The NER provide that the rate of return of a service provider is to be determined as the weighted average of the cost of equity and cost of debt. The weight applied to the cost of debt is to be the market value of debt as a proportion of the market value of equity and debt.[109] This is otherwise known as the level of gearing. The weight applied to the cost of equity is to be one minus the level of gearing.[110]

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[107] 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.

[108] Myers, S. C., 'Financing of Corporations', *Handbook of the Economics of Finance*, (Edited by G. M. Constantinides, M. Harris and R. M. Stulz), Elseiver, North-Holland, 2003, p. 217.

[109] Chapter 6A refers to the market value of debt as a proportion of the market value of equity and debt, whereas chaper 6 refers to the value of debt as a proportion of the value of equity and debt.

[110] NER, cls. 6.5.2(b) and 6A.6.2(b).

In undertaking a review of the WACC parameters, the NER sets out several matters that the AER must have regard to. Of particular relevance to the level of gearing are:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds
- the need for the value to be based on a benchmark efficient network service provider
- where a value cannot be determined with certainty:
  - the need to achieve an outcome that is consistent with the National Electricity Objective, and
  - the need for persuasive evidence before adopting a value that differs from the value that has previously been adopted for it.[111]

The AER's reasoning as to why these matters appear particularly relevant, while the other matter listed in the NER appear to be of lesser value to the review of the level of gearing is discussed in chapter three.

### 5.2.2 Previously adopted value

As noted above, the NER provides that where a value, method or credit rating level cannot be determined with certainty, the AER must have regard to the need for persuasive evidence before departing from the value, method or credit rating level that has previously been adopted for it.

Each of the 'true' WACC parameters is unobservable, and therefore must be estimated. Accordingly, it is unlikely that any of the WACC parameters, including the level of gearing, can be determined with certainty. Therefore, in addition to the other relevant factors, the AER must have regard to the need for persuasive evidence before departing from the previously adopted level of gearing.

The NER deemed the initial value of the market value of debt as a proportion of the market value of equity and debt (D/V) to be 0.6 for TNSPs in all jurisdictions and the DNSPs in NSW and the ACT.[112]. For the remaining DNSPs, the NER did not deem an initial value and the previously adopted value in these jurisdictions are those from the most recent distribution determination.

The AER notes that the proportion of debt to debt and equity in the NER originates from the ACCC's Statement of Regulatory Principles (SRP) for transmission. In adopting a 60 per cent gearing ratio the ACCC had regard to previous regulatory decisions and the book value of gearing taken from a Standard and Poor's Industry Report Card.[113]

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111 NER, cls. 6.5.4(e) and 6A.6.2(j).

112 NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

113 ACCC, *Statement of principles for the regulation of electricity transmission revenues–background paper*, Final decision, 8 December 2004, pp. 115-116.

As illustrated in table 5.1, for the purposes of the NER, the previously adopted market value of debt as a proportion of the market value of equity and debt for TNSPs and DNSPs in all jurisdictions is 0.6.

**Table 5.1: Previously adopted value – level of gearing**

| Service provider | Source | Level of gearing |
|---|---|---|
| Transmission (all jurisdictions) | NER | 0.6 |
| Distribution (NSW) | NER | 0.6 |
| Distribution (ACT) | NER | 0.6 |
| Distribution (Tasmania) | OTTER (2007) | 0.6 |
| Distribution (Victoria) | ESC (2006) | 0.6 |
| Distribution (Queensland) | QCA (2005) | 0.6 |
| Distribution (South Australia) | ESCOSA (2005) | 0.6 |
| | | **0.6** |

Source: NER,[114] OTTER,[115] ESC,[116] QCA,[117] ESCOSA[118]

## 5.3 Summary of issues raised in issues paper

In the issues paper the AER raised the following issues on the benchmark level of gearing:

- the availability of market valuations, and the definition of debt and equity
- deciding on what is an appropriate time period and frequency for deriving a benchmark level of gearing, and
- the selection of businesses used to derive an industry benchmark.

## 5.4 Summary of submissions in response to issues paper

In response to the issues paper, the AER received submissions on the benchmark level of gearing from:

- Energy Australia

[114] NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.
[115] OTTER, op. cit., September 2007, p.152.
[116] ESC, op. cit., October 2006, p.332.
[117] QCA, op. cit., April 2005, p.106.
[118] ESCOSA, op. cit., April 2005, p.55.

- the ENA
- Citipower, ETSA Utilities and Powercor
- Grid Australia
- Integral Energy
- the JIA
- the MEU, and
- SP AusNet

The MEU submit that the benchmark level of gearing should be set at the industry average of approximately 70 per cent rather than the historically assumed 60 per cent.[119] In contrast, the JIA propose that there is no persuasive evidence to depart from a benchmark level of gearing of 60 per cent based on analysis by the Allen Consulting Group (the ACG).[120]

Citipower, ETSA Utilities and Powercor, Energy Australia, the ENA, , Grid Australia, Integral Energy, and SP AusNet supported the positions taken in the JIA submission. The submissions from interested parties focused on comparisons between market and book valuation, the definition of debt and equity, and the characteristics of the businesses that should be included in the sample.

## 5.5 Issues and AER's considerations

### 5.5.1 Valuation and definition of debt and equity

The NER define for transmission businesses gearing as the market value of debt as a proportion of the market value of debt and equity. [121] Whereas, Chapter 6 of the NER defines gearing as the value of debt to the value of debt and equity (market values are not specified).[122] To ensure a consistent approach, the AER assumes that gearing for distribution businesses is the market value of debt as a proportion of the market value of debt and equity. This section considers whether there are reliable market valuations available in order to provide market valuations of debt and equity.

As discussed in the issues paper there are a number of approaches to estimating the gearing ratio. These include:

- debt to total capital (debt and equity), and

[119] MEU, *Submission in response*, op. cit., September 2008, p. 25.

[120] JIA, *Submission in response*, op. cit., September 2008, p. 33.

[121] NER, cl. 6A.6.2(b).

[122] NER, cl. 6.5.2(b).

- debt to the regulatory asset base.[123]

The first method can then be further disaggregated into using book and market valuations. The book valuation of debt and equity uses accounting valuations which are recorded in a business' financial reports while market valuation involves obtaining a valuation based upon trading values.

As outlined in its issues paper, the AER considers that there are a number of issues related to the definition of debt and equity in determining the benchmark gearing ratio. First, the measures of gearing provided by financial services such as Bloomberg[124] and Standard and Poor's rely on the book value of debt to calculate the level of gearing. The market value of debt is not readily available given that debt is not readily traded. That said, it is accepted practice to adopt the book value of debt contained in the financial reports as an approximation of the market value of debt.

In contrast, measures of the market value of equity of publicly traded businesses are readily available. The market value of equity of publicly traded businesses can be obtained by multiplying the number shares on issue as at the financial reporting date by the share price at the close of business on that date (also known as the market capitalisation). However, this approach to estimating the market value of equity may result in inconsistencies with the measurement of gearing in times of extreme market volatility. In particular, where there is extreme market volatility, the value of equity may fluctuate resulting in different levels of gearing and therefore may no longer be a reliable approach. If the market value of debt could be measured, this may mitigate this issue if the volatility in the equity market is reflected by the volatility in interest rates. Further, when interest rates become volatile the book value of debt is unlikely to be considered a reliable approximation of the market value of debt.

Accordingly, the AER has examined whether using a market valuation of common equity in combination with a book value of debt or a book valuation of common equity combined with a book value of debt results in a material difference in estimating the benchmark gearing ratio.

The second issue is the treatment of hybrid securities, quasi debt, long-term provisions, and current assets and liabilities. When examining levels of gearing provided by different financial services (e.g. Bloomberg and Standard and Poor's) the classification of equity and debt between these items vary. In addition, in some cases, multiple measures of gearing are used (e.g. Bloomberg provides the ratio of long term debt to total capitalisation, total debt to total capitalisation, and debt to market capitalisation). Accordingly, the AER has examined whether the different methods and definitions of gearing has a material impact on the benchmark level of gearing.

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[123] ACG, *Queensland Distribution Network Service Providers – Cost of Capital Study*, Report to the QCA, December 2004, p.8.

[124] It should be noted that Bloomberg provides two approaches; the first approach uses the book value of debt and the book value of equity to calculate gearing and the second approach uses the book value of debt and the market value of equity.

#### 5.5.1.1 Submissions in response to issues paper

The MEU submit that credit agencies use accounting data therefore accounting data should be used to estimate the benchmark gearing ratio.[125]The MEU also argue that for the purposes of assessing gearing, all liabilities should be treated as debt, just as all assets should be treated as assets.[126]

The JIA submit that market values are the correct approach to valuing a company's gearing ratio due to the NER requirement for transmission businesses. The JIA note the market value of equity significantly diverges from the book value of equity and therefore the book value of equity is unlikely to represent the market value of equity. However, the JIA consider that while the market value of debt is less readily available as it is not as extensively traded as equity, book values are a good indicator of market values.[127]

The JIA note that the NER require that the AER when assessing the benchmark gearing ratio that market values are prescribed for transmission but are less prescriptive for distribution. The JIA argue that the NER requirement to determine the benchmark gearing ratio by reference to market values for transmission reinforces the view that the most appropriate measure of gearing is based on market values (i.e. including for distribution).[128]That said, the JIA submit that the ACG recommends that the most appropriate and practical estimate of a business' market gearing ratio is the market value of equity and the book value of debt.[129] The JIA also submit that the ACG considers applying the debt to regulated asset base (RAB) ratio is inappropriate as the enterprise value of the regulated business exceeds the RAB and is a secondary metric used by analysts and credit rating agencies.[130]

The JIA support the ACG's definitions of debt and equity and [131] submit that non-cancellable operating leases should be seen as debt.[132] The JIA submit the ACG highlight a number of methodological issues with stapled securities (i.e. shareholder loans and double leverage). [133] The JIA also argue that shareholder loans that are stapled to the underlying stock of a business should be treated as equity.[134] The JIA note Envestra and Spark Infrastructure record stapled securities as debt, while SP AusNet records stapled securities as equity, as stapled securities bear residual risk.[135]

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125 MEU, *Submission in response*, op. cit., September 2008, p. 36.

126 ibid., September 2008, p. 37.

127 JIA, *Submission in response*, op. cit., September 2008, p. 33.

128 ibid., p. 40.

129 ibid.

130 ibid., pp. 48-49.

131 ibid., p. 51.

132 ibid., p. 52.

133 ibid., p. 39.

134 ibid., p. 52.

135 ibid., p. 50.

#### 5.5.1.2 Issues and AER's considerations

The purpose of setting a benchmark level of gearing is to indicate how a benchmark efficient business structures it finances. The AER considers that there are a number of liabilities and assets which do not directly relate to the funding of business requirements by TNSPs and DNSPs or are transitory in nature. Accordingly, the AER considers it is inappropriate to include all assets and liabilities when analysing the level of gearing for a benchmark efficient service provider. There appears to be a consensus from submissions that the ratio of debt to the RAB is an inappropriate measure for establishing the level of gearing for the benchmark efficient service provider. In order for the debt to RAB ratio to be a useful measure the AER considers that adjustments to the observed level of debt would be required. This adjustment would involve removing any debt that does not relate to a business' regulated activities. Given that this information is difficult to obtain, any adjustment to account for unregulated activities is likely to be ad hoc in nature and is unlikely to add further value to the analysis. Consequently, the AER has focused its analysis on debt to total capital ratios.

As noted above, Bloomberg and Standard and Poor's provide publicly available information on financial ratios (including gearing ratios) for businesses. In particular, Bloomberg provides a number of different financial ratios for publicly listed businesses. Standard and Poor's provides financial ratios for publicly listed, subsidiary and government owned businesses. However as noted above, both these services adopt different definitions when measuring the level of gearing. In addition, while the ACG has predominately used Bloomberg data, it also adjusts the Bloomberg data. The key differences between the gearing definitions by Bloomberg, Standard and Poor's and the ACG used to measure gearing is outlined below.

**Bloomberg**

Bloomberg provides gearing ratios for publicly listed companies. Bloomberg's analysis measures leverage (also referred to as gearing) according to:

- long term debt to total capitalisation (book value of long-term borrowings divided by the sum of the book value of short and long term borrowings and the book value of equity)
- total debt to total capitalisation (sum of the book value of short and long term borrowings divided by the sum of the book value of short and long term borrowings and the book value of equity)
- total debt to market capitalisation (sum of the book value of short and long term borrowings divided by the historical market capitalisation[136] – this can then be converted to a gearing ratio that is comparable to the above two ratios), and
- net debt to market capitalisation (sum of the book value of short and long term borrowings minus cash and near-cash items, which is then divided by the

[136] Historical market capitalisation is calculated by multiplying the number of shares as at the reporting date by the share price for the same date.

historical market capitalisation – this can also be converted to a gearing ratio that is comparable to the above two ratios).

***Definition of long-term debt***

Bloomberg defines long-term debt as long term borrowings, which in turn is defined as '*all interest bearing financial obligations that are not current.*'[137] Long-term borrowings are recorded as an item under non-current liabilities in a business' financial statements.[138]

In addition, convertible debt (i.e. debt which converts to equity) is treated as debt under Bloomberg's definition of long-term debt. Bloomberg also includes an adjustment to long-term debt for the portions of long-term debt that are to be repaid within the next year in circumstances where the financial report has not made this adjustment. In particular, this debt is removed from long-term borrowings and is transferred to short-term borrowings.

***Definition of total debt***

The calculation of total debt comprises long-term and short-term borrowings. Bloomberg defines short-term borrowings as:

- Includes bank overdrafts, short-term debts and borrowings, repurchase agreements (repos) and reverse repos, short-term portion of long-term borrowings, current obligations under capital (finance) leases trust receipts, bills payable, bankers acceptances, and current portion of hire purchase creditors. [139]

- Short-term borrowings are recorded as an item under current liabilities in a business' financial statements.[140]

Bloomberg provides no adjustment to total debt for hybrid securities (i.e. stapled securities such as loan notes) in the calculation of total debt on the basis that businesses usually record convertible debt as a liability and therefore no adjustment is required. Bloomberg also does not include in its definition of total debt items such as provisions, trade and other payables, and other non-current liabilities. This approach is consistent with Standard and Poor's approach.

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137 *Definition of long term borrowings*, Bloomberg professional service, Bloomberg, New York, 2008.

138 Borrowings are labelled as either borrowings or interest bearing liabilities. For Australian companies Bloomberg also includes long-term hire purchase and finance lease obligations and bills of exchange in its calculation of long-term borrowings.

139 *Definition of short term borrowings*, Bloomberg professional service, Bloomberg, New York, 2008.

140 Borrowings are labelled as either borrowings or interest bearing liabilities. For Australian companies Bloomberg also includes short-term hire purchase and finance lease obligations and bills of exchange.

***Definition of net debt***

Net debt is obtained by subtracting the total amount of cash and equivalents held by the business from the total debt. The ACG has used net debt in its analysis for completeness. However, the ACG notes that the two market measures of gearing (using total debt and net debt) are very similar due to a small amount of cash being on hand for the businesses being analysed.[141] For the purposes of calculating benchmark efficient level of gearing the AER considers that using net debt is likely to be inappropriate. If the level of debt is reduced by cash and equivalents, this amount must be moved into equity otherwise the level of gearing cannot reach 100 per cent. For example if debt was 65, equity was 35 and cash was 5, the following would be the gearing ratio:

$$\frac{65-5}{65+35}=60\%$$

This calculation on face value appears to be reasonable, however, unlike loan notes or stapled securities, it is likely to be inappropriate to transfer the amount subtracted from the debt to equity (as cash is an asset and could be funded by debt and/or equity). On this basis the maximum gearing ratio that could be calculated with this adjustment would be:

$$\frac{65-5+35}{65+35}=95\%$$

Accordingly, the AER considers the use of net debt to determine the level of gearing for the benchmark efficient service provider as inappropriate.

***Definition of total capitalisation***

Total capitalisation is calculated by combining total debt (as defined above) with the book value of equity. Bloomberg includes securities sold with repurchase arrangements, preferred equity, minority interests and total common equity in its book value of equity.[142]

## Standard and Poor's

***Definition of debt***

Standard and Poor's uses the ratio of debt to debt and equity as one of its financial measures when considering a business' credit rating. It defines debt as:

> Total short- and long-term borrowings of the company (including maturities), adjusted by adding a variety of on- and off-balance sheet financing arrangements pursuant to our adjustment methodology, and subtracting surplus cash, where applicable. Borrowings are measured at amortised cost

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[141] ACG, *Review of gearing issues raised in AER Issues Paper,*Report to Energy Networks Association, Grid Australia and APIA, 21 September 2008(a), p. 30.

[142] *Definition of short term borrowings*, Bloomberg professional service, Bloomberg, New York, 2008. For utilities businesses Bloomberg also includes in its calculation of the book value of equity the additional paid in capital and retained earnings.

(including re-measurement upon change in ownership of the issuer). Foreign-currency unhedged borrowings are measured at each period-end spot rate.[143]

A number of adjustments are made to include items such as guarantees (i.e. contractual obligations to provide services), the net of tax benefits (i.e. provisions for tax liabilities) and other items which are not traditionally recorded as debt. These include items such as leases, pensions and retiree medical liabilities, guarantees, and contingent liabilities.[144] This is in contrast to Bloomberg which does not make adjustments in its calculation of debt. Standard and Poor's also considers that short-term debt is an important factor as it is now commonplace to find permanent layers of short-term debt, which finance not only seasonal working capital requirements but also an ongoing portion of the asset base.[145] Convertible notes are treated in a similar manner to Bloomberg and are assumed to be a part of the calculation of debt. In addition, accrued charges or unpaid dividends which have accrued to the end of the period are considered to be debt.[146]

***Definition of equity***

Standard and Poor's defines equity as common equity and equity hybrids (contains a greater proportion of equity than debt), and minority interest.[147] Further, whether a hybrid security is considered by Standard and Poor's as debt or equity depends upon the amount of debt or equity content. The amount of debt or equity content depends on the proportion of the debt or equity to the total value of the security (e.g. if there is a high proportion of debt then Standard and Poor's treats the security as debt and if there is a high proportion of equity the security is treated as equity). In circumstances where the proportion between debt and equity is even, the hybrid security is then evenly split between debt and equity.

**The Allen Consulting Group**

The ACG in reviewing the existing benchmark level of gearing, estimates gearing based on the Bloomberg and the Standard and Poor's data, . However, when using the Bloomberg data for Envestra and Spark Infrastructure it makes adjustments for stapled securities (Envestra and Spark Infrastructure) and double leveraging (Spark Infrastructure).[148] In its most recent analysis for the JIA it has used data from Bloomberg and the business' analyst reporting pack from Spark Infrastructure. When

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143 Standard and Poor's, *Corporate Ratings Criteria*, Report, 15 April 2008, p. 53. Includes convertible, redeemable, retractable debentures, bonds, loans, mortgage debts, sinking funds, long term bank overdrafts and capital (finance) lease obligations. Excludes short-term portion of long-term debt, pension obligations, deferred tax liabilities and preferred equity. Includes subordinated capital notes. Includes mandatory redeemable preferred and trust preferred securities in accordance with FASB 150 effective June 2003

144 ibid., p. 24.

145 ibid., p. 44.

146 ibid., p. 64.

147 ibid., p. 53.

148 The term 'double leveraging' refers to businesses with a vertical structure (where an amount of debt is held by a subsidiary, while an additional amount of debt is held by the holding company). The ACG outlines it adjustments for Envestra and Spark Infrastructure in appendix A; ACG, *Review of gearing issues raised in AER Issues Paper,*Report to Energy Networks Association, Grid Australia and APIA, 21 September 2008, pp. 32-36.

examining gearing for the purposes of estimating equity betas for the ESC, the ACG relied on UBS data for businesses that either had stapled securities or had double leveraging.[149]

The ACG has relied on Bloomberg data for the majority of its gearing analysis, it has made adjustments to the gearing ratios where stapled securities have been treated as debt and where there is 'double leveraging'. The ACG notes that:

> [Stapled securities] – These are a hybrid instrument that should be classified as equity if they are stapled to shares and therefore bear residual risk. If classified as debt in the balance sheet they should be subordinated and added to equity, as their value will be reflected in the share price in any case.
>
> The term 'double leverage' refers to a regulated business that has an amount of debt in its regulated business, which is a subsidiary of a holding company that has an additional amount of debt….
>
> While the regulatory response has varied, it has generally been concluded that in order to reflect actual risks faced by equity holders, it is necessary to take account of the combined gearing implications.[150]

***Stapled securities[151]***

To address the issue of stapled securities (i.e. instruments classified as debt) the ACG has obtained the market value of the stapled security and reduced the corresponding book value of debt (or net debt where applicable). If the market value of the loan note does not equal the book value of the loan note the AER considers that it may be more appropriate to use the book value of the stapled security. The use of the book value is preferred rather than the market value of the stapled security when adjusting the book value of debt to ensure that the book value of debt is adjusted by a book value rather than adjusting a book value with a market value. That said, the AER notes that the difference between the book and market value of the stapled security is immaterial.[152]

***Double leveraging***

The JIA have considered double leveraging as an issue to be dealt with as a stapled security. However, the ACG discusses 'double leveraging' as a sperate issue. [153] The ACG have previously relied on UBS data which uses 'see through' debt exposure to account for 'double leveraging' when estimating equity betas for the ESC.[154] For the

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149 ACG, *Empirical evidence on proxy beta values for regulated gas distribution activities*, Report to the ESC, June 2007, p. 81.

150 ACG, *Review of gearing issues raised in AER Issues Paper* ,Report to Energy Networks Association, Grid Australia and APIA, 21 September 2008(a), pp. 15 and 21.

151 The ACG has adjusted the book value of debt downwards for the stapled securities of Envestra and Spark Infrastructure.

152 For example the book value of loan notes for Envestra in 2007 was 98.96 while the market value used by the ACG was 102.27, while Envestra's total debt was 1,948,861 for 2007. Refer to ACG, , op. cit., 21 September 2008(a), pp. 32-36, and Envestra, *Balance Sheets,* Annual Report 06-07, 27 September 2007, < http://www.envestra.com.au/files/pdf/annrep07_07_balance_sheet.pdf>, Accessed on: 27 October 2008.

153 ACG, op. cit., 21 September 2008, p. 21.

154 ACG, *Empirical evidence on proxy beta values for regulated gas distribution activities*, Report to the ESC, June 2007, p. 81.

WACC review the ACG has calculated the level of gearing using Bloomberg data and information provided by Spark Infrastructure.[155] This approach involves taking account of the short and long-term debt, and cash holdings of the subsidiary businesses.[156] The parent business' ownership of the subsidiaries (expressed as a percentage) is then multiplied by the total amounts to obtain the levels of debt and cash that apply to the parent business. Finally, the parent business' own debt and cash is added to the calculated levels of debt and cash (based upon the parent business' share of the subsidiary) and once these totals have been derived, the different gearing ratios are calculated.[157]

**Comparison between different gearing approaches**

Table 5.2 compares the levels of gearing provided by Bloomberg ('market' and book gearing), Standard and Poor's (book gearing) and the ACG ('market gearing') for selected electricity and gas businesses.

[155] ACG, op. cit., 21 September 2008(a), pp. 34-36

[156] The cash holdings were used to calculate net debt. The AER considers the use of net debt as inappropriate for the purposes of calculating the level of gearing for the benchmark efficient service provider.

[157] For an example of 'see through' leverage analysis, see ACG, op. cit., 21 September 2008(a), pp. 34-36.

## Table 5.2: Comparison of Bloomberg with Standard and Poor's -gearing

| Year[(a)] | Provider | DUET | Envestra(d) | GasNet | Spark[(d)] |
|---|---|---|---|---|---|
| 2002 | Bloomberg (book) | N/A | 93.6 | 67.3 | N/A |
| | Bloomberg ('market')[(c)] | N/A | 75.1 | 70.2 | N/A |
| | ACG ('market')[(c)] | N/A | 75.1 | 70.2 | N/A |
| | Standard and Poor's (book) | N/A | 79.9 | 67.2 | N/A |
| 2003 | Bloomberg (book) | N/A | 92.6 | 68.9 | N/A |
| | Bloomberg (market) | N/A | 73.9 | 67.5 | N/A |
| | ACG ('market') | N/A | 69.7 | 67.5 | N/A |
| | Standard and Poor's (book) | 80.1 | 80.8 | 68.9 | N/A |
| 2004 | Bloomberg (book) | 81.4 | 92.7 | 75.7 | N/A |
| | Bloomberg (market) | 80.4 | 70.5 | 64.9 | N/A |
| | ACG ('market') | N/A | 69.3 | 64.9 | N/A |
| | Standard and Poor's (book) | 80.2 | 80.8 | 75.8 | N/A |
| 2005 | Bloomberg (book) | 98.7 | 93.0 | 75.8 | N/A |
| | Bloomberg (market) | 79.4 | 69.1 | 64.4 | N/A |
| | ACG ('market') | N/A | 68.9 | 64.4 | 60.3[(b)] |
| | Standard and Poor's (book) | 78.3 | 83.9 | N/A | N/A |
| 2006 | Bloomberg (book) | 79.8 | 91.4 | N/A | 71.7 |
| | Bloomberg (market) | 75.4 | 67.7 | N/A | 57.9 |
| | ACG ('market') | N/A | 66.3 | N/A | 59.7[(b)] |
| | Standard and Poor's (book) | 77.8 | 85.4 | 77.2 | N/A |
| 2007 | Bloomberg (book) | 74.6 | 83.0 | N/A | 71.4 |
| | Bloomberg (market) | 72.9 | 70.1 | N/A | 45.3 |
| | ACG ('market') | N/A | 65.2 | N/A | 57.3 |
| | Standard and Poor's (book) | N/A | 86.4 | N/A | N/A |

Source: Bloomberg (2002 – 2007), Standard and Poor's, Industry Report Cards for utility businesses (2002-2008) and ACG (2008).

(a) As at 31st December.

(b) To derive these figures, the ACG has used historical market capital amounts of $1,750 m, however, it is unclear how this amount is derived as it does not correspond to Bloomberg's amount ($1,205 m in 2006). For 2006, the substitution of Bloomberg's amount would equate to a gearing ratio of 68.3 per cent.

(c) It should be noted that reference to the market gearing in this table, refers to a market value of equity and a book value of debt.

(d) Envestra has been included in the table to demonstrate the impact of the ACG's treatment of stapled securities and Spark has been included to demonstrate the impact of the ACG's treatment of 'see through gearing'.

Table 5.2 indicates that generally the gearing levels calculated using book values (for both debt and equity) are higher than those that use the market valuation of equity. In addition, the ACG's approach of applying 'see through' gearing for Spark Infrastructure results in higher levels of gearing than the market valuation provided by Bloomberg. The AER considers that it is not clear as to which approach best informs the AER about the level of gearing for the benchmark efficient service provider. However, the NER require for transmission businesses that the market value of debt and equity be used (whereas the Bloomberg data only provides the market value of equity). On the other hand, as the JIA have noted, the NER do not require that a market value of gearing be used for estimating the benchmark gearing level of distribution businesses. The AER considers that one limitation of using market data is that gearing ratios for privately owned and government owned businesses cannot be calculated. This can create limitations on sample size which may limit the robustness of the sample being examined.

The AER considers that given the limitations of relying only on market data, book values could be used as a proxy measure for market values. In addition, the ACG submits that one of the limitations with the current approach to calculating the market value of gearing is that the market value of debt could diverge from the book value of debt.[158] Given that this divergence is driven by changes in interest rate volatility over time and that energy businesses are more highly geared than the average listed business, it is also possible that the market value of equity is driven by interest rate volatility. Accordingly, in these circumstances, the AER considers that the book value of gearing may act as a proxy for the market value of debt and equity to obtain a benchmark efficient level of gearing.

#### 5.5.1.3 AER's conclusion

The AER considers that in having regard to persuasive evidence and the national electricity objective to determine whether the efficient benchmark level of gearing for electricity distribution and transmission businesses differs from the existing value of 60 per cent, regard should be given to market values of debt and equity provided by Bloomberg and book values provided by Standard and Poor's on the book valuation. In addition, the AER considers the 'see through' gearing analysis and treatment of stapled securities (using book values rather than market values) provided by the ACG provides a cross check on the estimates derived from Bloomberg and Standard and Poor's data.

### 5.5.2 Appropriate time period and frequency

As discussed in its issues paper, the AER considers that the selection and frequency of the 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/or the availability and reliability of the data. That said, the AER also recognises the importance of having a consistent approach to estimating the different WACC parameters, to the extent this is appropriate and possible.

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[158] ACG, op. cit., 21 September 2008(a), p. 6.

#### 5.5.2.1 Submissions in response to issues paper

The MEU argue that it is not so much the length of time that historic data may be relevant, but more the cross sectoral extent that the gearing levels applies.[159]

The JIA recommend a measurement period of five years, similar to the period often applied in the measurement of equity betas based on advice from the ACG.[160] The JIA also submit that caution should be taken with the five-year period as the sub-prime crisis will likely result in book values overstating the market value of debt.[161] In addition, the JIA consider that annual observations are appropriate as adding bi-annual observations does not improve the quality of the analysis (consistent with the views of the ACG).[162]

#### 5.5.2.2 Issues and AER's considerations

When examining the appropriate period and frequency to use when obtaining an average level of gearing the AER recognises there are a number of issues to consider such as:

- the period and frequency used for other WACC parameters (especially the equity beta which is re-levered using gearing)
- the trade-off between examining relevant data and obtaining an estimate which may smooth out transitory shocks that may occur, and
- the availability of data (e.g. financial reports, publicly available data sets).

Although it is desirable to have a consistent approach to estimating WACC parameters, the AER recognises that adopting the same period and frequency across all WACC parameters may be either undesirable due to the nature of the data underlying the parameter or the nature of the parameter itself.

**Period for measurement**

Given that it is standard practice to estimate equity betas over a five-year period, the AER considers it may be appropriate to use broadly the same number of years as used with the equity beta to obtain a benchmark level of gearing. However, recent events such as the collapse of the sub-prime market and the subsequent impact on the cost of credit may have an impact on the cost of debt and subsequently the benchmark level of gearing. Accordingly, the AER agrees with the JIA and the ACG that observations from recent years should be treated with caution.

In reviewing the available evidence from data, the AER notes that the frequency of observations is limited to quarterly, annual or semi-annual observations consistent with when listed businesses release financial reports. However, most financial information services (such as Bloomberg or Standard and Poor's) calculate gearing

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159 MEU, *Submission in response*, op. cit., September 2008, p. 35.

160 JIA, *Submission in response*, op. cit., September 2008, p. 42.

161 ibid., pp. 43 and 46.

162 ibid.

on a semi-annual or annual basis. As discussed in the issues paper combining the effect of only having semi-annual or annual observations and assuming the most up to date information is the most relevant may result in a trade-off between statistical robustness and relevance. As discussed in section 3.4.1 the AER has examined gearing ratios provided by both Bloomberg and Standard and Poor's. Bloomberg provides gearing ratios on semi-annual basis and Standard and Poor's uses annual financial reports to calculate its level of gearing. In estimating the benchmark level of gearing, the AER has used a time period to be broadly consistent with the approach of calculating the equity beta as suggested by the JIA.[163]

**Frequency of measurement**

The AER considers that annual observations to estimate gearing is appropriate as the observations obtained from Standard and Poor's data can be compared to the Bloomberg data. The AER notes the views of the ACG which consider that it is not evident that adding bi-annual observations will improve the quality of the analysis.[164]

Accordingly, the AER has had regard to data from 2002 to 2006 for Standard and Poor's. The AER notes that data is currently unavailable for some businesses' 2007 results and all businesses' 2008 results as Standard and Poor's has not released in its industry report cards for all energy networks' reported gearing levels.[165] Given this limitation the AER is currently unable to examine whether the sub-crime crisis has had an impact on book gearing levels. In contrast, for the Bloomberg data, the AER data to the end of 2007 is available and the AER has considered the data from 2002 to 2007 for the year ended up to 30 June 2007 in informing its estimate of the benchmark gearing ratio.

The AER also considers that as Standard and Poor's provides financial information on both listed and unlisted businesses there is likely to be sufficient observations over a period that is broadly consistent with the calculation of equity betas to provide a statistically robust estimate, given that observed levels of gearing are generally more stable over time than most parameters.[166]

#### 5.5.2.3 AER's conclusion

The AER considers that evidence from market data over a period that is broadly consistent with the calculation of equity betas using annual observations should be used to as the primary estimate of the benchmark credit rating. The AER has also examined yearly averages of gearing to assess whether there have been any impacts from the sub-prime crisis on actual gearing levels although it is not clear at this present point in time whether there has been an impact (see section 5.6).

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163 The AER has also had regard to empirical estimates of the equity beta based on estimation periods of 5 years (ACG) and 6 years (Henry).

164 ACG, op. cit., 21 September 2008(a), p. 24.

165 For example businesses such as ETSA Utilities, Powercor and Citipower do not release an annual report until 31 December which resulted in Standard and Poor's reporting on the 2007 results. The AER will update this data as part of the final decision.

166 This my be subject to how broad the sample is, for example private electricity networks provides approximately 30 observations while examining energy networks provides approximately 70 observations. In times of market volatility more observations may be required.

### 5.5.3 Selection of businesses used to derive an industry benchmark

The AER notes that jurisdictional regulators have selected a group of comparator businesses to inform the industry benchmark level of gearing rather than adopting a market-wide benchmark. When selecting the businesses to be used for an industry benchmark there are a number of considerations, these are:

- consistency in approach across other industry benchmarks applied in estimating WACC parameters where appropriate and where information is available
- the nature of the WACC parameter being estimated, and
- empirical issues such as statistical robustness and issues related to sample selection bias.

#### 5.5.3.1 Submissions in response to issues paper

The MEU argue that care should be taken when considering companies that are privately owned as owners request additional returns on top of dividends. The MEU argue this causes a reduction in available cash for the business and higher levels of gearing.[167]

The JIA support the ACG approach to selecting sample businesses where the ACG starts with the Standard and Poor's current *Industry Report Card* and excludes the following types of business:

- wholly government owned business – their gearing levels may be influenced by government ownership
- businesses with significant unregulated activities
- businesses undergoing restructuring or rapid expansion and
- businesses with significant international investments.

Using these criteria the ACG concludes that the appropriate comparator group for Australian regulated electricity transmission and distribution businesses would include APA Group, Envestra, GasNet, SP AusNet and Spark Infrastructure.[168] The JIA also note that the ACG has also undertaken 'cross-checks' by reviewing UK data and this data confirms a benchmark level of gearing 60 per cent is appropriate.[169]

#### 5.5.3.2 Issues and AER's considerations

The AER recognises that the selection of comparator businesses is an important factor as the selection of which businesses are included or excluded in a sample will have direct implications on the average level of gearing. The AER considers that ideally the level of gearing for the benchmark efficient service provider would be taken from

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167 MEU, *Submission in response*, op. cit., September 2008, pp. 12-13.

168 JIA, *Submission in response*, op. cit., September 2008, pp. 42 and 48.

169 ibid.,p. 34.

a 'pure play' electricity network business. However, in Australia, all electricity businesses either have part or full government ownership, own non-electricity network or have private parents. Accordingly, in order to examine the level of gearing for the benchmark efficient service provider the AER considers that it is appropriate to broaden the business characteristics used to obtain an average level of gearing which is likely to reflect the benchmark efficient service provider.

**Selection of comparator businesses**

The AER agrees with the JIA and the ACG that a benchmark gearing ratio derived from utility businesses may not be appropriate when selecting the comparator businesses. In particular, as a number of domestic utility businesses comprise large unregulated activities (retail operations or power generation) or are heavily involved with mergers and acquisition activities which require larger amounts of working capital, resulting in lower levels of gearing (which affects approximately a third of the sample from year-to-year). Accordingly, the AER considers these businesses should be excluded from the sample businesses. That said, the AER disagrees with the JIA and the ACG that government owned businesses should be excluded from the sample on the basis that the JIA do not also propose excluding businesses with private parents from the sample of comparators.[170] The AER considers that this view of advocating the exclusion of government businesses on the grounds that ownership may affect gearing is inconsistent as a parent company is equally likely to influence a subsidiary's level of gearing (e.g. for purposes of risk minimisation or obtaining a higher return), as noted by the MEU in its submission.[171] The AER considers that to maintain a consistent approach either all of the businesses that are associated with parent ownership are removed from the sample or all businesses remain in the sample. That said, if all businesses with parent ownership are removed, the sample size is significantly reduced thereby reducing any reliance that can be given to market data. Accordingly, to estimate the benchmark level of gearing the AER has selected businesses that operate in the Australian market and have operations which predominantly involve network businesses (includes electricity, gas and transmission and distribution businesses) in the energy sector.

The AER proposes to use the same sample businesses using the Bloomberg data as was used in the ACG's analysis on gearing with one exception. The AER notes that the ACG has not included DUET in its sample of businesses to estimate the benchmark level of gearing on the grounds that is has significant international investments.[172] Notwithstanding that a business with significant international investments may not be an appropriate comparator for the estimating gearing the AER considers that it is unclear what could be defined as 'significant international investments'.

The AER proposes to include DUET in the sample of comparator businesses but would consider removing DUET from the sample if it can be demonstrated that a large proportion of the assets relate to international activities. That said, the AER

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[170] If business with private parents were excluded from the sample, the sample businesses would be reduced to APA Group and Envestra.

[171] MEU, *Submission in response*, op. cit., September 2008, pp. 12-13.

[172] ACG, op. cit., 21 September 2008(a), p. 27.

notes the ACG has also excluded the Hastings Diversified Utilities Fund and the AER has also excluded this business from the sample on the grounds that ownership of water assets is likely to have an impact on its gearing levels. Accordingly, the AER considers that the APA Group, Envestra, GasNet, SP AusNet, Spark Infrastructure, and DUET.

The AER considers that regulatory and market conditions in other countries may be unlikely to result in an industry benchmark that is representative of the Australian market. The AER notes that while the ACG has examined foreign data, the ACG has only reviewed regulatory decisions in the UK as a cross check to demonstrate that 60 per cent gearing is appropriate.[173] The AER does not consider this as a sufficient cross check as regulatory decisions may or may not reflect the actual gearing of businesses operating in the UK. Further, given the availability of a large number of sample businesses that use book valuations of gearing to use for cross checking purposes, the AER considers that the use of foreign data as a cross check may not significantly add to the overall conclusion on the level of gearing for the benchmark efficient service provider.

The AER considers that the same sample that is used to determine the benchmark level of gearing could be used for estimating the benchmark credit rating. Although there may not be a direct relationship between the level of gearing and the credit rating, the AER considers there may be an indirect relationship. In particular, the proportion of debt used to fund a business' activities may have an impact on the level of interest payments which would then have an impact on the business' ability to meet financial obligations and affect the credit rating in turn.

**Summary estimates of gearing based on different comparator businesses**

The size of sample businesses provided by the Standard and Poor's data includes a sufficient amount of businesses to examine the impacts of removing businesses from the sample. Table 5.3 demonstrates the impact of adopting different comparator businesses (including the impact of removing non-energy network utilities businesses from the sample).

[173] ibid., p. 13.

**Table 5.3: Comparison of different samples using Standard and Poor's data**

**Panel A**

| Year | Utilities (%) | Energy networks (%) | Electricity networks (%) | Gas networks (%) | Privately owned (%) |
|---|---|---|---|---|---|
| 2002 | 51.43 | 57.62 | 48.96 | 69.43 | 53.43 |
| 2003 | 57.72 | 65.69 | 57.63 | 76.80 | 68.36 |
| 2004 | 55.22 | 63.13 | 55.54 | 80.80 | 64.94 |
| 2005 | 59.51 | 66.71 | 59.84 | 80.57 | 70.66 |
| 2006 | 61.03 | 66.90 | 58.65 | 81.20 | 70.07 |
| 2007 | 61.95 | 70.55 | 66.45 | 76.83 | 74.54 |
| 2002 - 2007 | 57.80 | 65.03 | 57.16 | 77.40 | 67.42 |

**Panel B**

| Year | Government owned (%) | Transmission networks (%) | Distribution networks (%) | Privately owned electricity (%) | Government owned electricity (%) |
|---|---|---|---|---|---|
| 2002 | 54.45 | 71.05 | 52.46 | 41.43 | 50.37 |
| 2003 | 55.08 | 70.75 | 62.98 | 59.10 | 50.67 |
| 2004 | 55.25 | 71.90 | 59.00 | 54.57 | 51.07 |
| 2005 | 55.00 | 75.53 | 63.08 | 63.18 | 50.67 |
| 2006 | 60.05 | 76.40 | 63.79 | 57.00 | 56.23 |
| 2007 | 51.1 | 68.88 | 74.40 | 70.65 | 51.10 |
| 2002 - 2007 | 55.73 | 72.45 | 61.52 | 56.86 | 51.76 |

| Panel C | | |
|---|---|---|
| **Year** | **Electricity transmission (%)** | **Electricity distribution (%)** |
| 2002 | 74.90 | 44.05 |
| 2003 | 72.60 | 56.17 |
| 2004 | 71.90 | 52.88 |
| 2005 | 75.40 | 56.63 |
| 2006 | 72.50 | 55.75 |
| 2007 | 69.35 | 63.55 |
| 2002 - 2007 | 72.68 | 53.58 |

Source: Averages calculated using Standard and Poor's industry report cards (2003 - 2008)

The utilities sample includes all domestic businesses that are involved in the domestic utilities sector. The energy networks sample excludes businesses that:

- do not own or operate either a gas or electricity network
- are involved with significant mergers and acquisition activities, and/or
- are involved in large retail operations.

The AER recognises that the Standard and Poor's Industry Report Cards provides that ratios have been calculated based upon results recorded in annual reports (ending for example on 31 December 2006 and 30 June 2007). The AER considers it is likely to be inappropriate to use the values in the May 2008 Industry Report Card to represent 2008 values. For this reason the AER considers examining the 2006 annual average is likely to be more appropriate as not all business' 2007 results have been recorded in the latest Industry Report Card. Further, when the data is collated and matched against the year the ratios relate to, these ratios relate to different periods during the year. The AER considers that annual averages can still be examined given that gearing appears to be relatively stable within years. However, if the data source allows for bi-annual observations the AER considers that it is more appropriate to use matching dates (i.e. 30 June) to obtain average levels of gearing.

The AER observes that gearing ratios tend to be more stable over time and has therefore shown the annual averages. However, the AER is aware that the composition of businesses in the Standard and Poor's data changes from year-to-year (see section 9.6.2) and therefore caution should be taken from examining annual averages.

Table 5.3 demonstrates that breaking the sample into different groupings results in a range of 52 to 77 per cent over 2002-2007, or 56 to 81 per cent in 2006. The gas network businesses have a much higher average than the private electricity businesses sample which further confirms that gas businesses may be reasonable but not perfect comparator. On the other hand both government electricity networks and government

networks have average levels of gearing which are much closer to (albeit below) the average level of gearing of private electricity network businesses.

The AER considers, at a minimum for a sample to be relevant for the purposes of cross checking, that it must contain at least one business that operates an electricity network business. For the samples that at least contain one electricity network business the range is 52 to 72 per cent gearing over 2002-2007, and 56 to 76 in 2006.

Table 5.4 demonstrates the impact of excluding and including DUET which the ACG excluded from its analysis using Bloomberg market gearing ratios and the ACG's estimates of market gearing.[174]

**Table 5.4: Comparison of different samples using Bloomberg data**

| Year | Bloomberg – DUET included (TD/TD+MC - %)[(a)] | Bloomberg – DUET excluded (TD/TD+MC - %) | ACG (%) – (Adjusted TD/TD+MC)[(b)] |
|---|---|---|---|
| 2002 | 65.5 | 65.5 | 62.6 |
| 2003 | 63.9 | 63.9 | 60.3 |
| 2004 | 66.7 | 62.2 | 59.9 |
| 2005 | 65.4 | 60.8 | 59.3 |
| 2006 | 63.0 | 59.8 | 59.1 |
| 2007 | 61.7 | 58.9 | 60.0 |
| 2002 - 2007 | 64.2 | 61.6 | 60.2 |

Source: Bloomberg and ACG (2008)
(a) book value of debt divided by book value of debt and market value of debt (market capitalisation)
(b) book value of debt divided by book value of debt and market value of debt (market capitalisation). Adjustments made to total debt for loan notes and double leveraging.

Table 5.4 indicates that the exclusion of the DUET Group has minimal impact on the average level of gearing.

#### 5.5.3.3 AER's conclusion

The AER considers for the reasons given in section 4.3 that 'pure play' electricity networks is likely to be most reflective of a benchmark efficient business. However, given that there is no market data on such a business, the AER considers that either private electricity network businesses or energy network businesses are likely to provide a sufficient number of businesses to obtain a benchmark level of gearing using book values as a proxy for market values. When examining the market valuation of gearing the AER considers there are insufficient sample businesses to

[174] ACG figures adjusted for stapled securities and 'double leveraging'.

average for private electricity businesses and therefore considers that an expanded sample of energy network businesses should be used.

Comparing energy networks sample to the private electricity networks sample in tables 5.3 indicates that caution needs to be taken when including gas businesses into a sample, as the inclusion of gas businesses into the sample results in the average level of gearing increasing above 60 per cent. The AER considers that gas businesses are a reasonable but not perfect comparator for the reasons discussed in section 4.3 This can again be demonstrated by comparing the private electricity networks sample (gearing of 57 per cent) to the private energy networks sample (gearing of 68 per cent; which includes privately owned gas businesses).

The AER considers that the inclusion of (lower geared) government owned businesses offsets the impact of (higher geared) privately owned gas businesses which results in the energy sample having a level of gearing of approximately 60 per cent. However, it appears that government owned networks appear to have levels of gearing (56 per cent) that are more reflective of a private electricity business (57 per cent) than gas network businesses (77 per cent).

The AER considers that it is inconsistent to remove businesses with 'significant' foreign activities from the gearing sample while also including these businesses for the estimation of equity betas. That said, while it may be debateable as to whether DUET is included in the benchmark sample, Table 5.4 indicates that removing these businesses from the sample has a minimal impact on the average level of gearing.

On this basis the AER will be excluding businesses that:

- do not own or operate either a gas or electricity network
- are involved with significant mergers and acquisition activities, and/or
- are involved in substantial unregulated activities.

## 5.6 AER's conclusion

Based upon the submissions, available data, and the considerations and conclusions made in sections 5.5.1 to 5.5.3 the AER considers the following approaches are most appropriate to analyse the level of gearing for the benchmark efficient service provider:

- The AER agrees with the MEU that book values of debt should be considered but disagrees that the ratio of total liabilities to total assets should be used (section 5.5.1).
- The AER agrees with the JIA that consideration of the ratio of the market value of debt to the market value of debt and equity is required in estimating gearing. However, both the AER and JIA recognise that calculating the market value of debt would be difficult as debt is not traded frequently. Further, the book value of debt will diverge from the market value of debt in times of interest rate volatility. Accordingly, the AER considers that the book value of gearing is an equally valid

proxy to the market valuation of gearing as the book value of debt to the book value of debt, and market value of equity (section 5.5.1).

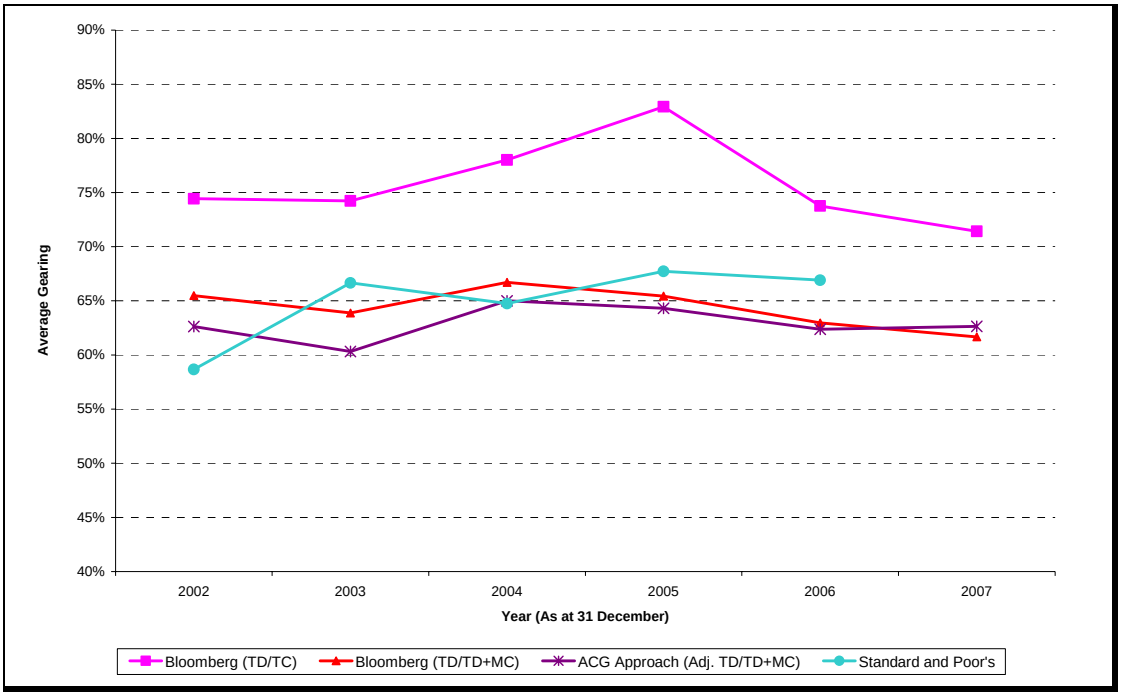
- The AER has examined book values of debt and market values of equity as provided by Bloomberg. The AER has also considered book values of debt and equity provided by Bloomberg as a cross check, Standard and Poor's book value of debt and equity and the 'see through' gearing analysis provided by the ACG (section 5.5.1).

- The AER agrees with the JIA that an average of gearing outcomes reduces the likelihood that any recent events may distort recorded gearing outcomes. The AER also agrees that increasing the frequency of the observations is unlikely to have a material impact on the average gearing ratio. The AER has examined historical gearing levels over a period consistent with the equity beta using annual observations (section 5.5.2).

- For the purposes of examining gearing, the AER agrees with the JIA that businesses which do not have significant mergers and acquisition activities, nor retail operations, should be excluded from the sample (section 5.5.3).

The AER has examined various sources and measurements of gearing, as can be seen by examining figure 5.1.

**Figure 5.1: Comparison of different approaches**




Source: Bloomberg, company reports, and, Standard and Poor's industry report cards (2003 - 2008)[175]

[175] Book values for loan notes held by Envestra (as at 31st December) were unavailable for 2002 and 2004. Market valuations were used in these years. Bloomberg (TD/TC) uses book valuation of

In considering a number of different sources and measurements of the gearing ratio the AER observes that:

- The average level of gearing across the four methods of calculating gearing range from 60.5 to 76.8 per cent over 2002-2006.

- The generally accepted approach uses the book value of debt as a proxy for the market value of debt and uses the market value of equity (Bloomberg 'market value' approach).

- The ACG's approach adjusts the Bloomberg 'market valuation' approach to gearing for 'double leveraging' and stapled securities. The ACG approach results in an average level of gearing in the range of 60.3 to 65.0 per cent over 2002 to 2007.

- In contrast, the Bloomberg measure of book gearing (i.e. book value of debt and equity) provides a higher average level of gearing. The AER considers that this approach is likely to be an upper bound as no adjustments have been made for market valuations, stapled securities or double leveraging.

- In addition, the Standard and Poor's measure of gearing (book value of debt and book value of equity) provides an average of 64.7 per cent from 2002 to 2006, which supports the conclusion that a 60 per cent gearing is an appropriate benchmark.

The AER will update its analysis for its final statement to include the latest gearing data. However, based upon current analysis, the AER does not consider there is persuasive evidence to depart from the currently adopted benchmark efficient level of gearing of 60 per cent.

Although there appears to be a downward trend in the average level of gearing in 2007 it is unclear whether this is due to the sub-prime crisis or other factors. The AER will update its analysis for the final decision to include the latest gearing data.

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

- is supported by the most recent available and reliable empirical evidence, which the AER considers is persuasive in support of no change to the existing value, and

- generates a forward looking rate of return that is commensurate with prevailing conditions in the market for funds

On this basis, the AER considers that its proposed value achieves an outcome that is consistent with the National Electricity Objective.[176]

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gearing, Bloomberg (TD/TD+MC) uses book valuation of debt and market valuation of equity, 'ACG approach' uses adjusted net debt (book value of net debt less book value of loan notes) and market valuation of equity, and Standard and Poor's uses book valuation of gearing (with adjustments).

[176] NER, cls. 6A.6.2(j) and 6.5.4(e).

# 6 Nominal risk free rate

## 6.1 Introduction

The risk free rate is the rate of return an investor receives from holding an asset with guaranteed payments (i.e. no risk of default). Where a risk free rate is calculated in nominal terms (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.[177]

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

## 6.2 Regulatory requirements

### 6.2.1 National Electricity Rules

In undertaking a review of the WACC parameters, the NER sets out several matters that the AER must have regard to. Of particular relevance the nominal risk free rate are:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds
- the need for the return on debt to reflect the current cost of borrowings for comparable debt
- where a method cannot be determined with certainty:
  - the need to achieve an outcome that is consistent with the National Electricity Objective, and
  - the need for persuasive evidence before adopting a method that differs from the method that has previously been adopted for it.[178]

[177] 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.

[178] NER, cls. 6.5.4(e) and 6A.6.2(j).

The AER's reasoning as to why these matters appear particularly relevant, while the other matters listed in the NER appear to be of lesser value to the review of method for the nominal risk free rate is discussed in chapter three.

As also discussed in chapter three, chapter 6A of the NER lists the maturity period and bond rates for particular circumstances (cl. 6A.6.2(d)) as parameters for which the AER must, in reviewing them, have regard to the need to base such parameters on a benchmark efficient service provider.[179] The AER has had regard to this factor in reviewing the maturity period and bond rate of the nominal risk free rate referred to in cl. 6A.6.2(d). However, the AER has given this factor little weight as the nominal risk free rate is a market-wide parameter that is not affected by the decisions of an actual service provider. Accordingly, having regard to the need to base these parameters on a benchmark efficient service provider has little meaning in the context of the maturity period and bond rates of the nominal risk free rate referred to in cl. 6A.6.2(d).

### 6.2.2 Previously adopted method

In addition to other relevant considerations, where a parameter cannot be determined with certainty, the NER provides that the AER must have regard to the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it. The AER must also have regard to the need to achieve an outcome that is consistent with the National Electricity Objective.[180]

The NER deemed the initial method for estimating the nominal risk free rate for both electricity transmission and distribution, consistent with current regulatory practice.[181] The basis for the current NER method – in particular the use of the yield on ten year CGS as the risk free proxy – was largely established by the Tribunal in its 2003 GasNet decision.[182] The prescribed NER method for transmission and distribution is almost identical [cls. 6.5.2(c)-(d) and 6A.6.2(c)-(d)], as set out below:

> (c) The nominal risk free rate for a regulatory control period is the rate determined for that regulatory control period by the AER on a moving average basis from the annualised yield on Commonwealth Government bonds with a maturity of 10 years using:
>
> (1) the indicative mid rates published by the Reserve Bank of Australia; and

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

[180] NER, cls. 6.5.4(e)(4) and 6A.6.2(j)(4).

[181] NER, cls. 6.5.2(c)-(d) and 6A.6.2(c)-(d).,

[182] Australian Competition Tribunal, *Application by GasNet Australia (Operations) Pty Ltd [2003] ACompT 6*, 23 December 2003. It should be noted that some jurisdictional regulators adopted a 10 year risk free proxy prior to the GasNet decision.

(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**

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

**Distribution**

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

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and, for the purposes of subparagraph (i):

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

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

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

It is also important to note the NER requirement that the term of the nominal risk free be equivalent to the term of the corporate bond used to calculate the debt risk premium. Specifically cls. 6A.6.2(e) and 6.5.2(e) define the debt risk premium as follows:

(e) The debt risk premium for a regulatory control period is the premium determined for the regulatory control period by the AER as the margin between the nominal risk free rate and the observed annualised Australian benchmark corporate bond rate for corporate bonds which have…

**Transmission**

…a BBB+ credit rating from Standard and Poors and a maturity equal to that used to derive the nominal risk free rate.

**Distribution**

> …a maturity equal to that used to derive the nominal risk free rate and a credit rating from a recognised credit rating agency.

The length of the averaging period is not a prescribed component of the formal NER risk free rate method, though the AER must not unreasonably withheld its agreement of an averaging period proposed by the service provider. In implementing this provision, the AER has adopted the ACCC's position as set out in the *Statement of principles for the regulation of electricity transmission revenues* (the 'SRP'), as follows:

> The ACCC will accept the period used to calculate the moving average of the risk free rate (between 5 and 40 days) submitted by a TNSP in its application.[183]

The averaging period adopted in distribution decisions has generally varied between 10 and 20 days in length.

## 6.3 Summary of issues raised in issues paper

In the issues paper the AER raised the following issues on the nominal risk free rate:

- the appropriate proxy for the risk free asset – noting recent arguments on the potential alternative proxies to Commonwealth Government Securities (CGS),
- the appropriate term of the risk free proxy – including discussion on refinancing risk, the 'present value principle' and consistency with the Market Risk Premium (MRP),
- approaches to estimating the risk free proxy – including discussion on the appropriate length and start date of the averaging period.

## 6.4 Summary of submissions in response to issues paper

In response to the issues paper, the AER received a substantive submission on the nominal risk free rate parameter from the JIA – endorsed by the ENA, Grid Australia and the APIA. The JIA engaged Professor Bob Officer and Dr Stephen Bishop (Officer and Bishop)[184] and the Competition Economists Group (CEG)[185] separately to provide reports on the issues associated with the appropriate methodology for estimating the nominal risk free rate. The key aspects of the JIA proposal on the nominal risk free rate parameter are as follows:

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[183] ACCC, *Statement of principles for the regulation of electricity transmission revenues*, Final decision, 8 December 2004, p.98.

[184] B. Officer and S. Bishop (ValueAdvisorAssociates), *Term of risk free rate: Commentary – Professor Bob Officer and Dr Stephen Bishop*, Prepared for Energy Networks Association, Australian Pipeline Industry Association and Grid Australia, September 2008.

[185] CEG, *Establishing a proxy for the risk free rate*, A report for the APIA, ENA and Grid Australia, 17 September 2008.

- An actively traded security with a ten year maturity is the appropriate proxy for the nominal risk free rate. Based on a report by consultants CEG examining the purported 'convenience yield' on CGS, there are alternative proxies that should be considered by the AER as part of its review.

- The same proxy should be used consistently to estimate the cost of equity and the cost of debt. Mixing maturities (e.g. between the risk free rate and the MRP in the CAPM equation) introduces a bias in the cost of capital. There is a paucity of research estimating an MRP based on a five year horizon.

- Based on analysis from consultants Officer and Bishop, the average historical difference between five and ten year CGS (i.e. term premium) is 18 basis points. This suggests that the impact on the cost of equity of moving to a five year maturity is relatively small.

- A prudent financing strategy seeks to minimise refinancing risk by ensuring that different debt instruments within the portfolio mature at different times. The importance of having in place a diversified debt portfolio is highlighted by the current state of financial markets. With this in mind the regulatory regime should not assume or imply that all or a substantial portion of debt is refinanced by regulated businesses in the specified averaging period.

- Based upon a sample of listed energy network companies the weighted average term of debt portfolios is 11.4 years, providing evidence that regulated energy network businesses seek to borrow long term to match asset lives. On this basis it is incorrect to argue that use of a ten year risk free rate rewards businesses for risks that they do not bear.

- Regulated businesses can and do enter into hedging arrangements to align debt costs as close as possible to the regulated cost of debt and therefore minimise interest rate risk over the regulatory period. However hedging is not costless, and in any case the credit spreads payable on long term debt financing (i.e. with a weighted average debt term of 11.4 years) must still be covered by the regulatory regime.

- Debt markets in Australia are not liquid enough to accommodate a move to a shorter (e.g. five year) term, therefore such a move will expose regulated businesses (and /or its customers) to significant unpriced rollover risks.

- Averaging observed yields over a 5 to 40 day period – commencing as close as possible to the start of the regulatory period or as nominated by the service provider – is an acceptable method for determining the regulated rate.[186]

Overall, on the key issue regarding the appropriate term of the risk free proxy, the JIA conclude as follows:

> …the average shape of the yield curve between 5 and 10 year bonds is relatively flat. Costs arising from hedging, rollover risk and transactions costs

[186] JIA, *Submission in response*, op. cit., 17 September 2008, pp.53-77.

> when funding shorter term debt will, most likely, more than offset any average premium in longer maturing bonds…
>
> …The Joint Industry Associations would require a careful analysis of the costs and benefits of moving away from the current use of a 10 year risk-free proxy. Overall, the Joint Industry Associations consider that there is no persuasive evidence to move from the current regulatory practice of using a 10 year maturing bond as proxy for the risk-free rate.[187]

The AER received separate submissions in support of the JIA's submission on the nominal risk free rate parameter from the following parties:

- the APIA
- Energex
- Energy Australia
- Citipower, ETSA Utilities and Powercor
- Grid Australia
- Integral Energy, and
- SP AusNet.

In its submission, the MEU state that there does not appear to be any persuasive evidence to depart from the current methodology for determining the nominal risk free rate, particularly given that the MRP would have to be recalculated to reflect such a departure. In addition the MEU make the following specific comments:

- The assumption that a regulated business would as a matter of preference seek to issue long term debt to match with asset lives is incorrect, as a competitive business will always seek to minimise its costs.
- Analysis of debt portfolios in the wider market indicates debt terms generally in the range five to eight years, therefore using a ten year term assumption is conservative.
- Allowing regulated businesses to select the duration of the averaging period provides a bias in favour of the business at the expense of consumers. To ensure regulatory certainty the averaging period should be fixed.[188]

The AER also received a separate submission from the Queensland Government regarding the practical ability of its regulated energy network businesses to recover the regulated cost of debt.[189] The submission is summarised as follows:

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[187] ibid., pp. 63 and 65.

[188] MEU, *Submission in response*, op. cit., September 2008, pp.38-41.

- The funding strategy required to guarantee recovery of the regulated cost of debt as it is currently determined is inconsistent with sound risk management principles as it involves a high level of refinancing and repricing risk.

- The extent of refinancing and repricing risk faced is exacerbated in Queensland, given the volume of debt required to fund required capital expenditure and the lack of liquidity in the Australian debt market.

- Attempting to match the regulated cost of debt will incur significant transaction (e.g. hedging) costs which are not reflected in the current allowed debt raising costs.

- Changing the method for calculating the risk free rate and the debt risk premium is the most effective way of addressing this issue.

The Queensland Government proposes that the AER consider revising the current methodology of estimating the risk free rate (and the debt risk premium) over a 5-40 day period just prior to the start of the regulatory period. Specifically, it is suggested that a percentage of the cost of debt (e.g. 20 per cent) could be updated annually to reflect prevailing market conditions. If the current methodology is retained, the Queensland Government submits that the transaction costs associated with attempting to meet the regulated cost of debt should be compensated by the regulatory regime.

The practical difficulty associated with meeting the regulated cost of debt was also specifically raised in submissions from Energy Australia and Grid Australia.

## 6.5 Issues and AER's considerations

This section is structured as follows:

- proxy for the risk free asset (section 6.5.1)

- meeting the regulated cost of debt (section 6.5.2)

- term of the risk free proxy (section 6.5.3)

- consistency with the Market Risk Premium (section 6.5.4), and

- measuring the risk free rate of return (section 6.5.5).

### 6.5.1 Proxy for the risk free asset

In the issues paper the AER discussed the issues associated with selecting an appropriate proxy for the risk free asset. It was noted that Commonwealth Government Securities (CGS) yields are generally considered to be the best proxy for the nominal risk free rate in Australia.

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[189] Queensland Government, *Submission to the AER issues paper*, 16 September 2008. The regulated businesses referred to in the submission are Ergon , Energex and Powerlink.

The AER noted recent debate stemming from a series of reports from NERA which sought to examine alternatives to the use of CGS, primarily due to a belief that CGS yields understate the true risk free rate due to a 'convenience yield'. As an alternative proxy for the risk free asset, the NERA reports advocated using the yield on corporate bonds less (matched) credit default swap (CDS) rates as an alternative proxy for the risk free asset. The AER noted the recent events in CDS markets in the US, in which CDS issuers have demonstrated that they themselves are not free from the risk of default.

**Submissions in response to issues paper**

Based upon a report from consultants the Competition Economists Group (CEG), the JIA submit that there is evidence to suggest that continued use of CGS as the proxy for the risk free asset will understate the required cost of equity by 61 basis points.

The CEG report submitted on behalf of the JIA follows from two earlier NERA reports examining the risk free rate.[190] Consistent with the findings in these earlier reports, the key conclusion in the CEG report is that CGS are inappropriate as a risk free proxy in a CAPM context, due to the existence of a 'convenience yield':

> …it is our view, consistent with the finance literature, that yields on CGS are below the benchmark risk free rate that should be used in the CAPM to price corporate assets. That is, yields on CGS are depressed relative to an unobservable "zero beta" benchmark that is relevant in the specific and narrow set of circumstances where the CAPM is being used to price corporate assets.[191]

CEG states that the existence of a convenience yield in CGS is attributed to special 'non-risk' characteristics such as high levels of liquidity, transparency and certainty of returns. It is argued that the convenience yield on CGS is currently at a historically high level, which makes them a poor proxy for the CAPM risk free asset.

CEG argues that there are at least three alternatives to CGS as the proxy for the risk free rate – State Government Debt, CDS insured bonds, and the fixed rate component of AAA-rated fixed-for-floating swaps. Table 6.1 presents, for each of CEG's suggested proxies the yield spreads relative to CGS.

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[190] CEG, op. cit., 17 September 2008. The two earlier reports are: 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*, June 2007.

[191] CEG, op. cit., 17 September 2008, p.14.

**Table 6.1: Yields and spreads on alternative risk rate proxies – 1 August 2007**

| 1-Aug-07 | Spread to CGS |
|---|---|
| 10 year CGS | 0.00 |
| 10 year Qld government bond | 0.53 |
| 5 year CDS insured corporate bond | 0.78 |
| 10 year swap | 0.88 |

Source: CEG[192]

CEG acknowledges that each of the alternative proxy assets in table 6.1 is subject to a 'miniscule' probability of default (i.e. above CGS), however it argues that the majority of the yield spreads are explained by investors willingness to pay a convenience yield on CGS.

CEG concludes that for practical reasons CDS insured bonds are potentially problematic, given the lack of bonds at each given maturity. Further the use of State Government debt is not recommended as it is also expected to contain a convenience yield, albeit smaller relative to that on CGS. On this basis CEG concludes:

> It is therefore proposed that NER set the risk free rate equal to the 10 year swap rate less the historical average difference between 10 year CGS yields and 10 year swaps…
>
> …The convenience yield on CGS (as measured by the spread between CGS and swap rates at 10 year maturity in mid July 2008) was around 100bp. Subtracting the historical average of around 39bp would, other things equal, result in the estimated cost of equity being 61bp higher than if the CGS yield were used as the risk free rate.[193]

Overall, on the basis of CEG's findings with respect to the potential understatement on the cost of equity, the JIA state that:

> This is very significant and therefore cannot be ignored by the AER. The Joint Industry Associations maintain an open mind on this important issue and look forward to participating further in consultations with the AER.[194]

### Consultant's review

In a report prepared for the AER, Associate Professor Handley argues that there is currently no consensus in the finance literature concerning the non-default risk component of credit and swap spreads.[195] While some authors focus on features

[192] ibid., p.15.

[193] ibid., p.18.

[194] JIA, *Submission in response,* op. cit., September 2008, p.68.

[195] J. Handley, *Comments on the CEG report: "Establishing a proxy for the risk free rate"*, Report for the Australian Energy Regulator, Final, 12 November 2008(a).

unique to government bonds to explain spreads,[196] others focus on differential taxation, differential liquidity and features unique to corporate bond or swap markets.[197] In sum Handley states that, contrary to CEG's claims, the conclusions to be drawn from the finance literature on non-default risk are unclear:

> …if liquidity is a priced factor then part of the credit spread may be interpreted as either (i) a price premium (lower expected return) that investors pay for holding (relatively) liquid government bonds – consistent with CEG/NERA's view or alternatively, (ii) a price discount (higher expected return) that investors receive for holding (relatively) illiquid corporate bonds (or swaps).[198]

Handley identifies three additional issues with CEG's conclusions:

- The purpose for which the risk free rate is to be used is a relevant consideration in determining an appropriate proxy. A risk free rate implied from a swap market may be relevant for derivative pricing purposes however it is not necessarily relevant for the purposes of estimating the corporate cost of capital.

- The beta of the risk free asset is by definition zero, however CEG provides no evidence concerning either the beta of CGS or the beta of the proposed alternative proxies for the risk free rate.

- CEG provides no evidence that Australian CGS are unique in a way that is consistent with US government bonds, which is important given that US markets are the main focus in the finance literature.[199]

On this basis Handley concludes as follows:

> …at this stage, there is insufficient evidence to justify CEG's claim that the observed Government bond yield is an inappropriate proxy for the CAPM risk free rate.[200]

**Issues and AER's considerations**

As noted in the issues paper, the debate concerning the risk free rate proxy has been prominent in recent ACCC and AER decisions for GasNet, SP AusNet and ElectraNet. The AER notes that the original arguments from NERA focused on a shortage of supply of nominal CGS in explaining what it termed an 'absolute bias' in CGS yields as a proxy for the CAPM risk free rate. For example, NERA stated that:

> To the extent that demand for CGS has grown in line with the level of economic activity then, other things equal, one might expect this to result in a

196 Handley cites as examples in the literature: Grinblatt (2001); Feldhutter and Lando (2007); and Krishnamurthy and Vissing-Jorgensen (2007).

197 Handley cites as examples in the literature: Longstaff (2004); Longstaff, Mithal and Neis (2005); Elton, Gruber, Agrawal and Mann (2001); and Liu, Longstaff and Mandell (2006).

198 Handley, op. cit., 12 November 2008(a), p.4.

199 ibid., p.5.

200 ibid., p.5.

> premium being paid for a nominal CGS security (and its yield being artificially depressed as a result) [emphasis added].[201]

By contrast, in responding to the advice received by the ACCC and the AER from the RBA and Treasury, CEG states in its latest report prepared for the JIA that:

> It is not our view that yields on nominal CGS are 'artificially low' *per se* or that they reflect the outcomes of a "distorted" market. Consistent with the views in the RBA letter, it is our view that the market for CGS in Australia is a well functioning market.[202]

Rather, CEG focuses almost exclusively on demand-side factors in arguing that the continued use of CGS as the risk free rate proxy is inappropriate.

While the AER recognises that the credit spread between CGS and other 'low risk' assets may not be completely explained by relative levels of default risk, the arguments for the existence of a 'convenience yield' are questionable. As Handley points out, the finance literature contains many potential explanations for the non-default risk component of credit and swap spreads. On this basis the AER considers there is no 'unambiguous' evidence that the spreads are driven purely by the relatively higher liquidity of CGS as claimed by CEG.

On the alternative proxies suggested, the AER notes that CEG appears to have moved away from the earlier NERA position which focused on CDS insured corporate bonds. While the concerns raised by CEG on the practical issues associated with obtaining yields of the appropriate maturity are indeed relevant, the AER reiterates its view from the issues paper that recent market events indicate that CDS issuers cannot be necessarily assumed to be free from the risk of default.

CEG proposes that the AER use the fixed rate component of AAA-rated fixed-for-floating swaps as a proxy for the risk free rate (adjusted for the historical average convenience yield). Based on Handley's advice, the AER considers that there is insufficient evidence to support such a change. Specifically CEG has not demonstrated that:

- the use of a risk free rate implied from a swap market is relevant for the purposes of estimating the corporate cost of capital (as opposed to relevant only for derivative pricing purposes)
- swap rates can be considered a zero-beta risk free asset, and
- Australian CGS are unique in a way which is consistent with US government bonds.

On this basis the AER considers that CEG (and the JIA) has not presented sufficient persuasive evidence justifying a move away from CGS as the appropriate proxy for the risk free asset.

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[201] NERA, op. cit., June 2007, p.4.

[202] CEG, op. cit., 17 September 2008, p.14.

Rather, the AER considers that the continued use of Australian CGS as the proxy for the risk free asset is appropriate in the context of the current review. It also accords with standard commercial and regulatory practice.

**AER's conclusion**

The JIA have not presented sufficient persuasive evidence justifying a move away from CGS as the appropriate proxy for the risk free asset.

On this basis the AER proposes to continue with the use of CGS as the proxy for the risk free asset as part of this review.

### 6.5.2 Meeting the regulated cost of debt

In the issues paper the AER discussed the impact of the regulatory regime on the level of refinancing and interest rate risk faced by regulated energy network businesses. The AER stated that:

> …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.[203]

This discussion was in the context of the term of the risk free proxy, and in particular the claim that businesses seek long term financing in order to minimise refinancing risk. The AER also recognised the role played by hedging instruments in practice.

A number of submissions to the issues paper raise practical issues associated with meeting the regulated cost of debt and the consequent interest rate risk faced by regulated businesses (i.e. irrespective of the term assumption). Although these issues are obviously not confined to the nominal risk free rate parameter, the analysis naturally follows from a focus on debt markets generally.

**Submissions in response to issues paper**

The AER received a substantive submission from the Queensland Government highlighting the challenges faced by its large regulated businesses in the management of refinancing and repricing risks. The Queensland Government submits that the only strategy that will enable recovery of the regulated cost of debt is to reset / lock-in the interest rate on all existing / forecast borrowings over the assumed averaging period. However it is argued that such a strategy is inconsistent with sound risk management principles as it creates significant refinancing and repricing risks. The Queensland Government states that implementing a diversified debt portfolio with staggered maturity dates is an effective way of managing such risks.[204]

The submission argues that there have been two recent and material changes which further increase refinancing and repricing risks for Queensland's regulated electricity networks:

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[203] AER, *Issues Paper*, op.cit., August 2008, p.31.

[204] Queensland Government, *Submission in response*, op. cit., September 2008, p.3.

1. The volume of debt required to fund new capital expenditure has grown and will continue to grow significantly, and the Australian debt market lacks the liquidity to accommodate large-scale refinancing over a 5 to 40 day period.

2. A sustained decrease in debt market liquidity due to the credit crisis has made it more difficult and costly to execute large physical or derivative debt transactions.

As a result it is argued that implementing a diversified debt portfolio and meeting the regulated cost of debt have become mutually exclusive objectives:

> Regulated businesses with large borrowing requirements may be forced to implement diversified funding strategies that, while more prudent from a risk management perspective, increase the likelihood of producing a cost of debt that exceeds the regulated cost of debt.[205]

The Queensland Government acknowledges that interest rate and refinancing risk can be managed with interest rate swaps and other hedging instruments. However it claims that liquidity in these markets is also an issue given the volume of debt required by Queensland's regulated electricity businesses. In any case it is argued that there still remains the risk that the actual premium payable on physical debt refinanced during the regulatory period will differ from the allowed debt risk premium. Based on an analysis of credit spreads between CGS and corporate (BBB) bonds over the period 2003-2008, the Queensland Government states that:

> A regulated business that implemented a swap-based strategy at prior determinations in either 2005 or 2007 would be forced to refinance maturing loans at premiums *several percentage points higher* than the debt premium used in the WACC. This would create a significant mismatch between the actual and regulated cost of debt.[206]

In order to mitigate these residual risks the Queensland Government proposes that the AER consider revising the current methodology of estimating the risk free rate (and the debt risk premium) over a 5-40 day period just prior to the start of the regulatory period. The specific details of this proposal are discussed further at section 6.5.5. If the current methodology is retained, the Queensland Government submits that the transaction costs associated with attempting to meet the regulated cost of debt (i.e. hedging costs) should be compensated by the regulatory regime.[207]

In its submission the JIA raise similar issues associated with refinancing and interest rate risk. According to the JIA, a prudent financing strategy dictates that funding should reflect the asset life as much as possible, with a spread of maturity dates. This is so as to minimise the risk of not being able to raise funds at reasonable interest rates at any particular point in time. The JIA argue that the importance of such a portfolio diversification strategy is further highlighted by the current state of financial

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[205] ibid., p.2.

[206] ibid., pp.10-11.

[207] ibid., p.8.

markets, in which access to funding is limited to shorter term bank debt with higher margins.[208]

In this context, the JIA submit that the regulatory regime should not in any way be based around a view that all debt will be refinanced in the averaging period:

> To do so is to adopt a very sizeable risk that all debt would have to be taken on at a moment when interest rates are high. Even worse, forcing a very sizeable quantity of debt to be taken on at once with no corresponding increase in the supply of debt at that time could substantially increase the clearing price of the market for debt…[209]

The JIA state that many of its members attempt to align the cost of debt with the regulated rate using hedging instruments, however these hedging instruments are not costless. In any case the JIA state there is residual risk that needs to be managed by regulated network businesses:

> There are no instruments for hedging refinancing risk. Businesses generally manage refinancing risk by spreading refinancing over time and ensuring that not all debt is refinanced in one large raising but rather by raising in smaller parcels over time.[210]

In its submission Energy Australia (EA) reiterates the views of the JIA on refinancing issues, and submits that:

> …the regulatory framework should recognise the practical and commercial issues of raising capital and the limitations of the simplified financing assumption in the regulatory framework.[211]

EA states that the underlying difficulty of raising debt in the current market is of particular relevance to its business given its large forecast capex program.

Grid Australia states in its submission that Australian corporate bond markets have been effectively closed since the start of 2008, therefore companies are forced to raise debt from other more expensive sources (e.g. short term bank facilities).[212] As a consequence Grid Australia states that the benchmark cost of debt (based on corporate bond yields) is potentially 200 basis points below actual debt costs in the current market. Consistent with the views of the Queensland Government, Grid Australia states that network businesses are exposed to residual refinancing risk:

> It is also important to note that it is not possible to hedge a change in the debt margin. Unlike interest rates, where there is a deep derivative market, there is no such market for debt margins. Therefore, each time a company issues new debt, it faces the debt margin prevailing at that point in time and not the debt margin set in its revenue determination.[213]

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208 JIA, *Submission in response*, op. cit., September 2008, p.71.

209 ibid., pp.56-57.

210 ibid., p.71.

211 EA, *EnergyAustralia's submission on AER's issues paper on WACC*, September 2008, p.3.

212 Grid Australia, *Submisison in response*, op. cit, September 2008, p.7

213 ibid., p.7

**Consultant's review**

In a report prepared for the AER, Deloitte examined issues associated with refinancing risk, debt market liquidity and hedging instruments, both in the current market and historically.[214]

Specifically, Deloitte was asked to examine capacity in the Australian corporate bond market, in light of the Queensland Government's claim that the market lacks liquidity for large-scale refinancing over a 5-40 business day period. In response Deloitte states that:

> We discussed with Market Makers the potential to refinance large amounts of debt in the current financial markets, the timing required and any perceived threshold for the amount of debt issued.
>
> The consensus view was that in the current market it would be impossible to refinance billions of dollars of debt in such a short period of time. It was thought it would take at least 6-8 weeks to refinance large amounts of debt, and the current market would be limited in any one year with a threshold of anywhere between $50-250 million.[215]

Further, Deloitte advises that in a liquid bond market it would take approximately 30 business days to raise a typical bond issuance of between $200-500 million.

Deloitte examined the hedging instruments available to energy network businesses to meet the regulated cost of debt. It describes a typical strategy as follows:

> Typically private companies borrow on the longest tenor available, and then convert the fixed rate debt into synthetic floating rate debt. This would then be hedged during the reset period via an interest rate swap for the duration of the regulatory period.[216]

Deloitte refers to the financing strategies employed by SP AusNet and ETSA Utilities as two current examples of such a hedging strategy.[217] Importantly, Deloitte considers there is sufficient liquidity in derivatives markets to carry out such a strategy, even in the current market:

> …the consensus view was that through OTC and ETC markets there is still the capacity in the market to hedge large amounts of debt (up to $11.1 billion) within a 5-40 day window. Spreads in the interest rate swap market have increased, and are expected to increase further, but there is still available capacity in both the swaps and futures markets.[218]

Deloitte states that the current corporate bond market in Australia has no liquidity, and is likely to remain illiquid for the next 1-2 years. As a result it is expected that in the current market regulated energy network businesses will need to raise finance via bank debt:

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[214] Deloitte, *Australian Energy Regulator – Refinancing, debt markets and liquidity*, Report to the AER, 12 November 2008.

[215] ibid., p.12.

[216] ibid., p.13.

[217] ibid., p.28.

[218] ibid., p.12.

> Bank loans have become increasingly attractive because they offer; a) potentially the only available market and b) significantly lower rates than bonds, despite a sharp increase since the credit crisis as banks themselves face higher funding costs.[219]

Deloitte advises that bank debt is available in the current market, primarily over a 3 year term, and with indicative pricing for BBB+ corporates of the bank bill swap rate (BBSW) plus a premium of 165 basis points. In addition, establishment fees for bank facilities have increased significantly to 50-80 basis points.[220]

Despite the volatility and lack of liquidity in credit markets currently, Deloitte advises that:

> Market makers perceive that there is still an appetite for investment in regulated businesses in the current market.[221]

Finally, Deloitte advises that a prudent financing strategy will seek to have a maturity profile that is spread over time, so that at no one time is a significant portion of the portfolio in need of refinancing. This is needed to mitigate exposure to refinancing risk and to enable an averaging of credit spreads over time.[222]

**Issues and AER's considerations**

The Queensland Government's specific proposal regarding the methodology used to calculate the cost of debt is discussed at section 6.5.5.

The AER has considered the views from submissions regarding the ability of energy network businesses to meet the regulated cost of debt. These views are obviously most relevant in the context of the current market however they also raise important issues in the context of the regulatory regime more generally.

The potential options available to meet (or at least mitigate chances of not meeting) the regulated cost of debt appears to include:

- refinancing the entire debt portfolio in the specified averaging period, or
- assuming a diversified debt portfolio, during the averaging period hedge the interest rate on the existing debt portfolio to a fixed rate equivalent to the regulated cost of debt.

The view from the JIA and the Queensland Government is that the first of these options is not possible given the lack of capacity in Australian corporate debt markets. This is confirmed in the Deloitte report, which found that refinancing of an entire debt portfolio (e.g. $14 billion) would not be possible even in a liquid bond market, let alone in the current market.[223]

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219 ibid., p.9.

220 ibid., p.11.

221 ibid., p.12.

222 ibid., p.30.

223 ibid., p.12.

As with most aspects of an incentive-based regulatory regime, the methodology for determining the cost of debt is a benchmark assumption against which incentives are created for regulated businesses. This was the underlying basis for the statement in the issues paper regarding the discretion afforded to regulated businesses by the benchmark cost of debt assumption. The AER did not intend to imply a certain financing strategy on the part of regulated businesses, rather the statement presented what was considered to be the potential 'base case' for mitigating interest rate risk – in which all refinancing takes place in the specified averaging period. It was recognised that this is not the only strategy available to mitigate interest rate risk – the role of hedging instruments was also recognised.

The AER acknowledges the views from submissions that a prudent financing strategy will seek a diversified debt portfolio so as to minimise refinancing risk. On this basis the second option – to hedge interest rate risk exposure during the averaging period – appears a reasonable assumption. The AER notes the concerns raised in the Queensland Government's submission regarding the lack of liquidity in derivatives markets – exacerbated by the large volume of debt required by Queensland's regulated electricity businesses. To address these concerns the AER requested advice from Deloitte regarding the underlying liquidity in derivatives markets. In response Deloitte advised that there is in fact sufficient liquidity in interest rate swap markets:

> From discussions with market makers a network business with a solid BBB+ rating and strong balance sheet, hedge facilities for large volumes should be available through the OTC market via the large banks.[224]

Specifically, Deloitte advised that liquidity in these markets is sufficient for large amounts of debt (e.g. $11 billion) to be hedged over a 5-40 business day period.[225]

The AER considers the independent views from market markers as contained in the Deloitte report to be influential in terms of assessing liquidity in derivatives markets.

Submissions indicate that network businesses are indeed active in hedging markets, which accords with the analysis undertaken by Deloitte in its report. It is also consistent with other market-based evidence contained in a number of financial analyst's reports. For example, Macquarie Research comments on the financing strategy followed by the DUET Group as follows:

> DUE's treasury policy is to hedge a minimum of 80% of senior debt and 100% of the subordinated debt at the time of the revised regulatory decision for each of [the] assets that fall under the regulatory framework (ie United Energy Distribution and Multinet Gas Distribution network).[226]

Similarly, for SP AusNet:

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224 ibid., p.13.

225 ibid., pp.12.

226 Macquarie Research, *DUET Group: FY08 – another excellent year*, 1 September 2008, p.23.

> Currently, 98% of SPN's debt is hedged against interest rates, in line with the regulatory periods for each of the regulated businesses… As such, SPN has minimal exposure to interest rate risk.[227]

Also, on Spark Infrastructure Group:

> …the majority of the debt exposure is hedged, typically above 90% (1H08: 89.2%) for the duration of the regulatory period.[228]

On the basis of the available evidence it appears reasonable to expect that interest rate exposure on a large existing debt portfolio can be largely hedged away over the averaging period.

In terms of the interest rate risk faced by regulated network businesses, the question then becomes whether the interest rate on future borrowings (i.e. to fund new capex over the regulatory period) can also be hedged during the agreed averaging period. This is relevant in the context of submissions from the Queensland Government and Grid Australia, which argue that there is significant residual interest rate risk that cannot be mitigated at the reset. It is noted that comments from SP AusNet contained in an analyst's report from Goldman Sachs JB Were (GSJBW) are consistent with the comments from the Queensland Government on this point:

> SPN hedges its interest rate exposure in line with resets, but is still exposed to credit spreads at the time of refinancing.[229]

The AER understands that the basis for these concerns is likely to arise primarily from the current conditions in credit markets. The impact of the credit crisis on bond yields is indeed material, particularly with respect to corporate bonds. This is illustrated in figure 6.1 taken from the Deloitte report.

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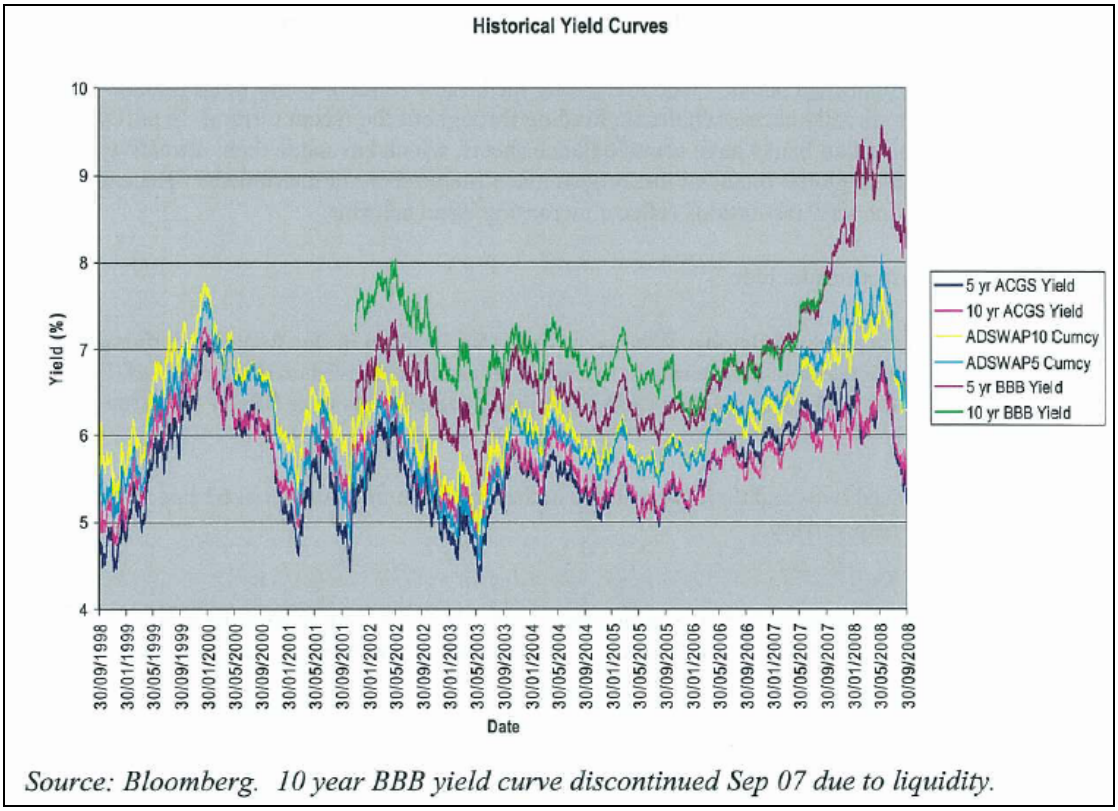
227 Macquarie Research, *SP AusNet – Upgrading to outperform*, 19 September 2008, p.4.

228 Macquarie Research, *Spark Infrastructure Group – FY08: No change to the solid story*, 26 August 2008, p.3.

229 GSJBW, *SP AusNet: Management briefing – steady as she goes*, 8 April 2008, p.1.

**Figure 6.1: Historical bond yields**




Source: Deloitte[230]

Deloitte advises that the bond market for BBB+ corporates has effectively closed since the onset of the credit crisis, and that existing BBB+ corporate bonds are currently trading around 300 basis points above CGS (i.e. nominal yield of around 8 per cent).

It is important to reiterate that the current NER methodology for calculating the debt risk premium allows for regulated businesses to be fully compensated for prevailing market conditions at the time of the reset. Therefore those businesses currently facing regulatory resets can effectively 'lock-in' the current cost of debt for the length of the regulatory period.

The AER acknowledges that the current market volatility may create interest rate risk for regulated businesses, particularly for businesses that:

- had regulatory resets prior to the onset of the credit crisis, and
- need to raise finance to fund new capex in the current market.

However, as Deloitte notes in its report, despite the current turbulence in financial markets the outlook appears positive for regulated energy network businesses. This sentiment is also evident in a number of financial analyst's reports. For example,

[230] Deloitte , op. cit., November 2008, p.9, graph 1.

Macquarie Research states, in relation to a recent refinancing undertaken by SP AusNet, that:

> SPN noted that the order book was almost two times oversubscribed. This issue along with it's A$1.55bn bank debt facility which was refinanced in Feb 08 again clearly demonstrates that these type of regulated utility businesses are not experiencing significant difficulties raising capital.[231]

Also, ABN Amro has stated recently that:

> SPN and SKI are THE places to park your money, in our view. Not only does SPN have almost a 12% cashflow-backed yield that is going to look even more attractive as the RBA cuts rates again next month, in our view, but the stock also has conservative gearing in-line with its regulatory benchmarks.
>
> This means that any blow-out in credit spreads can largely be passed through at each regulatory reset. In our view, this is about as bullet proof as you can get in this market…[232]

Further, Macquarie Research examines the impact of the regulatory regime on the ability of regulated businesses to cope with the current volatility:

> Despite being highly geared relative to the market, the listed distribution networks are in a strong position to cope with tight, volatile credit markets.
>
> The safety net is twofold. Firstly, the majority of the asset debt exposure is hedged, typically above 90%. Secondly, the regulated returns from the assets are calculated based on the same cost of debt as the regulator uses in his WACC assumptions thereby reducing the effects of rising debt costs on the asset owners.[233]

It is also important to note that regulated energy network businesses can still gain access to finance via bank debt, at a current indicative yield for BBB+ of BBSW plus a premium of 165 basis points (i.e. nominal yield of around 6.65 per cent).[234] Based on these numbers from Deloitte, regulated businesses facing revenue resets in the current market may in fact be able to beat the regulated cost of debt (i.e. based on the corporate bond yield) by approximately 150 basis points. However it is acknowledged that for some businesses the current cost of debt may exceed the regulated cost of debt as locked-in at a prior reset (i.e. pre-credit crisis).

The AER understands there are a number of ways that regulated energy network businesses can hedge future debt requirements ex-ante.[235] While these options may be expected to incur a premium, it does provide evidence that firms have some ability to lock-in the future cost of debt at close to the regulated rate. In fact this type of activity

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231 Macquarie Research, op. cit., 19 September 2008, p.3.

232 ABN Amro, *SP AusNet – The place to hide*, 30 September 2008.

233 Macquarie Research, op. cit., 1 September 2008, p.19.

234 Deloitte, op. cit., November 2008, p.11.

235 For example, a business could create a synthetic forward borrowing contract with a bank, with the fees charged by the bank based on the difference between the bank's borrowing and lending rates. Alternatively a business could enter into a contract with a bank to borrow in the future a certain amount at the regulated cost of debt.

is observed in practice, as these current examples cited in financial analyst's reports indicate:

- DUET Group (DUE) has locked in debt facilities in advance for upcoming capital expenditure related to the Dampier to Bunbury pipeline,[236] and

- SP AusNet (SPN AU) has $360 million of undrawn facilities available to fund future capex.[237]

The AER acknowledges that it may not be possible hedge future debt / interest obligations completely, however firms should be expected to engage in such activities to the extent it is wealth creating for shareholders.

Finally, to the extent that these residual interest rate and refinancing risks are systematic, they should be incorporated into the existing returns, in particular through the equity beta. On this basis it could be argued that regulated energy network businesses are already fully compensated for these risks and further compensation is not required. That is, if a firm exercises its discretion to take on interest rate risk and is unsuccessful, the regulatory regime should have already fully compensated the firm for bearing this risk (at least in expectation). Further, the regulatory regime provides for symmetrical incentives around the benchmark cost of debt. That is, to the extent that the actual cost of debt falls below the regulated cost of debt during the regulatory period, businesses are allowed to retain the benefits.

In sum the AER considers there is insufficient persuasive evidence to conclude that the regulatory regime imposes material levels of interest rate risk which:

- cannot reasonably be managed by regulated energy network businesses, and

- is not compensated (at least in expectation) via regulated prices.

The regulatory regime should continue to provide symmetrical outcomes with respect to the benchmark cost of debt, with interest rate risk fairly compensated via the equity beta.

In light of the above analysis, it is clear that hedging is likely to play an important role for regulated energy network businesses in meeting the regulated cost of debt. Given this assumption, the question becomes whether hedging costs should be compensated for via the regulatory regime. The AER has previously considered an allowance for hedging costs in the context of its 2007 Powerlink revenue determination.[238] In its final decision the AER did not allow recovery of hedging costs in allowed revenues, for the following reasons:

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[236] Macquarie Research, op. cit., September 2008, p.19.

[237] Macquarie Research, *SP AusNet (SPN AU) – Strong and steady… Utilities style*, 20 November 2008.

[238] AER, *Decision: Powerlink Queensland transmission network revenue cap 2007-08 to 2011-12*, Final Decision, 14 June 2007, pp.95-97.

- Powerlink did not demonstrate that its proposed hedging cost allowance was 'efficient' – that the value of any reduction in risk would be greater than the cost of achieving that risk reduction

- the CAPM framework should sufficiently capture interest rate risk in the equity beta, and

- Powerlink had not established that the total compensation for risk would be higher if an alternative model to the CAPM was applied.[239]

The AER notes that the Queensland Government in its submission has proposed that an allowance for hedging costs be included in regulated revenues.[240] Specifically the submission argues that the extent to which a regulated energy network business hedges interest rate risk may impact on its credit rating:

> Failure of a regulated entity to hedge may jeopardise the ability of the business to maintain its credit rating and be able to achieve the regulated return…
>
> …As a consequence, the benefits of hedging are likely to be captured by way of a higher credit rating than what would apply if these firms did not hedge. To ensure consistency both the costs and benefits of hedging should be acknowledged.[241]

The AER considers that these arguments for the allowance of efficient hedging costs in regulated revenues require further consideration.

However, as stated in the issues paper, the NER do not allow transactions costs to be included in the WACC as the cost of debt is defined as the risk free rate plus the debt risk premium (excluding transaction costs).[242] Accordingly the NER do not require the AER to review the methods of compensating for debt and equity raising costs as part of this review. To the extent that debt transactions costs satisfy the operating expenditure (opex) criteria in the NER they may be recovered in regulated revenues at the time of the reset.

Therefore on this basis the AER considers that any potential opex allowance for hedging costs is best considered outside of this review, jointly with debt and equity raising costs.

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239 ibid., pp.95-97. The AER received advice from consultants NERA on hedging costs for the purposes of the Powerlink review [NERA Economic Consulting, *Hedging for regulated businesses*, 12 April 2007].

240 Queensland Government, *Submission in response*, op. cit., September 2008, p.8. It is noted that the Queensland Government's preferred solution to mitigate refinancing risk is to reset the cost of debt on an annual basis. This specific proposal is discussed separately at section 6.5.5.

241 ibid., pp.7-8.

242 NER, cls. 6A.6.2(e) and 6.5.2(e).

**AER's conclusion**

The AER has considered the views raised in submissions regarding the ability of regulated energy network businesses to meet the regulated cost of debt. Based on the analysis above the AER concludes as follows:

- As with most aspects of an incentive-based regulatory regime, the methodology for determining the cost of debt is a benchmark assumption against which incentives are created for regulated businesses.

- Evidence indicates that network businesses are active in hedging markets, which accords with views in submissions and the analysis undertaken by Deloitte in its report. This allows interest rate risk to be mitigated to the greatest extent possible.

- The regulatory regime should continue to provide symmetrical outcomes with respect to the benchmark cost of debt, with interest rate risk fairly compensated via the equity beta.

- Any opex allowance for hedging costs is best considered outside of this review, jointly with debt and equity raising costs.

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

### 6.5.3 Term of the risk free proxy

Since the Tribunal's GasNet decision,[243] all regulators in the NEM have adopted a 10-year Commonwealth Government Securities (CGS) as the risk free proxy (including the ACCC and the AER).[244] As stated in the issues paper, 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 (and the corporate bond rate) that results in fair ex-ante compensation for any given investment over both the regulatory period and the life of the assets.[245] This should result in an ex-ante expected compensation that investors would get elsewhere in the capital markets for investments of similar risk.

The issues paper raised the following broad issues on the term of the risk free proxy:

- refinancing risk

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243 Australian Competition Tribunal, *GasNet Decision,* 2003, op. cit.

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

245 As stated in section 6.2 cls. 6A.6.2(e) and 6.5.2(e) require equivalence in the maturities of the nominal risk free rate and the corporate bond.

- the objective that the present value of expected future cash flows should equate to the initial investment (the 'present value principle'), and

- consistency with the estimate of the MRP.

**Submissions in response to issues paper**

The JIA submit that a 10 year maturity is the appropriate term for the risk free rate proxy in determining the cost of debt and the cost of equity:

> There is no evidence to demonstrate that a change to a risk-free proxy with a maturity that matches the regulatory period (ie, a change to a 5 year maturity instrument) leads to a more efficient outcome than the current 10 year term bond and that a 'better' estimate of the MRP can be derived from such a change.[246]

In support of these statements the JIA state as key considerations:

- The previously adopted MRP is based on 10 year CGS as the risk free rate proxy. This is a precedent established by the Tribunal's GasNet decision.

- There is a paucity of research on the MRP using a 5 year horizon.

- The yield on a 5 year maturing bond is more volatile that than on a 10 year bond, therefore potentially leading to more volatile revenue requirements if adopted.

- The average shape of the yield curve between 5 year and 10 year bonds is relatively flat. Cost arising from hedging, rollover risk and transactions costs when funding a shorter debt term will likely more than offset the average term premium in longer term bonds.[247]

In its submission the JIA present data on the debt profile of listed network businesses.[248] Based on the data presented, the JIA state that two clear messages emerge:

> The first is that these firms borrow long term, not short term. The weighted average term is 11.4 years. This means the interest rates charged to the businesses will include any term structure and term based credit premium…
>
> …The second message is that these firms stagger their financing over time. This is undertaken to minimise refinancing risk…[249]

The JIA submit that this provides empirical evidence that retention of a 10 year term will not over-compensate network businesses for costs or risks they do not bear. In fact with a weighted average debt term of 11.4 years a move to a five year term will under-compensate network businesses on average (assuming a positive term

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246 JIA, *Submission in response,* op. cit., September 2008, p.58.

247 ibid., p.58.

248 ibid., p.69. The businesses included in the JIA's sample are Powercor, Citipower, ETSA Utilities, Envestra, Jemena, SPI Elect & Gas, United Energy and GasNet.

249 ibid., p.68.

premium). Further it is submitted that moving to a five year term implies refinancing more often than under current practice, which increases refinancing / rollover risk.

The JIA engaged consultants Officer and Bishop to examine the issues raised in the AER's issues paper on the appropriate term for the risk free rate. According to Officer and Bishop, ideally the maturity of the CAPM should be the planning period for which the CAPM is to be used to estimate expected returns. For regulated network businesses the appropriate investment planning horizon is long term, given the long term nature of the underlying assets. On this basis, and given the relative depth and liquidity of the 10 year CGS market, Officer and Bishop support the use of a 10 year maturing proxy for the risk free rate.[250]

Officer and Bishop examine the relative liquidity in CGS markets across different terms to maturity. Based on RBA data, they find that nearly 70 per cent of the dollar value of Treasury bond tenders since August 1996 has been for terms greater than ten years, as illustrated in table 6.2.

**Table 6.2: CGS tenders August 1996 to August 2008 ($m)**

| Over 1 year and up to 3 years | Over 3 years and up to 5 years | Over 5 years and up to 7 years | Over 7 years and up to 10 years | Over 10 years and up to 15 years | Over 15 years |
|---|---|---|---|---|---|
| 0 | 6,203 | 8,303 | 1,902 | 34,703 | 0 |
| 0% | 12% | 16% | 4% | 68% | 0% |

Source: Officer and Bishop[251]

Officer and Bishop state that this data provides an indication that the primary market for CGS is deepest at the long end (i.e. for terms greater than 10 years). It is acknowledged that shorter term bonds become available with the passage of time, however no data is presented which explores secondary market data.

Officer and Bishop also point out that the use of a 10 year maturing proxy in estimating the MRP is standard commercial and academic practice, with one of the reasons being the lack of historical data at the shorter end of the yield curve (i.e. for terms less than 10 years).[252]

Officer and Bishop examine the key arguments for and against matching the term of the risk free rate with the term of the regulatory period. In their view, the costs of moving from a 10 year term to a term matching the length of regulatory period are likely to outweigh the benefits from such a change:

> …RBA Yield data shows an average of 18 basis points difference between the yield on ten year and five year bonds from January 1972 to present – upward sloping but small. If this is of benefit to those regulated then the

[250] B. Officer and S. Bishop, op. cit., September 2008, p.13.

[251] ibid., p.14, table 3.

[252] ibid., p.14.

> challenge is to show that this is not offset by the exposure to additional transactions costs and rollover risk.[253]

According to Officer and Bishop, in to order to justify a move to match the term of the risk free rate with the term of the regulatory period (usually five years):

> …it would be necessary to be of the view that:
>
> - There is an active and deep market for the five year proxy for the risk free rate;
> - The financing transactions costs that may be imposed on regulated firms are not higher than under current arrangements (ceteris paribus);
> - The roll-over risk is not higher as a result of 'going to market' more frequently than other arrangements under a ten-year financing regime;
> - The term structure is, on average, upward sloping from five to ten year maturities and passing on the financing risk and transactions cost to consumers does not dampen demand arising from this;
> - The market risk premium is estimated using observed historical market returns and the observed yield on a five year Commonwealth bond or other proxy.[254]

Officer and Bishop conclude there is no evidence to suggest that matching the term of the risk free rate with the term of the regulatory period yields a closer to zero answer applying the present value principle, all costs and benefits appropriately considered.

**Consultant's review**

The AER engaged Deloitte to examine the current and historic empirical evidence relevant to the appropriate term of the risk free rate, and in particular to examine the points raised by the JIA on the potential use of a 5 year term assumption. Specifically Deloitte examined:

- liquidity in CGS and corporate bond markets
- debt portfolios in the energy network sector, and
- term premium on long term bonds.

***Liquidity in bond markets***

In its report Deloitte provides data indicating the current level of liquidity in CGS and corporate bond markets, at different terms to maturity. Deloitte states that CGS issuances are timed so as to maintain a consistent maturity curve and specifically to ensure sufficient liquidity in the 3 year and 10 year futures bond market.

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253 ibid., p.18.

254 ibid., p.20.

The data indicates that the current CGS on issue (as at 30 September 2008) have terms to maturity ranging between one and 13 years. The majority of corporate (BBB+) bonds currently on issue have terms to maturity of less than 10 years.

Deloitte also examined potential market issuances and liquidity in bond markets over the period 2009-19. Data from the Australian Government's May 2008 Budget announcements indicates that the majority (81 per cent) of planned CGS issuances will have a term at issue of between 5 and 6 years, while the remaining planned issuances will have a term at issue greater than 10 years.[255]

According to Deloitte, given the current state of financial markets the outlook for liquidity in corporate debt markets is much more uncertain:

> In the current market, finance for BBB+ corporates is primarily 3 year bank debt, with very little liquidity in 5 yr bank debt…
>
> From published research and discussions with market makers, the expectations are for the domestic corporate bond market to remain illiquid, possibly into 2010 and beyond. Given the historic events in credit markets, market makers were reticent to make any predictions and caveated their comments with the uncertainty surrounding markets generally. Their expectations are for the corporate bond markets to have a very slow recovery, particularly for BBB+ issuances.[256]

Deloitte states that the small volume of corporate bond issues undertaken in 2008 has been by large financial institutions only, and for these issuances the average maturity has shortened to around 2 years compared with an historical average maturity of 4½ years previously.[257]

***Debt portfolios in the energy network sector***

Deloitte collected data on the debt maturity profiles of both private and government-owned energy network businesses. The data is sourced from published 2007 annual reports and financial statements.[258] Tables 6.3 and 6.4 illustrate the results.

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255 Deloitte, op. cit., November 2008, p.8; AER analysis.

256 Deloitte, op. cit., November 2008, p.9.

257 ibid., p.8.

258 In its report Deloitte notes limitations with the data sourced from published annual reports and the financial statements of listed companies.

**Table 6.3: Debt profile of privately owned energy network businesses**

| | | | | Average Term | | |
|---|---|---|---|---|---|---|
| **Distribution** | **Ownership** | **Amount ($M)** | **Not disclosed[(b)]** | **<1 Year** | **1 to 5 Years** | **> 5 Years** |
| CitiPower & Powercor | Non Gov't | 4,604 | | 1,013 | 1,763 | 1,828 |
| ETSA Utilities | Non Gov't | 4,098 | | 331 | 1,912 | 1,855 |
| SP AusNet | Non Gov't | 3,671 | | 537 | 2,051 | 1,083 |
| Envestra | Non Gov't | 3,661 | | 406 | 967 | 2,288 |
| APA Group[(a)] | Non Gov't | 4,297 | | 364 | 2,175 | 1,758 |
| **Summary** | | **20,331** | | **2,651** | **8,868** | **8,812** |
| **% share** | | **100%** | | **13%** | **43%** | **44%** |

Source: 2007 Annual reports, Deloitte[259]
(a) Now parent company of GasNet
(b) Floating rate instruments, tenor not disclosed

[259] ibid., p.27.

**Table 6.4: Debt profile of government owned energy network businesses**

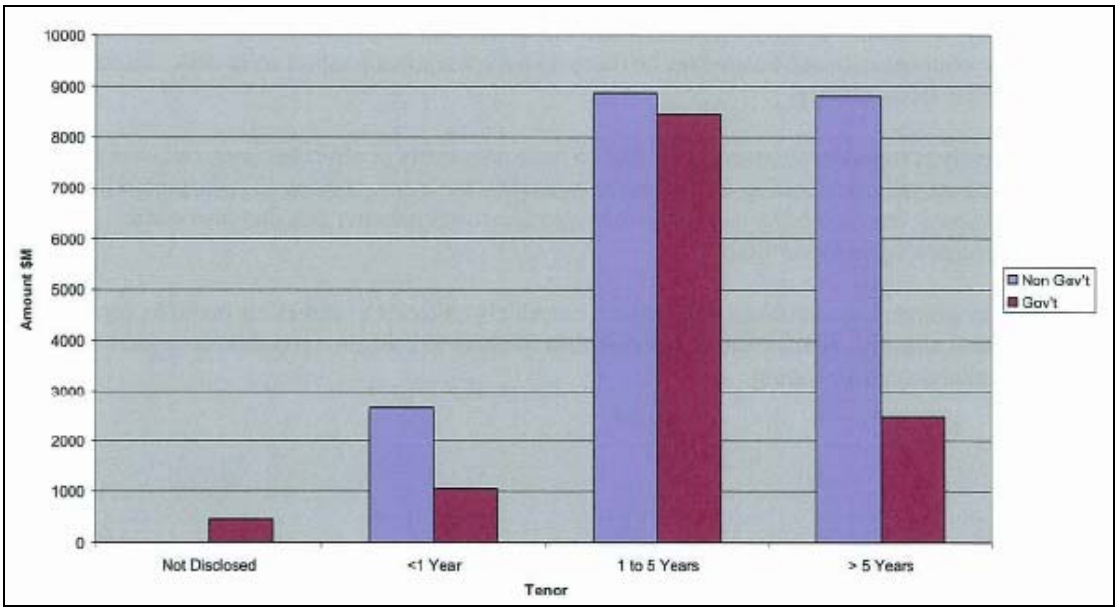
| Distribution and Transmission | Ownership | Amount ($M) | Not disclosed[(a)] | Average Term <1 Year | 1 to 5 Years | > 5 Years |
|---|---|---|---|---|---|---|
| Energex | Gov't | 3,265 | 218 | - | 3,045 | 2 |
| Ergon | Gov't | 2,535 | 50 | 91 | 2,394 | - |
| Horizon Power | Gov't | 132 | - | 38 | 51 | 43 |
| Power and Water Corp | Gov't | 349 | - | 10 | 47 | 292 |
| Western Power | Gov't | 2,552 | 173 | 510 | 1,072 | 797 |
| Powerlink | Gov't | 2,007 | (59) | 181 | 1,047 | 838 |
| Transend Networks | Gov't | 118 | 33 | 5 | 80 | - |
| TransGrid | Gov't | 1,454 | - | 254 | 717 | 483 |
| **Summary** | | **12,411** | **453** | **1,051** | **8,452** | **2,455** |
| **% share** | | **100%** | **4%** | **8%** | **68%** | **20%** |

Source: 2007 Annual reports, Deloitte[260]
(a) Floating rate instruments, tenor not disclosed

Deloitte then combined the results from the private and government-owned businesses to estimate an industry average maturity profile of debt portfolios. Figure 6.2 illustrates the results.

[260] ibid., p.28.

**Figure 6.2: Weighted average maturity of debt portfolios in the energy network sector**




Source: Deloitte[261]

As figure 6.2 illustrates, debt portfolios in the energy network sector are somewhat staggered across different maturities, however it appears that the majority of debt had maturities less than five years as at the end of 2007. At this time, government businesses held relatively more short term debt (i.e. less than 5 years), whereas private businesses held relatively more long term debt (i.e. greater than 5 years).

Deloitte states that these results support the notion that energy network businesses will try to achieve a diversified debt portfolio, so as to minimise refinancing risk. On the comparative results Deloitte comments as follows:

> Our analysis of government owned network businesses vs. publicly owned shows a similar debt maturity profile for both, but with non-government businesses having a significantly higher proportion of floating rate debt… The shorter debt profile of government businesses most likely reflects the greater confidence of government entities to refinance closer to the reset period.[262]

Deloitte notes that the data presented in its report:

> …should be typical of normal market conditions as the current credit crisis would likely have had minimal impact on entities debt structure in their 2007 annual reports.[263]

Given the current state of corporate debt markets, Deloitte states that financing is most likely only available over 3 years, therefore maturity profiles may begin to shorten going forward.

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[261] ibid., p.29.

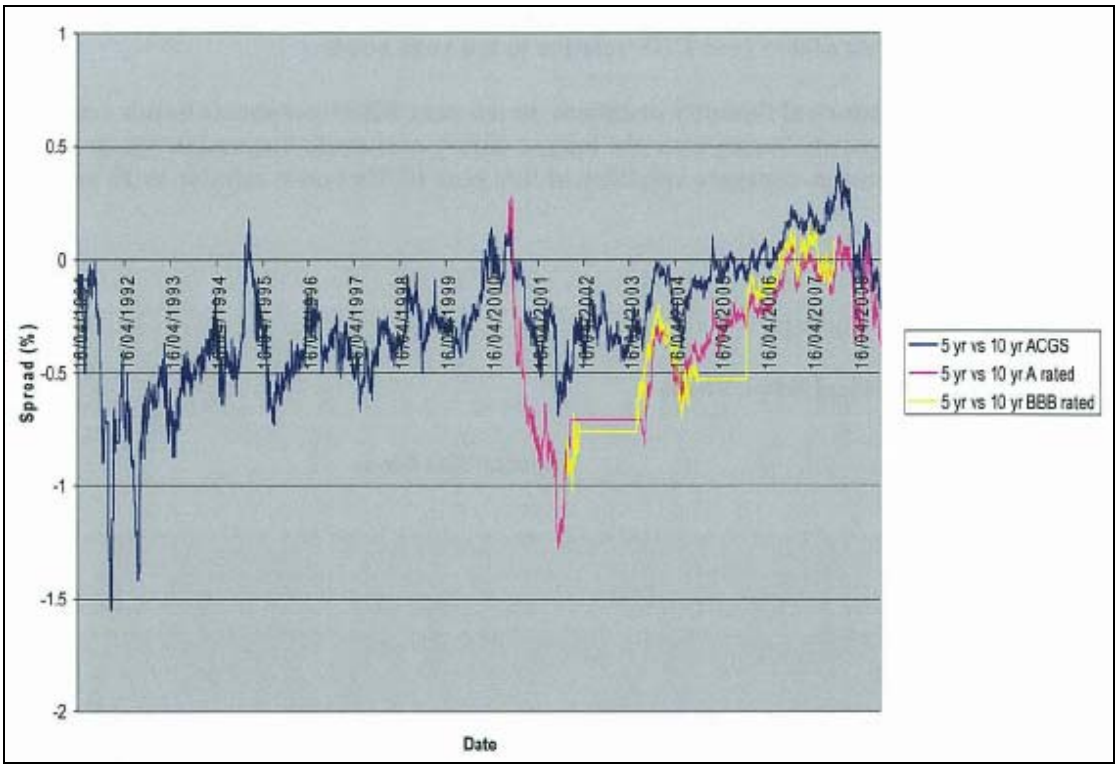
[262] ibid., p.30.

[263] ibid., pp.29-30.

***Term premium on long term bonds***

Deloitte examined the available data from Bloomberg on the historic and current term premium on 10 year bonds relative to 5 year bonds. Figure 6.3 illustrates the results of this analysis over the period 1991 to 2008, for both CGS and corporate bonds (A rated and BBB rated).

**Figure 6.3: Historical spreads on 5 year vs 10 year bonds[(a)]**




Source: Deloitte[264]

(a) Note that a negative spread indicates a positive term premium

Deloitte comments on the results in figure 6.3 as follows:

> The data implies that for a majority of the sample period, we had a normal upward sloping yield curve, with yield rising as maturity lengthens. From 2006 the interest rate curve has had periods where it is inverted, and short term yields have exceeded long term yields.[265]

For the 2001-2005 period, Deloitte estimates the average term premium of 10 year over 5 year CGS at between 23 and 52 basis points. For both A and BBB rated corporate bonds Deloitte estimates an average term premium of 58 basis points over the same period.[266]

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264 ibid., p.16.

265 ibid., p.17.

266 ibid., p.16.

**Issues and AER's considerations**

This section will focus exclusively on the issues raised by the JIA and its consultants with respect to the appropriate term of the risk free rate. The issue of maintaining consistency with historical estimates of the MRP – one of the key reasons adopted by the Tribunal in its GasNet decision – is discussed separately at section 6.5.4.

One of the key arguments raised by Officer and Bishop is that a longer term risk free rate better reflects the investment horizon of network businesses given the long term nature of the underlying assets:

> The argument for a term consistent with the regulatory period would be correct if the entity, at the time they purchased the assets, were guaranteed that they would get compensation for the required return based on a five year benchmarked fixed interest security and at the end of five years, if they choose to walk away from the asset, they would be fully compensated.[267]

This implies that network businesses will always seek to match the maturity of liabilities with that of assets, so as to 'guarantee' recovery of their required return. According to Officer and Bishop, a five year debt term implies that the full cost of the asset must be recovered over that same five year period, even though the economic life of the asset might be greater (i.e. 40 to 50 years).

There is no evidence provided by Officer and Bishop to support this assertion. In the AER's view, the fact that the term over which assets are financed is less than the asset's economic life does not imply that the full cost of regulated assets needs to be recovered over this shorter period. The regulatory regime allows for the full recovery of the costs of network assets, over the asset's economic life (including a rate of return). Officer and Bishop appear to suggest that unless network businesses can match the maturity of assets and liabilities so as to remove refinancing risk altogether, the investment would not take place ex-ante. This seems a rather unrealistic suggestion, and is inconsistent with the views from the JIA, the Queensland Government and Deloitte, all of whom recognise that refinancing risk cannot be removed entirely, but rather that it can be best mitigated with a diversified debt portfolio.[268]

The AER notes that the argument for matching the debt term with asset lives is in accordance with the Tribunal's conclusions in the 2003 GasNet decision.[269]

The issues paper noted that the Tribunal in its GasNet decision did not specifically discuss or address the possibility of over-compensation resulting from the use of a term for the risk free rate that exceeds the length of the regulatory period. It appears that, that specific issue was not argued before the Tribunal. As discussed below, there is evidence to suggest that regulated network businesses will in fact be over-compensated on average with a 10 year term given that cash flows and rates of return are reset at the end of each regulatory period.

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267 Officer and Bishop, op. cit., September 2008, p.19.

268 JIA, *Submission in response*, op. cit., September 2008, p.71.

269 Australian Competition Tribunal, *GasNet decision*, op. cit., 2003.

Further, there is no evidence to suggest that network businesses seek to match the maturity of assets and liabilities as a matter of preference. The current regulatory regime effectively compensates network businesses for the issuance of long term (i.e. 10 year) debt. Therefore if energy network businesses have a natural preference to issue long term debt, we would expect the weighted average debt portfolio to be around ten years or greater, given that the spread on ten year bonds is compensated via regulated prices. However the empirical evidence from Deloitte does not support this – as at the end of financial year 2007, Deloitte estimates the weighted average term of debt portfolios for regulated energy network businesses at around five years or less. Importantly, Deloitte indicates that the weighted average debt maturity profiles provided in its report are typical of normal (i.e. pre-crisis) market conditions.[270]

Rather than seeking long term debt as a matter of preference, the better explanation of a prudent financing strategy seems to be one that maintains a diversified debt portfolio with a range of maturities, so as to minimise refinancing risk. This is consistent with the views of Deloitte:

> Ideally companies structure their debt to have a maturity profile that is spread over time, so at no one time are they refinancing or looking to raise debt for large portions of their portfolio. This ensures a company has the ability to manage its exposure to refinancing risk and also enables an averaging of the credit spread over time.[271]

The need for a diversified portfolio is also raised in submissions from the JIA[272] and the Queensland Government.[273] In addition, the AER notes the views from the MEU in its submission regarding the financing strategies employed by competitive firms:

> The assumption that regulated businesses would as a matter of preference seek long term debt is incorrect as a firm operating competitively will always seek to minimise its costs. The wider market implements a mix of short and longer term debt (but seldom longer than 8-10 years in duration) as this is efficient. This does not appear to place a higher refinancing risk on firms, or they would not do so.[274]

Therefore within a diversified portfolio refinancing decisions on individual packages of debt could be expected to be subject to prevailing market conditions and expectations of future interest rate movements. Rather than seek to issue long term debt as a matter of preference, firms would be expected to act rationally in their refinancing decisions. The influence of prevailing market conditions on debt terms is supported by the Deloitte report, which indicates that shorter term debt (e.g. 3 year bank debt) is the predominant source of financing in the current market, given the significant premium payable on longer maturities.[275]

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270 Deloitte, op. cit., November 2008, p.29.

271 ibid., p.30.

272 JIA, *Submission in response*, op. cit., September 2008, p.71.

273 Queensland Government, *Submission in response*, op. cit., September 2008, p.2.

274 MEU, *Submission in response*, op. cit., September 2008, p.40.

275 Deloitte, op. cit., November 2008, p.9.

In sum, based on the available information the AER considers there is no evidence to suggest that network businesses will seek to issue long term debt as a matter of preference. In the AER's view, it appears that the evidence upon which this current assessment has been made was not before the Tribunal at the time of making its conclusions in the GasNet decision.

The AER notes the views from the JIA's consultants Officer and Bishop regarding the need to consider all potential costs and benefits in assessing whether a move to match the length of the regulatory period is justified. This follows from the discussion in the AER's issues paper regarding the 'present value principle':

> …in a regulatory setting, use of a term for the risk free rate that exceeds the length of the regulatory period may lead to overcompensation – for risks that are essentially removed at each reset…
>
> …this outcome does not appear consistent with the principle that in setting fair rates of return on regulated investments, the present value of expected future cash flows should equate to the initial investment such that the net present value of the investment is zero (the 'present value principle').[276]

In the AER's view the JIA have responded appropriately to this particular aspect of the issues paper. The framework established by Officer and Bishop – to consider all potential costs and benefits from moving to a term matching the length to the regulatory period – appears appropriate and reasonable for the purposes of this review. With this framework in mind, the section below discusses each of the potential (incremental) costs and benefits considered by Officer and Bishop in their paper prepared for the JIA. These are as follows:

- liquidity in bond markets
- refinancing and/or rollover risk
- transactions costs, and
- term premium.

The issue of consistency with the MRP is discussed separately at section 6.5.4.

***Liquidity in bond markets***

Officer and Bishop state that for a move away from current practice to be justified it must be established that:

> There is an active and deep market for the five year proxy for the risk free rate…[277]

Based on primary market data, Officer and Bishop argue that the market for CGS is deepest at the long end (i.e. for terms greater than 10 years). Although it is acknowledged that shorter term bonds become available with the passage of time, no data is presented which explores secondary market data.

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[276] AER, *Issues paper*, op. cit., August 2008, p.33.

[277] B. Officer and S. Bishop, op. cit., September 2008, p.20.

The AER considers that the analysis of liquidity in CGS markets must consider secondary market data, as current terms to maturity appear most relevant.[278] In addition, as the NER requires the term of the debt risk premium to be equivalent to the term of the risk free rate, liquidity in corporate bond markets is also relevant.[279]

In its report Deloitte provides data indicating the current level of liquidity in CGS and corporate bond markets, at different terms to maturity. Table 6.5 summarises the results of this analysis.

**Table 6.5: Current outstanding CGS and corporate debt (BBB+) – weighted average**

| | Commonwealth Government Securities (CGS) | | BBB+ corporate bonds |
|---|---|---|---|
| | Term at issue | Term to maturity[(a)] | Term to maturity[(a)] |
| Less than 5 years | 0% | 57% | 61% |
| 5 to 10 years | 13% | 25% | 12% |
| Greater than 10 years | 76% | 18% | 27% |

Source: Deloitte;[280] AER analysis
(a) As at 30 September 2008

It is noted that the data in table 6.5 on the 'term at issue' of outstanding CGS is consistent with the primary market data presented by Officer and Bishop.

The secondary market data indicates that 57 per cent of the current outstanding CGS on issue have a term-to-maturity of less than 5 years, while 18 per cent have a term-to-maturity of greater than 10 years (as at 30 September 2008). For corporate (BBB+) bonds currently on issue, 61 per cent have a term-to-maturity of less than 5 years.

This analysis indicates that the current market for outstanding CGS and corporate (BBB+) bonds is most liquid at the shorter end (i.e. for maturities less than 10 years).

Going forward, the data from Deloitte indicates that most new CGS issuances are expected to be for maturities around the 5 year term; however liquidity at the longer end is not expected to be an issue given the Australian Government's commitment to maintain liquidity in both the 3 and 10 year bond futures market.[281] Due to current market conditions it is clear from Deloitte's advice that the market for new corporate bond issuances is expected to remain illiquid for some time. However it is likely that

278 The relevance of secondary market data in this context was discussed at the AER's WACC review expert's group round-table discussion [AER, *Australian Energy Regulator review of WACC parameters for electricity transmission and distribution*, Transcript of proceedings, Melbourne, 10 October 2008, pp.9-12].

279 As stated in section 6.2, cls. 6A.6.2(e) and 6.5.2(e) require equivalence in the maturities of the nominal risk free rate and the corporate bond.

280 Deloitte, *Report to the AER*, op. cit., November 2008, p.7, tables 1 and 2. Deloitte compiled the data from Bloomberg.

281 ibid., pp.7-8.

liquidity in corporate bond markets, if any, will be concentrated at the short end of the yield curve.

The AER considers the analysis undertaken by Deloitte provides evidence that, at least in a relative sense, there is not an issue with liquidity in shorter term (e.g. five year) CGS and corporate bond markets. On this basis a potential move to a term matching the length of the regulatory period is not expected to impose additional costs in terms of illiquidity.

***Refinancing / rollover risk***

Officer and Bishop state that for a move away from current practice to be justified it must be established that:

> The roll-over risk is not higher as a result of 'going to market' more frequently than other arrangements under a ten-year financing regime.[282]

The suggestion from Officer and Bishop of an increase in rollover risk if the term is matched to the length of the regulatory period appears to be based upon data provided by the JIA. The data indicates that the weighted average debt maturity of listed energy network businesses is 11.4 years, implying that a move to a shorter (i.e. five year) term requires refinancing more often than under current practice. Further the JIA submit that a move to a five year term will under-compensate network businesses on average, as it will not compensate for the term premium of long term (i.e. 11.4 year) debt.

The AER considers that the analysis undertaken by the JIA on the debt maturity profile of energy network businesses contains some important omissions that may bias the results. Specifically the JIA data does not include:

- short term debt on issue, and
- the debt profile of government-owned energy network businesses.

While the JIA implicitly acknowledges that energy network businesses do hold short term debt in their portfolios, it states that data was omitted from the analysis for materiality reasons:

> It was noted that the Bloomberg data does not have bank debt but its inclusion is not expected to materially affect the results on the grounds that it is not a preferred source of funding long term assets.[283]

The JIA do not indicate the reasons for omitting government businesses from its sample however it acknowledges that these businesses have tended to issue shorter debt maturities in the past.

The AER considers there are strong reasons to support the inclusion of data on all debt on issue (i.e. both long term and short term) as well as data from all regulated energy network businesses (i.e. both private and government). The inclusion of this

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[282] B. Officer and S. Bishop, op. cit., September 2008, p.20.

[283] JIA, *Submission in response*, op. cit., September 2008, p.70.

data is clearly relevant to the analysis of debt portfolios for a benchmark regulated energy network business.

The analysis undertaken by Deloitte includes data on a wider sample of debt on issue and a wider sample of regulated businesses. The results are summarised in table 6.6.

**Table 6.6: Debt financing in the energy network sector**

| | | Average Term | | |
|---|---|---|---|---|
| **Network Businesses** | **Not Disclosed** | **<1 Year** | **1 to 5 Years** | **> 5 Years** |
| Government | 4% | 8% | 68% | 20% |
| Non Government | 0% | 13% | 44% | 43% |
| Industry Average | 1% | 11% | 53% | 34% |

Source: Deloitte[284]

As table 6.6 indicates, as at 2007 the majority (64 per cent) of debt on issue by energy network businesses had a term-to-maturity of less than five years. This implies a weighted average term of debt portfolios across the energy network sector of between 1 and 5 years. Importantly, the AER notes the advice from Deloitte that the profiles reflected in table 6.6 are typical of 'normal market conditions' – that is, the data pre-dates the current credit crisis that became evident in 2008.

The AER considers that the analysis provided by Deloitte in its report represents a more comprehensive snapshot of the weighted average maturity of debt portfolios for regulated energy network businesses.[285] Clearly the inclusion of more data over a wider sample of businesses materially affects the results of the analysis. Table 6.6 confirms that government businesses tend to issue more short term debt relative to private businesses – debt on issue with a term of less than five years represents 76 per cent of the portfolios of government businesses compared to 57 per cent for private businesses.

Although there is no data presented in its submission, the JIA suggest that the current debt maturity profile of government businesses is expected to resemble that for private businesses going forward:

> Particularly as a response to recent events in the capital markets, these members are more likely to move toward a more typically commercial approach to debt financing…
>
> …Where businesses have had shorter debt maturities in the past, the trend is to move toward adopting a range of debt maturities, commensurate with the other, predominantly privately owned businesses.[286]

[284] Deloitte, op. cit., November 2008, p.29.

[285] The limitations noted by Deloitte with respect to using data from published annual reports and financial statements are not expected to systematically affect the final results.

[286] JIA, *Submission in response*, op. cit., September 2008, p.70.

The AER notes that even if this turned out to be the case, the conclusion to be drawn from the Deloitte analysis would not change – the weighted average term of debt portfolios in the energy network sector would fall between 1 and 5 years.

In sum, given that the existing weighted average debt term indicates that energy network businesses already rollover debt every five years or less (on average), a potential move to a term matching the length of the regulatory period (i.e. five years) is not expected to impose additional rollover risk. Further, the data indicates that regulated businesses will not be under-compensated on existing debt portfolios, as the spread on the weighted average maturity of debt will be covered by regulated prices (on average).[287]

***Transactions costs***

Officer and Bishop state that for a move away from current practice to be justified it must be established that:

> The financing transactions costs that may be imposed on regulated firms are not higher than under current arrangements (ceteris paribus).[288]

The relevant question in the context the risk free rate term is the extent of any incremental transaction costs arising from a move to a term matching the length of the regulatory period. The two categories of debt transaction costs that may be relevant in this context are debt raising costs and hedging costs.

As stated in the issues paper, the NER do not allow transaction costs to be included in the WACC as the cost of debt is defined as the risk free rate plus the debt risk premium (i.e. excluding transaction costs).[289] Accordingly the NER do not require the AER to review the methods of compensating for debt and equity raising costs as part of this review. However the AER considers it appropriate to respond to the implied assertion from Officer and Bishop that debt transaction costs may increase as a result of a change to the term of the risk free rate. To the extent debt transaction costs satisfy the operating expenditure (opex) criteria in the NER they may be recovered in regulated revenues at the time of the reset.

Officer and Bishop do not provide any supporting information on the extent of any additional transaction costs arising from a potential change to the term of the risk free rate, however they state:

> We understand that the manager / arranger fees on bank debt vary from 50 to 110 basis points.[290]

Although it is somewhat unclear, the argument for additional debt raising costs appears to rest on the assumption that a move to match the term of the risk free rate with the length of the regulatory period will result in more frequent refinancing by regulated businesses. Firstly, it is noted that the AER's existing methodology for

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287 That is, assuming a regulatory period (and therefore bond term) of five years, and bond market liquidity reflective of normal market conditions.

288 B. Officer and S. Bishop, op. cit., September 2008, p.20.

289 NER, cls. 6A.6.2(e) and 6.5.2(e).

290 B. Officer and S. Bishop, op. cit., September 2008, p.18.

calculating debt raising costs assumes a median debt term of five years, consistent with the ACG methodology.[291] Further, as discussed above the data from Deloitte on the weighted average maturity of debt portfolios indicates that energy network businesses tend to rollover debt every five years or less (on average).[292] Therefore a potential move to a term matching the length of the regulatory period (i.e. five years) is not expected to result in more frequent refinancing (and hence increased debt raising costs) than under current arrangements.

None of the submissions to the issues paper contained evidence suggesting that hedging costs are likely to increase as a result of changing the term of the risk free rate.

The AER considers that the extent of hedging costs incurred will not in practice be dependent on the term assumption. The JIA state that under current arrangements many of its members hedge in an attempt to align the cost of debt with the rate set in their regulatory determinations, thereby minimising interest rate risk over this period.[293] Therefore it appears likely that, irrespective of the term assumption, hedging will continue to be carried out by regulated businesses during the averaging period (i.e. once each regulatory period).[294]

In sum, the AER does not consider there would be an incremental increase in debt transaction costs as a result of a move to a risk free rate term which matches the length of the regulatory period.

***Term premium***

Officer and Bishop state that for a move away from current practice to be justified it must be established that:

> The term structure is, on average, upward sloping from five to ten year maturities and passing on the financing risk and transactions cost to consumers does not dampen demand arising from this.[295]

The AER stated in the issues paper that use of a term for the risk free rate that exceeds the length of the regulatory period may lead to overcompensation in a regulatory setting – for risks that are essentially removed at each reset. The basis for this statement was an assumption that the yield curve on bonds is on average upward sloping between maturities of 5 and 10 years, reflecting a positive 'term premium'.[296] In turn, the term premium between 10 and 5 year bonds is assumed to reflect the incremental risks associated with holding a 10 year bond relative to a 5 year bond. In a previous paper prepared for the ACCC, Professor Martin Lally explained the rationale for potential overcompensation:

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[291] ACG, *Debt and Equity Raising Transaction Costs*, Report to the ACCC, December 2004, p. 53.

[292] Deloitte, op. cit., November 2008, p.29.

[293] JIA, *Submission in response*, op. cit., September 2008, p.71.

[294] Hedging costs are discussed in more detail at section 6.5.2.

[295] B. Officer and S. Bishop, op. cit., September 2008, p.20.

[296] The 'term premium' is defined here as the difference in yield between bonds of different maturities.

> 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.[297]

The extent of any overcompensation due to a term premium is essentially an empirical question. To this end, Officer and Bishop examined the historical difference in yields on 5 and 10 year CGS between 1972 and 2008 and found an average term premium of 18 basis points.[298] Table 6.7 from the JIA illustrates the results.

**Table 6.7: Average yield and volatility of CGS**

| | Yield on Commonwealth Bonds | |
|---|---|---|
| | **5 Year Maturing** | **10 Year Maturing** |
| Average | 9.10% | 9.28% |
| Standard Deviation | 3.31% | 3.20% |
| Return per unit risk | 2.75% | 2.90% |

Source: JIA[299]

Given that the data in table 6.7 from the Officer and Bishop report is publicly available from the RBA, the AER considers that the estimate of an average 18 basis point term premium on CGS is reasonable. The AER also notes from table 6.7 that the volatility of 5 year CGS yields is marginally higher than the volatility of 10 year CGS yields. This is not expected to materially impact regulated prices in the event that a 5 year term assumption is adopted.

In the AER's view, the analysis of the historical term premium in CGS yields is relevant in the context of the risk free rate term (and the MRP). However given that the NER requires the AER to adopt a consistent term assumption across the risk free rate and debt risk premium parameters,[300] the extent of any term premium between 10 and 5 year corporate bonds is of equal if not greater significance in the current context. This has not been considered by Officer and Bishop or the JIA.

In its report Deloitte examined Bloomberg data on the historical term premium in corporate bonds. The results are summarised in table 6.8.

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297 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.

298 B. Officer and S. Bishop, op. cit., September 2008, p.18.

299 JIA, *Submission in response*, op. cit., September 2008, p.63. The data is sourced from the Reserve Bank of Australia [RBA, Bulletin Statistical Tables, Capital Market Yields – Government Bonds (Table F02)].

300 NER, cls. 6A.6.2(e) and 6.5.2(e).

**Table 6.8: Historical term premium on corporate bonds (bps)**

| Date | 10 year vs 5 year A rated | 10 year vs 5 year BBB rated |
|---|---|---|
| 2001 - 2005 | 58 | 58 |
| 2006 - Sept 2008 | 10 | 2[(a)] |
| **Average** | **40** | **37** |

Source: Deloitte;[301] AER analysis
(a) average from Jan 2006 – Sept 2007, when Bloomberg 10 year BBB curve was discontinued

Table 6.8 indicates that over the period 2001-2008 the average term premium on 10 year corporate bonds relative to 5 year corporate bonds is 37-40 basis points.

Although the data period sampled by Deloitte is relatively short, the AER considers that table 6.8 provides evidence that use of a 10 year term assumption will on average over-compensate regulated network businesses on the cost of debt.[302] Over the period 2001-2008 the positive term premium averaged around 40 basis points.

In sum, the AER considers that there will be a material incremental benefit to consumers as a result of a potential move to a risk free rate term which matches the length of the regulatory period. The quantum of the incorrect compensation (cet par) from using a 10 year term assumption is estimated to be 37-40 basis points on the cost of debt on average.

The AER notes that the 18 basis point premium on CGS estimated by Officer and Bishop is relevant to the historical estimates of the MRP. This is discussed in section 6.5.4.

**AER's conclusion**

The currently adopted methodology under the NER for estimating the risk free rate is based on a 10 year term assumption. In turn, the NER methodology has been consistently adopted by all regulators in the Australian energy sector since the Tribunal's 2003 GasNet decision (including the ACCC and the AER).

Leaving aside the issue of consistency with the MRP (discussed at section 6.5.4), based upon the most current available evidence the AER considers that there are significant counter-arguments to a number of the Tribunal's reasons for adopting a 10 year term assumption, including:

- Because the issue does not appear to have been argued before the Tribunal in its GasNet decision did not specifically discuss or address the possibility of incorrect compensation resulting from the use of a term for the risk free rate that exceeds the length of the regulatory period.

[301] Deloitte, op. cit., November 2008, p.16. The data was sourced from Bloomberg.

[302] The AER notes that corporate bond yield data is not available on Bloomberg for years prior to 2001.

- Given that energy network businesses are estimated to have a weighted average debt maturity profile of around five years or less, there is no evidence to suggest that network businesses will seek to issue long term debt as a matter of preference. It appears that the evidence upon which this current assessment has been made was not before the Tribunal at the time of making its conclusions in the GasNet decision.

On this basis the AER has explored the arguments for an alternative term assumption based upon consistency with the length of the regulatory period.

The framework established by Officer and Bishop – to consider all potential costs and benefits from moving to a term matching the length to the regulatory period – appears appropriate and reasonable for the purposes of this review.

- Data from Deloitte provides evidence that, at least in a relative sense, there is not an issue with liquidity in shorter term (e.g. five year) CGS and corporate bond markets. On this basis a potential move to a term matching the length of the regulatory period is not expected to impose additional costs in terms of illiquidity.

- Data from Deloitte indicates a weighted average debt term of 5 years or less for energy network businesses, implying that refinancing takes place every five years or less (on average). Therefore a potential move to a term matching the length of the regulatory period (i.e. five years) is not expected to impose additional rollover risk.

- There is no evidence to suggest an incremental increase in debt transactions costs as a result of a potential move to a risk free rate term which matches the length of the regulatory period, given that the current methodology supports a five-year refinancing assumption.

- Data from Deloitte indicates that there is a positive term premium between 10 and 5 year corporate bonds, indicating a material incremental benefit to consumers as a result of a potential move to a risk free rate term which matches the length of the regulatory period. The quantum of the term premium is estimated to average around 40 bps on the cost of debt.[303]

In sum the AER estimates that, relative to a term assumption consistent with the length of the regulatory period (i.e. 5 years), the current 10 year term assumption will result in incorrect compensation for the risks faced over the regulatory period. The empirical evidence indicates that the extent of over-compensation on the cost of debt has been around 40 basis points on average.

Leaving aside the issue of consistency with the MRP (discussed at section 6.5.4), the AER considers there is persuasive evidence to move away from a 10 year term assumption to a term that matches the length of the regulatory period.

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[303] Given the NER requirement to have equivalent bond terms [cls. 6A.6.2 (e) and 6.5.2(e)], in estimating the over-compensation the AER has had regard not only to the effect on the risk free rate but also to the effect on the corporate bond rate.

### 6.5.4 Consistency with the market risk premium

In the issues paper the AER noted that the need to maintain consistency with the estimate of the MRP has been raised as one of the key arguments for using a long term risk free rate throughout the CAPM. This was also one of the key conclusions of the Tribunal in its GasNet decision.

**Submissions in response to issues paper**

The JIA state that consistency between the risk free rate proxy and the MRP is paramount from both a theoretical and practical point of view. The JIA state in its submission that:

> The MRP currently adopted by all regulators in Australia was derived from historical data using the yield on the 10 year Commonwealth bond as the proxy for the risk-free rate. If a 5 year maturing bond was to be used as the risk-free rate to which a risk premium is added then consistency requires that the MRP be re-estimated using 5 year bonds.[304]

The JIA state that it is not aware of any current historical studies that utilise 5 year CGS yields to estimate the MRP. It argues that there is a lack of liquidity in 5 year government bond markets such that historical estimates measured relative to 5 year government bond yields would not be reliable anyway.[305]

Based on the advice of Officer and Bishop, the JIA argue that due to the offsetting effects, there is very little difference in the overall cost of equity using either a five or ten year risk free rate consistently, but that mixing the maturities of the risk free rate proxies introduces a bias in the MRP of around 20 basis points (rounded from 18 basis points).

The MEU state in its submission that:

> There is strong logic supporting a move that the risk free rate should be aligned to the regulatory period, and if the derivation of the MRP was changed to be based on the 5 year CGS then such a change could be implemented with internal consistency.[306]

**Issues and AER's considerations**

The AER acknowledges that consistency between the term of the risk free rate throughout the CAPM is an important consideration as part of this review.

This issue is discussed in detail in the context of the MRP at section 7.5.2.2.

In this section the AER notes the views from Officer and Bishop regarding the requirement for consistency in terms of setting a fair rate of return:

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304 JIA, *Submission in response*, op. cit., September 2008, p.60.

305 ibid., p.72.

306 MEU, *Submission in response*, op. cit., September 2008, p.40.

> Clearly the argument of mixing the term of the risk free rate in different parts of the CAPM equation is flawed as it will introduce a 'known' bias if the yield curve is upward sloping.[307]

The AER acknowledges the analysis undertaken by Officer and Bishop in relation to the cost of equity. However as stated above, the extent of incorrect compensation on the cost of debt resulting from a 10 year term has not been properly considered by either Officer and Bishop or the JIA. Based on the Deloitte report, the extent of net overcompensation in the cost of debt as a result of a 10 year term assumption is around 40 basis points. In the AER's view, this is 'known bias' in the cost of debt resulting from the use of a 10 year term which must also be taken into account.

**AER's conclusion**

The issue of consistency between the term of the risk free rate and the estimate of the MRP is discussed in detail at section 7.5.2.2.

In sum, the AER considers that a forward-looking MRP of 6 per cent is consistent with a 5 year term assumption for the risk free rate.

### 6.5.5 Measuring the risk free rate of return

In the issues paper the AER raised issues regarding the appropriate methodology for estimating the risk free rate (and the debt risk premium), including:

- the appropriate length and start date of the averaging period, and
- the method of interpolation from published market data.

**Submissions in response to issues paper**

The JIA support the current methodology of estimating the risk free rate over an agreed 5 to 40 day averaging period, for three primary reasons:

> 1. it smooths out spikes in the nominal risk-free rate across the period;
> 2. it allows a regulated electricity transmission or distribution business the ability to manage interest rate risk by entering into financial products to match a portion of its total interest rate exposure during this period; and
> 3. it allows a regulated electricity transmission or distribution business the ability to manage interest rate risk by refinancing a portion of its total debt portfolio during this period.[308]

The JIA submit that a range of 5 to 40 days should be allowed for the averaging period, so as to enable each business to choose a period that achieves the most efficient outcome. However it is submitted that the regulated businesses should retain

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[307] B. Officer and S. Bishop, op. cit., September 2008(a), p.12.

[308] JIA, *Submission in response*, op. cit., September 2008, p.76.

discretion to select the start date for the averaging period.[309] This view is also supported in a separate submission from Energex.[310]

The JIA supports the current linear interpolation methodology for calculating the nominal risk free rate (and the debt risk premium) over the averaging period.

The MEU state in its submission that the AER should remove discretion form regulated businesses in relation to the averaging period:

> Allowing the regulated firm to select the averaging duration for setting the risk free rate is inconsistent with regulatory certainty. This approach provides a bias in favour of the firm to the disadvantage of consumers.[311]

As discussed at section 6.5.2, the Queensland Government submission raises practical issues associated with meeting the regulated cost of debt – particularly relevant in the context of the current state of corporate debt markets.[312] The Queensland Government argues that it is not possible to refinance an entire portfolio over a 5-40 day averaging period, and therefore proposes that that the AER consider an alternative method for calculating the risk free rate (and the debt risk premium). Specifically the submission proposes that the risk free rate be recalculated annually, effectively mimicking a funding strategy that refinances 20 per cent of total debt each year. For consistency the submission acknowledges that other WACC parameters should be updated at the same time.

In support of this approach the Queensland Government states that:

> The benefits of this approach are twofold. Consumers will benefit from a reduced chance of prices being set during a period of temporarily high interest rates and / or debt risk premiums. Prices will be set in a way that enables the regulated business to recover the assumed cost of debt whilst pursuing a prudent and diversified funding strategy.[313]

The weaknesses of the approach are also acknowledged, including:

- regulated prices would reflect both current and historical interest rates, which is inconsistent with the current approach that assumes prices reflect the marginal cost of funds, and

- the type of risk free rate used under this scenario will differ from that used to estimate the MRP.

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309 ibid., p.53.

310 Energex, *Energex's response to the AER's issues paper – Review of the weighted average cost of capital (WACC) for electricity transmission and distribution*, Submission in response, September 2008.

311 MEU, *Submission in response*, op. cit., September 2008, p.41.

312 Queensland Government, *Submission in response*, op. cit., September 2008, pp.6-7.

313 ibid., p.7.

**Issues and AER's considerations**

The AER has considered its ability under the NER to consider the specific proposal from the Queensland Government to recalculate the WACC on an annual basis. The NER requires that a single rate of return must be calculated for each regulatory control period.[314] In turn, for both electricity transmission and distribution, chapter 10 of the NER (glossary) defines a 'regulatory control period' as a period not less than five years. On this basis the AER considers that the Queensland Government proposal for the risk free rate (and indeed the WACC) to be reset annually is not permissible under the NER as currently written. In any case, as discussed at section 6.5.2 the AER considers it is reasonable to expect that regulated energy network businesses can manage their exposure to interest rate risk over the regulatory period. Therefore it would not appear that any wholesale changes to the 'averaging period' methodology are justified.

In the issues paper the AER stated that:

> It remains open to question whether an averaging period of 5 to 10 days in length can sufficiently overcome volatility driven error.[315]

The AER notes that the JIA support the current methodology for calculating the risk free rate over a 5-40 day averaging period. The potential issue of volatility with an averaging period as short as 5 days is not explicitly addressed in the JIA submission. The AER proposes to amend its current approach regarding the length of an acceptable averaging period, for the following reasons:

- there is the potential for large volatility-driven error with an averaging period as short as 5 days, which could lead to an unrepresentative cost of debt, and
- to the AER's knowledge there has never been a 5 day averaging period accepted by any energy regulators in Australia.

On this basis the AER proposes that it will accept as reasonable an agreed averaging period between 10 and 40 business days in length.

In submissions the JIA and Energex argue that businesses should have discretion over the start date for the commencement of the averaging period. As stated in the issues paper, the AER's current approach is to agree in advance an averaging period commencing as close as practically possible to the start of the regulatory period. This is to ensure an unbiased estimate of the forward-looking risk free rate (and the debt risk premium). The AER proposes to retain its current practice in this regard.

The MEU have raised issues regarding the discretion afforded to regulated businesses in selecting the length of the averaging period. As discussed in the issues paper, in selecting an appropriate length for the averaging period there is a direct trade-off between 'volatility driven error' and 'old information driven error'. Given the uncertainty the AER considers it reasonable to allow businesses to optimally make this trade-off, within the bounds of a 10 to 40 day range. In any case, as the start date

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[314] NER, cls. 6A.6.2(a) and 6.5.2(a).

[315] AER, *Issues Paper*, op. cit.,August 2008, p.36.

of the averaging period is selected well in advance there is not expected to be any systematic bias in the final estimates if discretion over the precise length of the period is afforded.

**AER's conclusion**

The AER proposes to retain the current NER methodology for calculating the risk free rate, with one exception – the AER will only accept an averaging period commencing as close as practically possible to the start of the regulatory control period. This represents a formalisation of the AER's current approach in this regard.

Subject to satisfying the formal NER methodology, the AER proposes to accept as reasonable an averaging period between 10 and 40 business days in length.

## 6.6 AER's conclusion

The AER's objective is to set a term for the risk free rate (and the corporate bond rate) that 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.

The NER deemed the initial method for estimating the nominal risk free rate for both electricity transmission and distribution, consistent with current regulatory practice. The basis for the current NER methodology – in particular the use of the yield on ten year CGS as the risk free proxy – was largely established by the Tribunal in its 2003 GasNet decision.

Based upon the most current available evidence the AER makes the following observations in relation to the Tribunal's decision to adopt a 10 year term assumption:

- The issue of consistency between the risk free rate terms in the CAPM equation is recognised as important as part of this review.
- 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 was not argued before the Tribunal in its GasNet decision.
- Given that energy network businesses are estimated to have a weighted average debt maturity profile of around five years or less, there is no evidence to suggest that network businesses will seek to issue long term debt as a matter of preference. It appears that the evidence upon which this current assessment has been made was not before the Tribunal at the time of making its conclusions in the GasNet decision.

The AER has re-examined the issues associated with the risk free rate afresh, in particular to establish whether there is persuasive evidence to justify a departure from current practice.

The AER's conclusions are as follows:

- There is insufficient persuasive evidence to justify the use of an alternative to CGS as the appropriate risk free rate proxy.

- While it is clear that the current conditions in debt markets are far from favourable, market-based evidence from a number of sources strongly suggests that, rather than create risks, the regulatory regime insulates energy network businesses from market volatility.

- Market-based evidence indicates that network businesses are active in hedging markets, which accords with views in submissions and the analysis undertaken by Deloitte in its report. This allows interest rate risk to be mitigated to the greatest extent possible. Any opex allowance for hedging costs is best considered outside of this review, jointly with debt and equity raising costs.

- The regulatory regime should continue to provide symmetrical outcomes with respect to the benchmark cost of debt, with interest rate risk fairly compensated via the equity beta.

- A term of the risk free proxy which matches the length of the regulatory period (i.e. 5 years) better reflects the financing strategies of regulated energy network businesses.

- Relative to a term assumption consistent with the length of the regulatory period (i.e. 5 years), the current 10 year term assumption is expected to result in net over-compensation on average, given the risk faced over the regulatory period. In other words, the use of a 10 year term assumption is expected to violate the 'present value principle'. The empirical evidence indicates that the extent of over-compensation on the cost of debt is expected to be around 40 basis points on average.

- A forward-looking MRP of 6 per cent is consistent with a 5 year term assumption for the risk free rate.

- The current NER methodology for calculating the risk free rate will be retained, with one exception – the AER will only accept an averaging period commencing as close as practically possible to the start of the regulatory control period. An averaging period of between 10 and 40 business days in length will be accepted as reasonable.

Overall, the AER considers there is sufficient persuasive evidence to depart from the previously adopted 10 year risk free rate term assumption – as a term matching the regulatory period better reflects the weighted average maturity of outstanding debt portfolios, and results in correct compensation according to the 'present value principle'. Having regard to all the relevant factors in the NER,[316] the AER considers it is appropriate to depart from the previously adopted methodology for estimating the nominal risk free rate.

[316] NER, cls. 6A.6.2(j) and 6.5.4(e).

The AER proposes that the methodology for estimating the risk free rate is based upon the yield on CGS with a maturity matching the length of the regulatory period, calculated over a 10 to 40 business day period commencing as close as practically possible to the start of the regulatory control period. In accordance with the NER, the AER considers that this method:

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

On this basis the AER considers that its proposed method achieves an outcome that is consistent with the National Electricity Objective.[317]

[317] NER, cls. 6A.6.2(j) and 6.5.4(e).

# 7 Market risk premium

## 7.1 Introduction

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

## 7.2 Regulatory requirements

### 7.2.1 National Electricity Rules

In undertaking a review of the WACC parameters, the NER sets out several matters that the AER must have regard to. Of particular relevance to the market risk premium are:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds, and
- where a value cannot be determined with certainty:
  - the need to achieve an outcome that is consistent with the National Electricity Objective, and
  - the need for persuasive evidence before adopting a value that differs from the value that has previously been adopted for it.[318]

The AER's reasoning as to why these matters appear particularly relevant, while the other matters listed in the NER appear to be of lesser value to the review of the market risk premium is discussed in chapter three.

### 7.2.2 Previously adopted value

As with all other WACC parameters, the MRP is not directly observable. As a result, it must be estimated by reference to proxies and cannot be determined with certainty. Therefore, in addition to the other relevant factors, the AER must have regard to the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it.

[318] NER, cls. 6.5.4(e) and 6A.6.2(j).

The NER deemed the initial value of the MRP for TNSPs in all jurisdictions and the DNSPs in NSW and the ACT to be 6 per cent.[319] For the remaining DNSPs, the NER did not deem an initial value of the MRP and the previously adopted values in these jurisdictions are those from the most recent distribution determination.

As illustrated in table 7.1, for the purposes of the NER, the previously adopted value of the MRP for TNSPs and DNSPs in all jurisdictions is 6 per cent per annum.

**Table 7.1: Previously adopted value – market risk premium**

| Service provider | Source | MRP |
|---|---|---|
| Transmission (all jurisdictions) | NER | 6.00% |
| Distribution (NSW) | NER | 6.00% |
| Distribution (ACT) | NER | 6.00% |
| Distribution (Tasmania) | OTTER (2007) | 6.00% |
| Distribution (Victoria) | ESC (2006) | 6.00% |
| Distribution (Queensland) | QCA (2005) | 6.00% |
| Distribution (South Australia) | ESCOSA (2005) | 6.00% |
| | | **6.00%** |

Source: NER[320], OTTER[321], ESC322, QCA[323], ESCOSA[324].

## 7.3 Summary of issues raised in issues paper

In the issues paper, the AER noted the different approaches commonly used to estimate the MRP. In relation to historical estimates, the AER raised, among other matters, the following issues:

- selection of the appropriate proxy for the market portfolio and risk free rate
- length of estimation period and appropriate start and end dates
- method of averaging returns over multiple periods (arithmetic or geometric)
- adjustments to historical estimates to account for imputation credits

[319] NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.
[320] NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.
[321] OTTER, op. cit., September 2007, p.152.
[322] ESC, op. cit., October 2006, p.332.
[323] QCA, op. cit., April 2005, p.97.
[324] ESCOSA, op. cit., April 2005, p.161.

- adjustments to historical estimates to account for unexpected or one-off events in historical data, and
- qualitative reasons suggesting a decline in the MRP from historical estimates.

In relation to cash flow measures and surveys, the AER sought comments on whether there were particular cash flow studies or surveys that should be considered, and asked how the AER should determine which cash flow studies and surveys to place greater weight on.

The AER also asked what weight should be placed on each of the measures raised in the issues paper, and whether there were any other measures the AER should consider.[325]

## 7.4 Summary of submissions in response to issues paper

In response to the issues paper, the AER received eight submissions that commented specifically on the MRP. These submissions were from:

- the APIA
- the ENA
- EnergyAustralia
- the JIA – with an attached report from Value Adviser Associates (Professor Bob Officer and Dr Steven Bishop)
- Grid Australia
- Integral Energy
- the MEU, and
- SP AusNet

The MEU provide data indicating that the financial return (capital gains and dividends) of the utilities sector has consistently outperformed the market average by around 15 to 35 per cent, even though, as the MEU argue, regulated utilities are less risky than the overall market due to their very stable and predictable cash flows. As the risk premium from the regulated return to equity is a multiple of the equity beta and MRP, the MEU argue this clearly implies that either the equity beta or MRP allowed by regulators is too high, or both.[326]

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325 AER, *Issues paper*, op. cit., August 2008, pp.38-52.

326 MEU, *Submission in response*, op. cit., September 2008, p.16.

The MEU argue that using long term historical estimates does not recognise the exogenous changes that have impacted the share market over this time, and consequently historical estimates should only include data from around the last 25 years. For example, the MEU consider that the unexpected asset price inflation present in long term historical averages will led to an upwards biased estimate of a forward looking MRP. The MEU also notes the importance of recognising the relationship between the MRP and gamma. Overall the MEU consider a forward looking MRP lies within the range of 5 to 6 per cent, and that a 5.5 per cent point estimate should be adopted.[327]

The JIA make three substantive arguments on the MRP, all relating to the consistency between the MRP and gamma:

- First, an assertion that the previously adopted MRP of 6 per cent was originally based on evidence that effectively assumed imputation credits had no value, whereas the decisions adopted a positive value of gamma. Therefore the previously adopted MRP of 6 per cent needs to be 'corrected' if the AER adopts a materially positive value of gamma in this review.[328]

- Second, as alternative to making this correction, the JIA state that if the AER adopts a gamma of zero in this review then the continued use of a 6 per cent MRP is supported by an array of secondary estimation sources.[329]

- Third, the JIA argue that the best estimate of a forward looking MRP is the long term arithmetic average of historical excess returns over the 1958-2007 period, which Officer and Bishop (2008) estimate at 6.7 per cent, assuming a gamma of zero. If imputation credits have a positive value, the JIA argue there is persuasive evidence to increase the MRP to 7 per cent.

The JIA consider that other measures such as historical estimates from different time periods, surveys, cash flow based measures and foreign estimates of the MRP provide useful 'cross-checks' on an MRP estimated from long term historical averages. However the JIA argue that adjustments should not be made to historical estimates, with the exception of the adjustment for imputation credits The JIA's arguments on specific MRP issues are generally supported by its consultants (Officer and Bishop). Overall, the JIA's recommendation is for a MRP of 7 per cent and a gamma of 0.2.

The APIA recognises that as the MRP is a market wide parameter, the outcome from this review may be equally applicable across the gas and electricity sectors. However, as the National Gas Law (NGL) provides that the WACC parameters are to be determined at the time of each gas access arrangement, the APIA notes that there may be legitimate reasons for a departure from the MRP determined in this review, such as due to new information.[330]

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327 ibid., pp.42-43.

328 JIA, *Submission in response*, op. cit., September 2008, p.78.

329 ibid., p.78.

330 APIA, *Submission in response*, op. cit., September 2008, p.7.

EnergyAustralia notes that market observations of the MRP are imprecise. It notes that the data presented by Officer and Bishop (2008) is significantly higher than 6 per cent, but in the range of 6-7 per cent. EnergyAustralia considers that given the imprecision of the measurement of the MRP, the AER should adopt a cautious approach in moving away from the previously adopted value.[331]

The APIA, EnergyAustralia, and the remainder of the submissions from industry stakeholders listed above, also argue that, according to the evidence presented in the JIA's submission, the previously adopted MRP of 6 per cent effectively assumed a gamma of zero.

Several points of note are:

- The JIA's combined recommendation on the MRP and gamma is not explicitly supported by its consultants (Professor Bob Officer and Dr Steven Bishop), who state support for a 7 per cent MRP for values of gamma of 0.3 or greater. Officer and Bishop state:

> While we have not focused on estimating an explicit value of gamma or the value of imputation credits once distributed in this paper, regulatory practice places a value on gamma 0.3 and greater. Under these circumstances we recommend the MRP be 7%.[332]

- The JIA's combined recommendation on the MRP and gamma is not supported by EnergyAustralia who consider that if a 0.2 gamma is adopted, then there is no persuasive evidence to move away from a MRP of 6 per cent. EnergyAustralia states:

> …EnergyAustralia notes that there is persuasive evidence to demonstrate that the value of the gamma should move from 0.5 to 0.2. … If this is accepted by the AER there would be **no** persuasive evidence to move away from the value of 6.0 for the MRP.[333]

- Whilst emphasising the importance of recognising the value of imputation credits in the MRP, the JIA do not present historical estimates which are 'grossed-up' consistent with its proposed value of gamma, which is based on a utilisation rate of between 0.2 and 0.35. Rather the JIA present estimates which are grossed-up for utilisation rates of 0.5 and 1.0.

- There also appears to be inconsistencies in the JIA's submission in that in some parts of their submission they state that a 7 per cent MRP should be adopted for 'a' positive value of gamma, whereas in other sections they state it should be adopted for a 'materially positive' value of gamma. In addition, the submission does not clearly specify what the JIA consider to be a materially positive value of gamma. Presumably 0.2 is considered to be materially positive though in parts of their submission they appear to state this value is 'not materially different from zero'.

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331 EA, *Submission in response*, op. cit., September 2008.

332 B. Officer, and S. Bishop, *Market risk premium – A review paper*, August 2008.

333 EA, *Submission in response*, op. cit., September 2008.

## 7.5 Issues and AER's considerations

Given the JIA's assertion, and that of other industry stakeholders, that the previously adopted MRP of 6 per cent was based on a gamma of zero and therefore needs to be 'corrected', the AER first considers the basis of the 6 per cent MRP from the time this estimate became adopted in Australian regulatory practice.

Estimating a forward looking MRP, commensurate with prevailing conditions in the market for funds, may involve regard to historical estimates, known as 'ex post' measures of the MRP, on the basis that investors' forward looking expectations will be based on past experience. The AER discusses the use of historical estimates of the MRP in the following order:

- historical estimates – methodological issues, and
- historical estimates – results and interpretation.

Next, the AER considers the use of more forward looking 'ex-ante' measures of the MRP, specifically:

- estimating the implied MRP from current stock prices and forecasts of future cash flows, and
- adopting the MRP from surveys of market practitioners.

Rather than placing sole weight on any particular measure, it is common practice to have regard to most or all of these measures, tempered by an understanding of the strengths and weaknesses of each measure, in determining a 'final' MRP. The AER considers this is an appropriate approach in the context of having regard to the need for persuasive evidence, and is consistent with past regulatory practice. The AER's overall considerations and weighting of each of these measures is discussed in section 7.6.

### 7.5.1 Basis of previously adopted value

As noted above, the JIA commissioned a report from Officer and Bishop in the context of this review. On the original basis of the 6 per cent MRP, Officer and Bishop state:

> The market risk premium of 6% was originally based on evidence that excluded any explicit consideration of a component to reflect any value of imputation tax benefits in the historical MRPs. Consequently the 6% can be viewed as an estimate of the MRP when this value is zero…
>
> The inclusion of an estimate of the imputation tax benefits in the historical estimate of the market equity returns forms the basis of our recommendation that the MRP be increased from 6% to 7% as qualified below.[334]

The JIA accept this position by Officer and Bishop, and state:

[334] B. Officer, and S. Bishop, August 2008, p.i.

> As Officer and Bishop demonstrate, the 6 per cent MRP was originally based on evidence that excluded any explicit consideration of the value of imputation credits. This is clearly inconsistent with previous regulatory decisions which adopted a positive value for gamma. To correct this inconsistency when calculating [the] MRP, it is necessary to recognise the value of the imputation credits.[335]

It is this alleged necessary 'correction' to the previously adopted MRP of 6 per cent that forms of the basis of the JIA's argument that there is persuasive evidence to depart from 6 per cent. Accordingly, whether or not regulators had regard to the value of imputation credits in establishing the previously and consistently adopted MRP of 6 per cent in regulatory practice, is potentially an important issue.

The AER has reviewed the decisions from the time the 6 per cent MRP was established, and the reasoning behind the adoption of this value. The AER has found that regulators did have regard to the value of imputation credits in establishing this value, which was consistent with the positive value of imputation credits adopted in those decisions Therefore the JIA appear incorrect in their assertion that the previously adopted MRP of 6 per cent was based on an assumption that imputation credits have no value.

To the AER's knowledge the first determinations by Australian regulators to adopt a point estimate for the MRP of 6 per cent were:

- the 1998 decision by the ACCC on the access arrangement submitted by Transmission Pipeline Australia (TPA) for the Victorian Principal Transmission System and Western Transmission System,[336] and

- the 1998 decision by the (Victorian) Office of the Regulator-General (ORG) on the access arrangements submitted by Multinet Energy, Westar (Gas) and Stratus (gas).[337]

In the context of these reviews, the ACCC and ORG, commissioned Professor Kevin Davis to prepare a report on the WACC for the gas industry. Professor Davis' report was responding to a report by Credit Suisse First Boston (CSFB) commissioned by TPA.

After considering the advice of Professor Davis, the ACCC rejected TPA's proposed MRP and gamma values of 6.5 per cent and 0.25, respectively, and substituted these for values of 6 per cent and 0.5. Professor Davis' report formed much of the basis of ACCC's position on the WACC parameters.

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335 JIA, *Submission in response*, op. cit., September 2008, p.84.

336 ACCC, *Access arrangement by Transmission Pipelines Australia Pty Ltd and Transmission Pipelines Australia (Assets) Pty Ltd for the Principal Transmission System – Access arrangement by Transmission Pipelines Australia Pty Ltd and Transmission Pipelines Australia (Assets) Pty Ltd for the Western Transmission System – Access arrangement by Victorian Energy Networks Corporation for the Principal Transmission System*, Final decision, 6 October 1998.

337 ORG, *Access arrangements – Multinet Energy Pty Ltd and Multinet (Assets) Pty Ltd – Westar (Gas) Pty Ltd and Westar (Assets) Pty Ltd – Stratus (Gas) Pty Ltd and Stratus Networks (Assets) Pty Ltd* , Final decision, October 1998.

In the interests of completeness, the AER has reproduced in detail Professor Davis's advice and the ACCC's reasons for adopting an MRP of 6 per cent. On the MRP, Professor Davis advised:

> Historical evidence indicates a market risk premium under a classical tax system of around 6-8 per cent – although financial economists have argued that this premium is to too high to be consistent with reasonable estimates of risk aversion. Those estimates measure returns as the cash dividend plus capital gains. Following the introduction of imputation, that premium if measured in the same way could be expected to have fallen – to reflect the additional value of franking credits received on an investment in the market from the change in the tax treatment of dividends. However, if the premium is measured as a "partially grossed up" figure, and there has been no change in the after – all – tax premium on equities over bonds required by investors, the premium may not have changed. Hence an estimate in the order of 6-7 per cent might not be unreasonable.
>
> Historical measures of the market risk premium may not be particularly appropriate, since the risk premium in the CAPM is a forward looking concept – the return investors expect to receive from a current investment in the market over that received on risk free securities.
>
> An alternative approach is to apply a valuation technique such as the dividend growth model to the market as a whole to derive the implied rate of return. For example, the dividend growth model relates current price ($P_0$) to next period's dividend ($D_1$) and the required return (r) and expected dividend growth in perpetuity (g) as:
>
> $$P_0 = \frac{D_1}{r - g}$$
>
> which can be rearranged as:
>
> $$r = \frac{D_1}{P_0} + g$$
>
> $$r = \frac{D_1}{P_0} + g_y + g_p$$
>
> where $\frac{D_1}{P_0}$ is the (prospective) annual dividend yield, and g (the annual growth rate of dividends) is assumed to match the growth rate of GDP divided into its components of expected real growth ($g_y$) and expected inflation ($g_p$).
>
> Since the discount rate required is the partially grossed up rate, $\frac{D}{P}$ is a partially grossed up dividend yield and a reasonable estimate of that figure is currently in the order of 4.5-5.0% (based on a dividend yield of 3.5-4.0% and a franking credit valuation rate of 0.5). Assuming expected real growth of 3-4% and expected inflation of 3-4%, gives a required (partially grossed up) return on the market of between 10.5-13.0%. Compared to a risk free rate of 6%, this gives an ex ante market risk premium of between 4.5-7% with

> figures at the lower end of that range probably more applicable.[emphasis added][338]

Following this advice, the ACCC also had regard to the value of imputation credits in assessing the reasonableness of TPA's proposed MRP. The ACCC's reasons for adopting a MRP of 6 per cent were as follows:

> The market risk premium is a parameter in the CAPM model which together with the risk free rate and firm specific beta determine the expected return on equity in the business. CSFB proposed 6.5 per cent for the market risk premium given that the conventionally accepted value has been six to seven per cent under the classical tax system. Davis suggests that this may not be in keeping with a forward looking CAPM framework favoured by the Commission. For example, the more stable inflationary environment now prevailing may mean that the relevant market risk premium is less than has been observed over recent years. Also following the introduction of imputation, the premium, as measured in the conventional way, would have fallen to reflect the additional value of franking credits. However, a 'partially grossed up' premium is appropriate within the WACC model and with such adjustment the six to seven per cent range may still be acceptable.
>
> Davis also notes that this range is too high to be consistent with reasonable estimates of risk aversion and derives alternative figures based on a dividend growth model. With this approach he estimates a range of between 4.5-7.0 per cent for the market risk premium. Officer also provides support for the view that the MRP may be trending downward. Despite these claims of a falling trend, six to seven per cent is still the 'conventional market wisdom' favoured by many financial analysts in view of the year to year volatility.
>
> On balance the Commission believes the lower end of the probable range should be reduced, giving a range from 4.5 to 7.5 per cent and, along with Davis, has chosen to use the mid-value of six per cent as the market risk premium for the purpose of estimating WACC.[emphasis added]339

That is, after considering the advice of Professor Davis, the ACCC rejected TPA's proposed MRP and gamma values of 6.5 per cent and 0.25, respectively, and substituted these for values of 6 per cent and 0.5. The ACCC derived a range of 4.5-7.5 per cent for the MRP, and adopted the mid-point of that range being 6 per cent. The upper bound of this range was based on historical estimates, while the lower bound was based on cash flow measures.

On the original basis of the 6 per cent MRP, several important points are apparent from the above extracts:

- The forward looking estimates considered at the time were explicitly 'grossed-up' to reflect the value of imputation credits (specifically to reflect a value of 0.5, consistent with the value of gamma adopted in the ACCC's and ORG's decisions).

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338 K. Davis,, *The weighted average cost of capital for the gas industry*, Report prepared for the ACCC and ORG, 18 March 1998, pp.15-16.

339 ACCC, *Access arrangement by TPA for the Principal Transmission System – Access arrangement by TPA for the Western Transmission System – Access arrangement by VENCorp for the Principal Transmission System*, Final decision, 6 October 1998, p.53.

- The historical estimates considered at the time were not explicitly 'grossed-up' to reflect the value of imputation credits, as such 'gross-ups' would have been erroneous. This is because the historical estimates considered were based on historical excess returns under a classical tax system. As is evident from Officer (in his seminal 1994 paper), if the introduction of dividend imputation only changes the sources but not the total required return to equity holders, which Officer argues is what would happen, then 'un-grossed-up' historical estimates under a classical tax system will be an unbiased proxy for 'grossed-up' historical estimates under an imputation tax system.[340] This issue is discussed further in section 7.5.2.5.

- The MRP of 6 per cent was not 'mechanistically' based on historical estimates but on a range of considerations.

Given the above, the AER considers it is clear that the JIA's assertion (and that of Officer and Bishop) that the MRP of 6 per cent was originally based on evidence that assumed a value of imputation of credits of zero appears incorrect.

To the AER's knowledge, all subsequent energy decisions determined by the ACCC, AER and other Australian regulators have followed on from these decisions and adopted either point estimates for the MRP and gamma of 6 per cent and 0.5, respectively, or ranges for these parameters with these point estimates falling within those ranges. The AER acknowledges that some decisions by Australian regulators since this time have been less explicit on the recognition of imputation credits in a 6 per cent MRP. However in many respects these decisions followed on from the precedent established in the 1998 decisions of the ACCC and ORG, with some referencing the Davis report in justifying 6 per cent (which did have explicit regard to the value of imputation credits).

As noted in chapter three, on applying the persuasive evidence factor in the NER, the JIA's legal advisers (Gilbert and Tobin) consider that:

> In this context the evidence would need to establish, more likely than not, that a previously adopted value was incorrect.[341]

The premise of the JIA's submission on the MRP seems to be an assertion that the previously adopted MRP of 6 per cent was initially determined having no regard to the value of imputation credits. Therefore it was 'incorrect' and needs to be 'corrected'.

As discussed in section 7.5.2.5, the AER accepts the legitimacy of the value of imputation credits forming part of the MRP. However, as outlined above, the AER considers that the previously adopted MRP of 6 per cent does not need to be 'corrected' to incorporate the value of imputation credits. Regard was had by Australian regulators to the value of imputation credits in establishing the previously

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340 R. R. Officer, 'The cost of capital of a company under an imputation tax system', *Accounting and Finance*, vol. 34, 1994, p.10

341 Gilbert and Tobin, *Legal opinion 1*, 22 September 2008(a), p.18. The AER notes that is does not agree with Gilbert and Tobin's interpretation of persuasive evidence, as discussed in chapter three.

and consistently adopted MRP of 6 per cent. Accordingly, the issue is not whether a 6 per cent MRP needs to be 'corrected' for imputation credits. Rather, the issue is whether, after 'grossing-up' historical excess returns for the value of imputation credits, among other measures and matters considered, whether or not 6 per cent remains a reasonable estimate of the MRP, having had regard to:

- the need for the rate of return to be a forward looking rate commensurate with prevailing conditions in the market for funds
- the need for persuasive evidence before departing from the previously adopted MRP, and
- the need to achieve an outcome that is consistent with the National Electricity Objective.

### 7.5.2 Historical estimates – methodological issues

Estimates based on historical averages are arguably the most common proxy of the MRP. Historical estimates though strictly not forward looking are often used to estimate the MRP on the assumption that investors base forward looking expectations on past experience.

Widely cited studies of Australian historical excess returns include Officer (in 1989) and Dimson, Marsh and Staunton (in 2003).[342] Officer estimated the arithmetic average historical excess return, relative to bonds, over the 1882-1987 period to be 7.9 per cent.[343] Dimson et al estimated the arithmetic average historical excess return, relative to bonds, over the 1900-2002 period to be 7.6 per cent.[344]

To this collection a recent study by Brailsford, Handley and Maheswaran (in 2008) has made a significant contribution in assessing the quality of the underlying data used in previous Australian studies.[345] Brailsford et al estimate the arithmetic average historical excess return, relative to bonds, over the 1883-2005 period to be 6.2 per cent. This is significantly less than previous estimates due principally to an issue identified by Brailsford et al regarding the method in which the return from dividends had been incorporated into the overall return in data from before the mid-1950's.

In the context of this review, the JIA commissioned Professor Bob Officer and Dr Steven Bishop to, among other matters, update the estimates from the previous

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342 R. R. Officer,,'Rates of return to shares, bond yields and inflation rates: an historical perspective', in R. Ball, P. Brown, F. Finn and R.R. Officer (eds.), *Share markets and portfolio theory: readings and Australian evidence*, 2nd ed., University of Queensland Press, Brisbane, 1989; E. Dimson, P. Marsh and M. Staunton, *Global evidence on the equity risk premium*, LBS Institute of Finance and Accounting, working paper, August 2003.

343 R. R. Officer., 'Rates of return to shares, bond yields and inflation rates: an historical perspective', in R. Ball, P. Brown, F. Finn and R.R. Officer (eds.), *Share markets and portfolio theory: readings and Australian evidence*, 2nd ed., University of Queensland Press, Brisbane, 1989, p.207.

344 E. Dimson P. Marsh and M. Staunton (2003), *Global evidence on the equity risk premium*, LBS Institute of Finance and Accounting, working paper, August 2003, p. 6.

345 T. Brailsford, J.C.Handley, and K.Maheswaran , 'Re-examination of this historical equity risk premium in Australia', *Accounting and Finance*, Vol.48, 2008.

Officer study. The AER commissioned Associate Professor John Handley to, among other matters, update the estimates from the Brailsford et al study to incorporate data from 2005 to 2008 (to date).

The methodological issues addressed in this section are:

- selection of the appropriate proxy for the market portfolio
- selection of the appropriate proxy for the risk free rate
- method of averaging returns over multiple periods (arithmetic, geometric, average)
- length of the estimation period and start and end dates
- adjustments for imputation credits, and
- adjustments to historical estimates to account for unexpected or one-off events in historical data.

The resultant historical estimates are then presented and discussed in section 7.5.3.

#### 7.5.2.1 Selection of the appropriate proxy for the market portfolio

Theoretically the CAPM market portfolio consists of all risky assets in the economy and is not limited to equities. However for practical reasons this is commonly restricted to a subset of listed stock. To capture the return provided by both capital gains and dividends, an accumulation index is commonly used. In the issues paper the AER raised the question of whether the selection of the appropriate proxy for the market portfolio proxy was an issue of contention.

The issue of whether the value of imputation credits should be incorporated into the market portfolio proxy is discussed in section 7.5.2.5.

**Submissions in response to issues paper**

The JIA recognise that theoretically the MRP should represent the return on all risky assets, but for practical reasons historical excess returns from a broad stock market index are generally relied upon. The JIA consider the use of either the All Ordinaries Accumulation index or AGSM market returns presents no particular issues of contention.[346]

**Issues and AER's considerations**

As the AER is applying a domestic version of the CAPM, for consistency, a domestic market index is warranted for consistency. The AER also recognises the appropriateness of using an accumulation index to incorporate the return provided from both capital gains and dividends. A broad based market accumulation index is generally considered appropriate, and the AER supports this approach. However as no particular regularly published and high quality accumulation index has been in

[346] JIA, *Submission in response*, op. cit., September 2008, p.86.

existence for the longest periods of time, various finance experts who have been attempting to estimate the MRP have had to construct their own long term accumulation indices splicing together different data sources, or rely on accumulation indices that have previously been constructed by other experts. Finding a particular data source from which to obtain returns data, particularly for returns data prior to the 1950s can be an issue of contention.

For post-1980 data, there appears to be consensus that the All Ordinaries Accumulation index is an appropriate and reliable data source.[347] The use of this index is supported by the JIA, and utilised by each of the Australian studies referred to above. The All Ordinaries Index began on 31 December 1979, with the All Ordinaries Accumulation index beginning in June 1980.

For pre-1980 data, the data sources used by different experts vary to some degree across time periods, however for the 1958-1980 period these differences do not produce a material difference in estimates. For the 1883-1958 period, Officer and Bishop (in 2008) rely on the returns data series used in the 1989 Officer study. This study sourced its data series for this period on stock prices and dividend yields from Lamberton (published in 1958).

Brailsford et al and Handley also rely on the Lamberton data series for stock price returns for the 1883-1958 period, however Brailsford et al caution that concerns over the small sample of firms, exclusion of certain sectors, and government stock price controls result in a probable bias that overstates equity returns up to the mid-1950s. Of greater concern is Brailsford et al's findings in relation to the dividend yields calculated by Lamberton for the pre-1958 period. Brailsford et al note that the dividend yield series represents the simple equal-weighted average yield on dividend-paying stocks only, with non-dividend paying stocks excluded, and will consequently contain two sources of bias. The first bias is that this equal-weighted, rather than value-weighted, average is biased towards high yielding small stocks. The second being that as the yield is based only on dividend-paying stocks, the yield inevitably overstates the market average as not all stocks pay dividends. Effectively, this assumes that stocks that pay no dividends are paying the same amount of dividends as the (unweighted) market average. Brailsford et al consider that:

> …although there might be uncertainty about the appropriate magnitude of the adjustment to be made to the Lamberton/SSE dividend yield series, it is clear than an adjustment is required. In the absence of doing so, estimates of the historical stock return and, hence, the historical equity risk premium will be overstated.[348]

Based on several different measures and sources, Brailsford et al consider a defensible range for an adjustment factor is 0.65-0.75 (that is, a downwards adjustment of between 35 to 25 per cent). Conservatively, Brailsford et al apply an

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[347] The All Ordinaries Accumulation Index provides the return on the 500 largest companies based on market capitalisation listed on the Australian Stock Exchange. Dividends are included into the index on the ex-dividend date.

[348] T. Brailsford, J.C.Handley, and K.Maheswaran , 'Re-examination of this historical equity risk premium in Australia', *Accounting and Finance*, Vol.48, 2008, p.91.

adjustment factor at the top of that range, of 0.75, being the smallest adjustment from the estimated range.

Without making this adjustment, Brailsford et al obtain historical estimates almost identical to that of Officer and Dimson et al studies. Brailsford et al explain:

> Accordingly, the difference between our results and those of Officer (1989) and Dimson et al (2002), which is largely explained by our estimate of lower stock returns, appears in turn to be largely explained by differences in the dividend yield series used in the retrospective construction of the underlying stock accumulation index for the period prior to 1958.[349]

Officer's historical estimate over the 1882-1987 period of 7.9 percent (and subsequent updates to this study), were an influential source of historical estimates to Australian regulators in initially setting the 6 per cent MRP. These estimates were arguably the source of the upper bound of the 4.5 to7.5 per cent range noted above, and from which the mid-point of 6 per cent was adopted. As noted, Brailsford et at have uncovered significant data quality issues with the Officer estimate, and have estimated the arithmetic average Australian historical excess return over the 1883-1987 period to be 6.4 per cent, which is significantly lower than the Officer estimate of 7.9 per cent.

Of a more general nature, and as acknowledged by the JIA, theoretically the CAPM market portfolio consists of all assets in the economy and is not restricted to equities. Equities, as an asset class, is widely accepted as the riskiest asset class and consequently providing the highest return, with the other asset classes being cash, bonds and property. To construct an index that encapsulated all of these asset classes would be cumbersome and controversial and the AER does not propose a departure from the current approach of using equities as the proxy for the CAPM market portfolio. However, the AER considers that it is important to recognise, in forming a view on the value of the MRP, the limitations in this approach, and the likelihood that any estimate of the MRP derived purely from historical equity returns may consequently overstate the return of the CAPM market portfolio.

**AER's conclusion**

Consistent with a domestic version of the CAPM, the AER considers that a domestic market index should be used. To incorporate the return provided from both capital gains and dividends, a broad based accumulation index should be used, where available. For the post-1958 period, the data sources adopted by either Officer (in 1989), Brailsford et al (in 2008), and subsequent updates by these authors, are all of an acceptable quality standard and produce either the same or similar results. Where estimates from the pre-1958 period are used, the AER considers reliance should be placed on estimates derived using the approach of Brailsford et al, and not of Officer, due to the significant data quality issues subsequently identified by the former.

The AER notes that of the two significant biases identified by Brailsford et al in the pre-1958 data series commonly adopted in Australian studies, the authors only attempt to correct for one of the biases. Additionally, of the bias that is corrected for,

[349] ibid.

the correction factor applied is on the boundary of what the authors consider a defensible range, meaning a conservatively small downwards correction is made. Therefore, in using the approach from Brailsford et al, returns from pre-1958 are still highly likely to overstate the market return from this period.

#### 7.5.2.2 Selection of the appropriate proxy for the risk free rate

As outlined in chapter six, the AER considers there is persuasive evidence to depart from the previously adopted term of the risk free rate of 10 years, and to adopt a term of the risk free rate consistent with the term of the regulatory control period (in general, five years). In this section, the AER addresses the issue of consistency in the term of the risk free rate and the term of the risk free rate proxy used in historical estimates of the MRP.

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

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

where:

$k_e$ = the expected rate of return on equity or cost of equity

$r_f$ = the nominal risk free rate of return

$\beta_e$ = the equity beta

$r_m$ = the expected return on the market portfolio

$(r_m - r_f)$ = the expected market risk premium

The CAPM is a single period model, though with an unspecified time period (that is, it may be applied to any time period). Internal consistency in the model would imply that when a time horizon is determined for one parameter, such as the risk free rate, then the same time horizon should be adopted for all parameters. 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 excess return on the market portfolio, including the second risk free rate used to estimate this, should also be set equal to the term of the regulatory control period. Similarly a 10 year risk free rate would be consistent with a 10 year regulatory control period.

In the issues paper, the AER raised the question of whether a distinct MRP could be estimated for different terms, and what considerations are relevant in determining the term of the risk free rate proxy used in historical estimates of the MRP.

**Submissions in response to issues paper**

The JIA do not directly address the question of whether a distinct MRP can be estimated for different terms, but do consider that a forward looking MRP for any

term should be estimated on the basis of long term historical data.[350] Officer and Bishop consider that a ten year view for both the risk free rate and MRP is a 'near convention'.[351]

The JIA state that consistency between the risk free rate proxy and the MRP is paramount from both a theoretical and practical point of view. They consider that at the theoretical level there is 'no debate' that the term should be the same, and at the practical level 'no convincing argument' has been presented for not adhering to consistency.[352]

Based on the advice of Officer and Bishop, the JIA argue that due to the offsetting effects, there is very little difference in the overall cost of equity using either a five or ten year risk free rate consistently, but that mixing the maturities of the risk free rate proxies introduces a bias in the MRP of around 20 basis points (rounded from 18 basis points).

The JIA argue that the previously adopted value of the MRP was based on historical estimates relative to 10 year government bond yields, and so historical estimates would need to be re-estimated relative to 5 year government bond yields should the AER move to a five year term of the risk free rate. The JIA note that it is not aware of any current historical studies that utilise 5 year government bond yields. It alleges that there is a lack of liquidity in 5 year government bond markets meaning that historical estimates measured relative to 5 year government bond yields would not be reliable anyway.[353]

**Issues and AER's considerations**

In responding to the issues paper, the JIA stated:

> The apparent debate appears to arise from two arguments. The first relates to the alleged short term nature of the CAPM as presented in the [AER's] Issues Paper. The second relates to an apparent argument that because historical estimates of the MRP based on 10 year bonds is an imperfect estimate of the forward looking MRP then it is acceptable to break with consistency and use a 5 year risk-free rate along with an MRP based on a 10 year rate.[354]

On this first issue, it appears that the JIA have misunderstood the comments of the AER in the issues paper. The AER does not believe that the CAPM is a short term model. As stated in the issues paper, the AER considers that:

> The CAPM is a single period model, though with an unspecified time period.[355]

The AER's reference to a CAPM that assumes a 'short-term' horizon was on the issue of consistency. That is, when a time horizon is determined for one parameter, such as

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[350] JIA *Submission in response*, op. cit., September 2008, p.89.

[351] B. Officer, and S. Bishop, op. cit.,August 2008, p.3.

[352] JIA *Submission in response*, op. cit., September 2008, p.74.

[353] ibid., p.72.

[354] ibid., p.74.

[355] AER, *Issues paper*, op. cit., August 2008, p.46.

the risk free rate, then for internal consistency in the model this would imply that the same time horizon should be adopted for all parameters, whether short-term or long-term.

As discussed in chapter six, the AER considers there is persuasive evidence to adopt a five year term of the risk free rate. The AER recognises the importance of consistency in the terms between parameters. This implies that the term of the MRP should also match the regulatory period (which in general is five years). In this regard the JIA have correctly understood the comments of the AER in the issues paper on the second issue.

Theoretically, if the AER adopted a term of the risk free rate of, for example, one, five, or ten years, then for consistency a MRP of one, five or ten years should also be adopted. The AER does not contest, and in fact completely emphasises, the importance of this internal consistency. However it is important to understand that a forward-looking MRP of any term is unobservable. All the regulator, industry stakeholders or academics have to rely on are proxies. If data on shorter term government bond rates are unavailable for long estimation periods or are not preferred for other reasons, then historical market returns based on ten year bond rates may be a more appropriate proxy for a forward looking MRP. This may be the case even where a forward looking MRP of a shorter term is adopted (e.g. the length of the regulatory control period). If this approach is adopted, then historical estimates based on this approach should be interpreted based on the limitations of this approach. This is the AER's position on the use of market data generally. Market data will always be an imperfect proxy for the unobservable WACC parameter that the AER is attempting to measure.

Rather than discarding the market data completely, or preventing a theoretically superior approach to the term of the risk free rate due to limitations with the market data, the AER considers that the market data available should be interpreted with regard to the limitations of the underlying data. The AER notes that this is essentially the approach that has always been used in practice in relation to the MRP, though has rarely been acknowledged. Officer and Bishop state:

> It has been conventional in Australia for academics and practitioners to use ten year Commonwealth Bond Yields as the proxy of the risk free rate… For example, Officer (1989) used it to estimate the MRP…[356]

This statement appears to imply that academics and practitioners have constantly and consistently estimated Australian historical excess returns relative to 10 year government bond yields. However Officer in his 1989 study did not use 10 year government bond yields as the risk free rate proxy for the entire length of his study period, but rather only for the post-1950 period. This is evident from Officer who states:

> For the period 1915-1949 the yields were on Commonwealth Government Securities maturing in five years or more… [emphasis added][357]

[356] B. Officer, and S. Bishop op. cit., September 2008, p.13.

Presumably this data of varying yields were used because 10 year government bonds yields were not consistently available for this period. For the 1882-1914 period, Officer does not state the yield used but it seems unlikely that data on 10 year government bond yields would have been consistently available for this period either. Similarly, Brailsford et al's estimates relative to 'bonds' were not based on 10 year government bond yields for the entire 1883-2005 period, but rather only for the post-1959 period. For the 1883-1913 period, Brailsford et al (2008) appear to use the same data source as Officer and similarly do not state the term or terms of the yields used. For the 1914-1958 period, Brailsford et al state:

> The series for 1914-1925 represents the yield on Commonwealth and State government securities trading on the SSE and maturing in 4 or more years, derived from material contained in the RBA's archives. For 1926-1958, the data were sourced from the RBA's Research Department. In particular, the series for 1926-1940 is the average redemption yield on a fully taxed security maturing in 10 or more years. For 1941-1947 the series is the theoretical redemption yield on a fully taxed security maturing in 12 years. For 1948-1958 the series is the theoretical yield on government securities maturing in 10 or more years subject to current tax. [emphasis added][358]

The purpose of the AER in emphasising these inconsistent yields is not to claim that that Officer's pre-1950 estimates or Brailsford et al's pre-1959 estimates are 'invalid' and must be completely discarded, but rather the opposite. That is, in interpreting these estimates regard should be had to the underlying strengths and weaknesses of the data series, and the potential for these estimates to over or underestimate the 'true' value of the parameter.

The historical estimates from Officer's 1989 study were influential to Australian regulators in deriving the previously adopted value of 6 per cent, yet as clearly outlined above, Officer did not use 10 year yields for the entire 1882-1987 period. Accordingly, the following statement by the JIA appears mistaken:

> The MRP currently adopted by all Australian regulators in Australia was derived from historical data using the yield on the 10 year Commonwealth bond as the proxy for the risk-free rate.[359]

The issue of consistency in the term of the proxies for the two risk free rates was a significant issue in the context of GasNet's second access arrangement decision (2003-2007), which was appealed to the Australian Competition Tribunal. Yet in the historical estimates relied upon by GasNet and its consultant (NECG) in its proposal 10 year risk free rate proxies were not consistently used.

GasNet's proposed MRP for its second access arrangement was based on a report by NECG that it commissioned. The NECG report referenced the Officer's historical estimate over the 1882-1987 period, among other studies. Neither GasNet's proposal

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357 R. R. Officer, 'Rates of return to shares, bond yields and inflation rates: an historical perspective', in R. Ball, P. Brown, F. Finn and R.R. Officer (eds.), *Share markets and portfolio theory: readings and Australian evidence*, 2nd ed., University of Queensland Press, Brisbane, 1989, p.211.

358 T. Brailsford, J.C.Handley, and K.Maheswaran, 'Re-examination of this historical equity risk premium in Australia', *Accounting and Finance*, Vol.48, 2008, p.82.

359 JIA, *Submission in response*, op. cit., September 2008, p.60.

nor the NECG report argued that Officer's 1882-1987 estimate was 'invalid'. In fact, neither GasNet nor NECG even acknowledged that Officer's 1882-1987 estimate was not consistently based on a 10 year risk free rate proxy for over half the estimation period. Presumably, neither GasNet nor NECG considered this was a material issue.

Also on the issue of consistency between the term of the risk free rate and the term of the risk free rate proxy used in historical estimates of the MRP, Officer and Bishop state:

> There is difference between measurement error with no known bias i.e. the expected value of the measurement error is zero, which we believe to be the case in estimating the MRP from historical data, and introducing a bias where the expected value of the error is non zero.[360]

The AER notes there are many potential biases in the use of historical data as a proxy for an unobservable forward looking estimate. Some may lead to an overestimate of the 'true' parameters value whereas others may lead to an underestimate. The AER's position is that the mere potential of a bias should not lead to the data being completely disregarded, as to do so would likely lead to little or no data which could be relied upon. Rather that data should be interpreted having regard to the potential downwards or upwards bias.

For example, as acknowledged by the JIA, 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. Yet it is commonly accepted that equities are the riskiest asset class and provide the highest return over the long term. Accordingly the use of historical equity returns is likely to lead to a 'non-zero' measurement error and overstate the return on the CAPM market portfolio. Strictly applying the principle from Officer and Bishop would lead to no regard being placed on historical excess equity returns in estimating the MRP. Clearly this is an impractical outcome. As stated, the AER's preferred approach is instead to interpret the data having regard to the strengths and weaknesses of the underlying data, including the potential for the data to include an upwards or downwards bias. An additional upwards bias may be that a forward looking MRP will be lower than long term historical excess returns because of the diversification benefits across countries that have only been substantially available in the last several decades as capital markets have become more open. As discussed in chapter four, the AER's approach is to adopt a domestic version of the CAPM that recognises the presence of foreign investors in Australian capital markets. Likewise, the AER does not consider that no regard should be given to historical estimates because of this potential bias, but rather, that historical estimates should be interpreted with the knowledge of this potential upward bias.

Accordingly the AER turns next to considering the potential magnitude of the bias if a 5 year risk free rate is adopted, but a 10 year risk free rate proxy is used to estimate historical excess returns to determine the MRP. The potential bias is introduced where the term structure of observed yields is not flat.

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[360] B. Officer, and S. Bishop, op. cit., September 2008, p.8.

Officer and Bishop note:

> Indicative data on Government bond yields from January 1972 to July 2008 does show an average yield difference between ten year and five year bonds of 18 basis points with there being more positive than negative differences. This suggests that the MRP relative to a five year bond will be slightly higher than for a ten year bond.[361]

Based on the estimates from Officer and Bishop, the AER considers that 20 basis points may be a reasonable estimate of the difference in historical excess returns based on 10 year government bonds compared with 5 year bonds. Historical excess returns relative to a 10 year risk free rate should therefore be interpreted in the context that that they may underestimate historical excess returns relative to a 5 year risk free rate proxy by approximately 20 basis points.

The AER notes that data on 5 year government bond yields are available since 1969. Estimates relative to these yields for the longest estimation period possible results in an arithmetic average of historical excess returns over 1969-2007 of 5.5 per cent, or over 1969-2008 (to date) of 4.6 per cent.[362] These estimates could be used as an alternative though, at present, historical estimates relative to 5 year CGS are not statistically significant.

**AER's conclusion**

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.

As outlined in chapter six, the AER is proposing a term of the risk free rate that matches the term of the standard regulatory control period, which in general is five years. As historical returns relative to 5 year CGS are not, at present, statistically significant, the AER is not advocating historical estimates be estimated in this manner. Rather, following Officer and Bishop's estimate of the difference between 10 and 5 year CGS yields, the AER considers that historical estimates should continue to be estimated relative to 10 year CGS, but interpreted with the understanding that these estimates may underestimate historical estimates relative to 5 year CGS by approximately 20 basis points.

#### 7.5.2.3 Method of averaging returns over multiple periods (arithmetic, geometric, average)

Historical excess market returns are highly sensitive to the method of averaging returns over multiple periods. For example, Brailsford et al (2008) 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.[363] If returns vary over

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361 ibid., p.8.

362 J. Handley, *A note of the historical equity risk premium*, Report prepared for the AER, September 2008.

363 T. Brailsford, J.C. Handley, and K. Maheswaran, op. cit., 2008, p.90.

time, a geometric average will always be less than an arithmetic average. The greater the volatility in returns the greater the difference between an arithmetic average and geometric average will be. With the level of volatility present in historical stock market returns, a difference of around 200 basis points (2 per cent) is common.

In estimating a forward looking parameter from historical data some authors argue for the arithmetic average, others for the geometric, and others still for a weighted average of the two. In Australian regulatory practice, use of the arithmetic average is standard. However the ability of an arithmetic average to be an unbiased estimate relies on the assumption that all returns are independent from each other, in a statistical sense. In the issues paper, the AER noted that this assumption may not be realistic, and asked how historical returns should be measured over multiple periods.

**Submissions in response to issues paper**

The JIA argue that the issue is in determining how investors' expectations are formed on historical returns. The JIA argue:

> Whether investors' expectations of the annual return of the market portfolio are determined by the arithmetic or geometric average of historical returns depends on the extent that investors believe that historical observations of market returns are independent.
>
> The arithmetic average MRP is the generally accepted approach and assumes that investors treat all historical observations as independent. That is the MRP in a given year is not influenced by the MRP in a prior year.[364]

Officer and Bishop (2008) also note that the arithmetic average is usually used and state this is appropriate 'if' all historical observations are treated as independent draws from the same distribution.[365]

**Issues and AER's considerations**

If an index starts at 100, falls to 80 and then increases again to 100, the arithmetic average return is 2.5 per cent (the average of the initial 20 per cent fall and subsequent 25 per cent rise) and the geometric average return is zero (because the value of the index at the end of the two periods is the same as at the beginning).

A geometric average is usually adopted when measuring historical performance, whereas an arithmetic average is commonly adopted when estimating a forward looking estimate from historical data. Some authors have argued that use of an arithmetic average for estimating a forward looking parameters is biased up and a geometric average is biased down and have proposed various methods to average the two.

For example, Blume has developed an averaging technique where the arithmetic average is adjusted downwards where there are more return intervals in the estimation period than the forecast period, which Blume argues would otherwise lead to an arithmetic average being biased upwards as a measure of a forward looking estimate.

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[364] JIA, *Submission in response*, op. cit., September 2008, p.88.

[365] B. Officer, and S. Bishop, op. cit., August 2008, p.6.

Dimson, Marsh and Stuanton have also developed an averaging technique where historical arithmetic averages are adjusted based on the relative historical volatility compared to expected future volatility.

Hathaway (2007), and Gray and Officer (2005) 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.[366] 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. The AER considers there is some merit in the alternatives proposed by Dimson et al, Blume and other experts however the AER acknowledges that there is no one alternative that is universally accepted each involves a certain level of complexity. Therefore on balance, the AER considers that use of an arithmetic average is reasonable. However these estimates should be interpreted with the understanding that they may to some degree overestimate a forward looking MRP.

**AER's conclusion**

Whilst several alternative methods that weight arithmetic and geometric averages have been proposed, the complexity of these alternatives and existence of more than one alternative are unlikely to make adoption of these alternatives worthwhile. Rather arithmetic averages should be interpreted having regard to the argument that they may produce an upwards biased estimate of the expected market risk premium.

#### 7.5.2.4 Length of estimation period

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

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

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

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

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

In the issues paper the AER asked what factors should be considered in determining the length of the estimation period, if a shorter or longer period should be considered, and what start and end dates should be considered.

**Submissions in response to issues paper**

The MEU argue that using long term historical estimates does not recognise the exogenous changes that have impacted the share market over this time, and consequently historical estimates should only include data from around the last 25 years. For example, the MEU consider that the unexpected asset price inflation present in long term historical averages will led to an upwards biased estimate of a forward looking MRP.[367]

The JIA consider that the principal factors that should be considered include:

- the underlying quality of the data and data source
- the stability and robustness of the estimates, noting that if changes to the length of the estimation period results in volatile estimates, then a longer term period is appropriate, and
- no exclusions of periods within a sample period or exclusion of reliable data at the start of a sample period should be made unless there is strong evidence of a structural break or trend away from the long term average.[368]

The JIA note reasons why a structural break or trend away from long term estimates could occur include an overall fall in risk or more diversification opportunities. However the JIA argue that structural breaks are difficult to identify, and that identifying them is an empirical question. They also note that a shorter estimation period would lead to greater confidence intervals.

Overall the JIA consider that a long term average is preferable to a short term average with the only constraint on the start date being data quality issues. The JIA consider data from 1958-2007 should be used as the primary estimate. The start date being based on the data quality issues identified by Brailsford et al (2008) in data prior to this date and the end date based on 2007 being the most recent complete calendar year of data. However the JIA consider that historical estimates incorporating data from pre-1958 should be used as a 'cross-check'.[369]

**Issues and AER's 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.[370] Further, the stability of the MRP over time is also

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367 ibid., pp.42-43.

368 JIA, *Submission in response*, op. cit. September 2008, pp.87-88.

369 ibid., p.88.

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

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.

Studies that argue for a shorter estimation period generally consider data covering approximately the last 30 years to be appropriate, though these studies do not generally give a reason for this specific timeframe. Studies that argue for a longer estimation period generally incorporate data from around the last 120 years; presumably as this incorporates all data available. Brailsford et al (2008) examined the quality of Australian market return data and government bill and bond data over time, and present estimates of Australian historical excess returns corresponding to specifically determined periods of increasing data quality but of decreasing sample size. The authors consider that identifiable and material changes in the quality of the underlying data occurred in 1883, 1937, 1958 and 1980. The authors also estimate historical excess returns for the 1988 onwards period, representing the period after the introduction of the imputation tax system. [371]

Table 7.2 illustrates the historical excess returns up to 2005 for each of the estimation periods identified by Brailsford et al. Also illustrated are estimates with the same start dates but ending in 2007, being the most recent complete year of data, and periods with the same start dates but ending in mid-October 2008, incorporating the most recent data.

**Table 7.2: Historical excess returns (arithmetic average, relative to 10 year bonds, per cent)**

| Estimation period (end date / start date) | 2005 | 2007 | 2008 (to date) |
|---|---|---|---|
| **1883-** | 6.2* | 6.4* | 6.1* |
| **1937-** | 5.8* | 6.1* | 5.6* |
| **1958-** | 6.3* | 6.7* | 6.0* |
| **1980-** | 6.0 | 6.8 | 5.5 |
| **1988-** | 5.1 | 6.3 | 4.5 |

Source: Brailsford et al (2008), Handley (2008)[372]
*Indicates estimates are statistically significant at the five per cent level based on a two-tailed t-test.

Brailsford et al considered that Australian data prior to 1958 should be used with caution. Concerns over the small sample of firms, exclusion of certain sectors, and

[371] ibid., pp.73-97.

[372] T. Brailsford, J.C.Handley, and K.Maheswaran , 'Re-examination of this historical equity risk premium in Australia', *Accounting and Finance*, Vol.48, 2008, p.90; J. C. Handley, , *A note on the historical equity risk premium – Report prepared for the AER*, November 2008, p.6 and p.13.

government stock price controls result in a probable bias that overstate equity returns up to the mid-1950s. However the most significant concern raised by Brailsford et al (2008) relates to how dividend yields have been incorporated into historical market returns in previous studies, as discussed in section 7.5.2.1 above.

On the appropriate length of the estimation period, Officer and Bishop consider:

> In our view, which has been confirmed by the data we have examined, we should use the longest time series possible, subject to minimising data measurement errors, to estimate the MRP.[373]

The AER notes that estimates over each of the 1883-2008, 1937-2008 and 1958-2008 periods are all statistically significant. In contrast estimates over the more recent periods of 1980-2008 and 1988-2008 are not statistically significant. As noted above, the JIA consider the estimation period starting in 1958 should be used as the primary estimate, whereas estimates over different periods should be used as 'cross checks'. However, as a balance of the factors noted above, including those raised by the JIA, the AER considers that weight should be applied to each of the three particular long term estimation periods which produce statistically significant results.

As also noted, based on the data quality issues identified by Brailsford et al (2008), the authors consider data before 1958 should be used with caution. The AER agrees with this and has exercised this caution by noting that estimation periods that include data from pre-1958 are likely to overstate historical excess returns from this period because of the biases identified by Brailsford et al.

In terms of end dates for the estimation periods, it is generally accepted that incorporating the most available data is appropriate. Officer and Bishop (2008) argue this view. However they consider only the most recent 'full year' of data should be included. The AER considers this approach is reasonable, though the AER notes the estimates are quite sensitive to the end date.

As can be seen from the table 7.3, simply adding another year or two of data can have a significant impact on the historical average, even the average from the last 50 years. Moreover, adding another year or two of data to the 20-year average can have a more profound result on the estimate than on the estimate using a 50-year average. The AER cautions against any 'mechanistic' approach to estimating the MRP from historical estimates given the sensitivity of these results.

As noted above, as an alternative to using simple historical averages over a defined period, various estimation techniques may be used that weight more recent data over older data. Hancock (in 2005) assessed the predictive power of various estimation techniques including simple averages, moving averages, exponentially weighted moving averages and Hodrick-Prescott filters. [374] 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

[373] B. Officer, and S. Bishop, op. cit., August 2008, p.7.

[374] J. Hancock, *The market risk premium for Australian regulatory decisions*, South Australian Centre for Economic Studies, 2005, pp.32-34.

downward move in historical excess returns since the late 1950s. However, Bishop (in 2007) and Officer and Bishop (in 2008) argue that updated data shows this apparent downward trend has been substantially reversed.[375] The AER considers that these alternative techniques have the potential to provide an insight into trends in historical excess returns away from long term averages, though such estimates may also place too much weight on recent data that does not reflect the 'true' unobservable forward looking MRP. On balance, and for simplicity, the AER considers having regard to simple historical averages over a range of estimation periods is reasonable and should be preferred.

**AER's conclusion**

The AER considers it is appropriate to consider a range of estimation periods, and in particular, 1883 onwards, 1937 onwards and 1958 onwards. The AER considers the end date of the estimation period should be based on the most recent data. The estimation periods considered in this chapter end in mid-October. However, the AER will update these estimates to include the data for the complete 2008 year for the final decision. As the end date can vary even the long term historical average substantially, the AER considers this further supports the proposition that the MRP should not be based 'mechanistically' on historical averages.

#### 7.5.2.5 Adjustment for imputation credits

As noted above, JIA have argued that the previously adopted value of the MRP of 6 per cent was developed without consideration of any value for imputation credits. As discussed in section 7.5.1 above, the AER disagrees with this view, in that regard was had to the value of imputation credits by Australian regulators in initially establishing the previously and consistently adopted MRP of 6 per cent. 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 ten of this explanatory statement. This section addresses if and how historical excess returns should be 'grossed-up' to incorporate the value of imputation credits.

Since 1 July 1987, a dividend imputation tax system has been operating in Australia. Under a dividend imputation tax system, the return to equity holders is potentially comprised of three components – dividends, capital gains, and imputation credits. Imputation credits can be used by certain investors to off-set their personal income tax. This can be thought of as a prepayment of personal income tax at the 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 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.

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[375] S. Bishop., *Market risk premium – commentary on recent papers*, Capital Value, 2007, p.5.

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

Gray and Hall (2006) 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. [376] Gray and Hall (2006) 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 capital gains and dividends alone, while maintaining consistency with the CAPM framework.[377]

In the issues paper the AER asked if and how historical excess returns (based on accumulation indices) should be 'grossed-up' to include the value of imputation credits. The AER also asked if a gamma, MRP and tax rate of 0.50, 6 per cent and 30 per cent were inconsistent with each other.

**Submissions in response to issues paper**

The JIA state that in calculating historical excess returns the dividends paid to the market should be 'grossed-up' to account for the value of imputation credits.[378] The JIA commissioned Officer and Bishop (2008) who estimate the arithmetic average of historical excess returns over the 1958-2007 period, and then gross these estimates up for values of imputation credits once distributed of zero, 0.5 and 1.0, resulting in historical estimates of 6.7 per cent, 7.1 per cent and 7.4 per cent, respectively. Officer and Bishop (2008) state that the focus of their paper is not on estimating the appropriate value of imputation credits once distributed and so these assumed values are for illustrative purposes only.[379]

The JIA argue that:

> …the empirical evidence confirms that the value of gamma is low, and that correct interpretation of the data indicates a gamma value that is not materially different from zero. If the AER determines a zero value for gamma then the requirement to increase the MRP is removed.[380]

The JIA argue that if a 0.5 value of gamma is maintained then the MRP should be increased from 6 to 7 per cent. The JIA argue the MRP should be increased from 6 to 7 per cent 'if any material positive value were adopted for gamma' though in other

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

377 ibid., pp.405-428.

378 JIA, *Submission in response*, op. cit., September 2008,p.94.

379 B. Officer, and S. Bishop, op. cit., August 2008, p.6 and p.24.

380 JIA, *Submission in response*, op. cit., September 2008, p.94.

parts of their submission the JIA argue that a 7 per cent MRP should be adopted for any positive value of gamma.[381]

The Major Energy Users consider that as the bulk of share holdings are now with superannuation funds who pay a tax rate no more than, and often less than, the company tax rate, the value of imputation tax to Australian investors generally is less than when the imputation tax system was introduced. The Major Energy Users argue that the 'real' current impact of imputation needs a close assessment of the ownership structure of firms, and the ability for these owners (such as superannuation funds) to benefit from imputation credits.[382]

The AER notes that no submissions argued that there was an inconsistency between a gamma of 0.5, MRP of 6 per cent and assumed tax rate of 30 per cent, along the reasoning of Gray and Hall (2006). Stakeholders appear to have accepted the counter arguments against the reasoning of Gray and Hall (2006) put forward by Lally (2008) and Truong and Partington (2008), which are discussed below.

**Issues and AER's considerations**

From the specification of the 'building blocks' and WACC formula, it is evident from the NER that the appropriate rate of return is an after-company-before-personal tax rate of return.

On the issue of measuring the market risk premium under an imputation tax system, Officer (1994) notes:

> This raises the important question of whether we can use conventional measures of this risk premium, such as an x percent premium over the risk free rate, when the x percent is based on historical rates under a classical tax system. If the imputation tax does *not* affect the cost of capital on an *after-company tax basis* as I have argued, then we could estimate $E(r_{jt})$ using historical rates estimated under a classical tax regime. However, where estimates of returns are derived under an imputation tax using equation (16), some personal tax payments will be capitalised into the risk premium which consequently will be lower. In these circumstances, an adjustment (add $\tau$) will be needed to include the personal tax credits so that the cost of equity capital is calculated to reflect an *after-company tax* but *before-personal tax* return consistent with the definition of cash flows.[383]

The AER accepts the legitimacy of 'grossing-up' historical excess returns (based on accumulation indices) to include the value of imputation credits. However, as pointed out by Officer (1994), assuming the introduction of the imputation tax system did not change the total required return to equity holders (and rather only the sources of that return where altered), then historical excess returns should not be 'grossed-up' before the introduction of the imputation tax system.[384] The issue is therefore restricted to

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381 ibid.

382 MEU, *Submission in response*, op. cit., September 2008, p.47

383 R. R. Officer, , 'The cost of capital of a company under an imputation tax system', *Accounting and Finance*, vol.34, 1994, p.10.

384 Officer (1994) argues that in an open capital market, such as Australia, where the size of the market relative to offshore markets implies that Australia is a price taker, the cost of capital would not be expected to change.

how historical excess returns (based on accumulation indices) should be 'grossed-up' to include the value of imputation credits after the introduction of the imputation tax system. In an Australian context, the issue is how should historical excess returns be 'grossed-up' after 1987.

One option would be to only use a period of Australian historical excess returns that completely predates 1987. However, as this would exclude approximately the last 20 years of data, this would not be appropriate unless it could be argued that the MRP had not changed in recent decades. Brailsford et al (2008) estimate the arithmetic average historical excess returns, relative to bonds, to be 6.4 per cent over the 1883-1987 period.[385]

A second option would to use a period of Australian historical excess returns that spans the periods both before and after the imputation tax system without adjustment for imputation credits, but to interpret the results with the knowledge that the historical excess returns would understate to some degree the total return to equity holders in the years after the introduction of the imputation tax system. Handley (2008) estimates the arithmetic average historical excess returns, relative to bonds, to be 6.1 per cent over the 1883-2008 period or 6.0 per cent over the 1958-2008 period. Effectively, this was the approach that was previously promoted by Gray and Officer (2005), who stated:

> We note that the effect of franking credits on the estimate of MRP is small relative to both estimation error and the way in which other evidence in reflected in the final MRP estimate. We conclude that (i) it is appropriate to combine data from before and after the introduction of imputation and to express an estimate of the MRP that ignores any adjustment for the value of franking credits, and (ii) that the estimate of 6% that has been adopted by regulatory and market practice is such an estimate. We believe an adjustment to the MRP for franking credits is likely to be less than 50 basis points and to take the MRP to a decimal point, in view of general measurement errors, in our opinion would give a spurious impression of precision in the estimate.[386]

A third option would be to attempt to adjust or 'gross-up' historical excess returns after 1987 to include the return derived from the value of imputation credits distributed, and to average these with estimates before 1987. This requires estimates of the value of imputation credits distributed 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.

It is first important to recognise what the 'gross-up' should consist of. To be consistent with the Officer (1994) framework, the historical excess returns (from capital gains and dividends) should only be 'grossed-up' to reflect the value of imputation credits *distributed* and not the value of imputation credits *created*. This is recognised by Officer and Bishop (2008) who state:

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[385] T. Brailsford, , J.C.Handley, and K.Maheswaran , 'Re-examination of this historical equity risk premium in Australia', *Accounting and Finance*, Vol.48, 2008, p.90.

[386] S. Gray, and R.R. Officer, *A review of the market risk premium and commentary on two recent papers*, A report for the Energy Networks Association, 2005. pp.3-4.

> …the term 'gamma' is usually used to reflect the value of $1 of imputation tax benefits created by the firm however we are concerned with the value of a dollar of imputation tax benefits once distributed given that we are adjusting observed market returns.[387]

The AER agrees with this statement from Officer and Bishop (2008). As demonstrated in Officer (1994) it is important to be consistent in the definition of both cash flows and the rate of return. 'Gamma' is used to adjust downwards the corporate income tax building block (i.e. cash flows) for the value of imputation credits created. Accordingly a rate of return is required that also reflects the value of imputation credits created. To achieve this, historical excess returns (from capital gains and dividends) need only be 'grossed-up' for the value of imputation credits distributed. The reason is that the value of imputation creates not distributed (which combined with the value of imputation credits distributed make up the value of imputation tax credits created) can be expected to already be present in the capital gains as investors place a value on this undistributed credits in the belief that they will be distributed in the future. Officer and Bishop (2008) agree with this notion and state:

> Any value to imputation tax benefits retained will be reflected in the share price through an anticipation of when they may be distributed and their value at that this.[388]

That is, the value of undistributed imputation credits will be reflected in the share price (capital gains) and accordingly it is only necessary to add back the value of distributed imputation credits onto the return from accumulation indices. This will lead to a consistent definition of cash flows and the rate of return which is the critical contribution of the Officer (1994) framework.

These 'grossed-up' historical excess returns were first estimated by Brailsford et al (2008) and Handley and Maheswaran (2008), which both 'grossed-up' estimates over different time periods ending in 2005. Brailsford et al (2005) 'grossed-up' historical estimates for assumed utilisation rates of 0.5 and 1.0, noting that these were chosen for illustrative purposes only. Handley and Maheswaran (2008) extended this work by 'grossing-up' for more precise estimates of utilisation rates determined from tax statistics, which averaged 0.71 over the 1990-2004 period.

It is noted that in both reports the authors urge a cautious approach to the use of their 'grossed-up' estimates. Brailsford et al (2008) caution:

> We reiterate that because of restrictions on data availability and the short sample period involved, these estimates are considered to be indicative only of the potential impact that imputation might have on the equity risk premium in Australia.[389]

Handley and Maheswaran (2008) note:

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387 B. Officer, and S. Bishop, op. cit., August 2008, p.i.

388 ibid., p.9.

389 T. Brailsford, J.C.Handley, and K.Maheswaran, 'Re-examination of this historical equity risk premium in Australia', *Accounting and Finance*, Vol.48, 2008, p.92.

> In this section, we provide preliminary evidence of the impact of the imputation system on the rate of return to equity holders…[390]

On the other issues presented by Gray and Hall (2006) relating to the alleged inconsistency between a MRP, gamma and assumed tax rate of 6 per cent, 0.5 and 30 per cent, respectively, the AER notes that this assertion has been disputed by Lally (2008), and by Truong and Partington (2008). Lally (2008) noted that there is no inconsistency, as amongst other reasons, the observed and implied dividend yields quoted in Gray and Hall (2006) are not comparable as the observed yields are based on data that largely predates dividend imputation.391 Truong and Partington (2008) argued that instead of setting the gamma to zero, recognising that retained imputation credits may have a positive value removes the inconsistency.[392]

**AER's conclusion**

Conceptually the AER recognises the importance of consistency in the cash flows and rate of return, which follows the Officer (1994) framework.

#### 7.5.2.6 Adjustment for unrepresentative data (unexpected or one-off events)

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

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 (2005) estimated the current MRP (at time of publication) to be 4.5 per cent, whereas Hancock (2005) estimated the most likely value of the MRP is in between 4.5-5.0 per cent.[393] The specific adjustments proposed by Hathaway (2005) and Hancock (2005) are discussed below.

**Submissions in response to issues paper**

The JIA and Officer and Bishop (2008) make some comments on the specific adjustments proposed, but in general, state that a longer estimation period that

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390 J. C. Handley, and K. Maheswaran, 'A measure of the efficacy of the Australian Imputation Tax System', *The Economic Record*, Vol. 84, No. 264, 2008, p.91.

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

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

393 N. Hathaway, *Australian market risk premium*, Capital Research, 2005; J. Hancock, *The market risk premium for Australian regulatory decisions*, South Australian Centre for Economic Studies, 2005.

includes both positive and negative shocks should be used rather than making 'ad hoc' adjustments to historical estimates.

**Issues and AER's considerations**

***One-off increase in PER***

The price-earnings ratio (PER) is calculated as the share price divided by the earnings per share (EPS). Hathaway (2005) 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.[394] It was concluded that this shift in the PER added 145 basis points to the 1965-2005 period historical excess market return. Hathaway (2005) 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 (2005) considered the inflation of the PER was a one-off historical event.

***Unexpected introduction of dividend imputation in 1987***

Hancock (2005) 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 (2005) estimated this unexpected event biases up the 30 year average MRP by approximately two thirds of a per cent.[395]

Gray and Officer (2005) have previously stated that:

> It is quite inconsistent to assume that franking credits have such value that their anticipated introduction drove stock prices up by more than 20%, but then to assume that those same franking credits are irrelevant when they are actually paid.[396]

The AER agrees with Gray and Officer (2005), and accordingly has presented historical estimates 'grossed-up' for the value of imputation credits in the section 7.5.3. However clearly if Gray and Officer (2005)'s argument is accepted, then the reverse must also be true. That is, that it would be quite inconsistent to assume that imputation credits have such value that historical excess returns should be 'grossed-up' to incorporate them, but that the large one-off and unexpected capital gain that their introduction caused can simply be overlooked in basing a forward looking MRP on historical estimates.

***Unexpected gains from a long term downward move in discount rates***

Hancock (2005) also noted that real interest rates fell around one per cent over the 30 year period from the early 1970's. Hancock (2005) argued that on an unchanged

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394 N. Hathaway, op. cit., 2005, pp.7-9.

395 J. Hancock, op. cit., 2005, p.11.

396 S. Gray, and R.R. Officer, *A report for the Energy Networks Association*, op. cit., 2005, p.29.

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.[397]

***Arguments against adjustments to historical estimates***

The adjustments to the historical data proposed by Hathaway (2005) and by Hancock (2005) have been reviewed by Gray and Officer (2005) and by Bishop (2007).[398] The comments in Officer and Bishop (2008) substantially reflect these earlier views. In both cases, the authors argued against the proposed adjustments, arguing they are 'ad hoc' and may themselves be a source of bias.

Gray and Officer (2005) 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 (2005) further argued that it is because there are unexpected events that a risk premium is required.[399] Bishop (2007) 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.[400] Each set of authors also note that, except for Hathaway (2005)'s acknowledgement of the relationship between the MRP and imputation credits, only events that might bias the historical MRP upwards had been considered, and not events that might do the reverse.

Gray and Officer (2005) 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.[401]

***AER's conclusion***

The AER considers that it may not be appropriate to make explicit adjustments to historical estimates of the MRP, as suggested by Hathaway (2005) and Hancock (2005). However these authors have identified several significant unexpected or one-off historical events that are likely to bias upwards historical estimates as a proxy for a forward looking MRP. Accordingly, historical estimates should be interpreted in this knowledge.

### 7.5.3 Historical estimates – results and interpretation

Estimates based on historical averages are arguably the most common proxy of the MRP. Historical estimates though strictly not forward looking are often used to estimate the MRP on the assumption that investors base forward looking expectations on past experience.

The MRP is an expected return which is not directly observable and so must be estimated. In their seminal paper, Mehra and Prescott (1985) provide evidence that historical excess returns have been too high in relation to the return on government

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397 ibid., pp.11-12.

398 S. Gray, and R.R. Officer, *A report for the Energy Networks Association*, op. cit., 2005; Bishop, *Market risk premium – commentary on recent papers*, Capital Value, 2007.

399 S. Gray, and R.R. Officer, *A report for the Energy Networks Association*, op. cit., 2005 pp.25-29.

400 S. Bishop, op. cit., 2007, pp.6-7.

401 S. Gray, and R.R. Officer, *A report for the Energy Networks Association*, op. cit., 2005 p.3.

bonds to be explained by the standard economic models of risk and return without invoking unreasoningly high assumptions about the risk aversion of equity holders. Mehra and Prescott (1958) label this phenomenon the 'equity premium puzzle'.[402] Dimson, Marsh and Staunton (2006) posit:

> Logically, there are two possible resolutions to the puzzle: either the standard models are wrong, or else the historical premium is misleading and we should expect a lower premium in the future.[403]

The authors conclude, as does Siegel (1999), that a forward looking MRP can be expected to be less than historical estimates.[404] This is an important consideration as the NER provides that the AER must have regard to the need for the MRP to be forward-looking and only compensate for non-diversifiable risk.

Where structural breaks have occurred, or are expected to be presently occurring, using historical excess returns may not be a good proxy for a forward looking estimate. 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.

As can be seen in table 7.3, historical excess market returns 'grossed-up' for an assumed utilisation rate of 0.65 results in an arithmetic average of between 5.9 and 6.5 per cent for estimation periods commencing between 1883 and 1958 and finishing in 2008. As noted in section 7.5.2.2 above, these estimates may underestimate historical excess returns relative to 5 year government bonds by approximately 20 basis points.

Table 7.3 identifies that the incremental increase of adopting a utilisation rate of 0.65, compared to 0.5, is between 0 and 10 basis points, over the estimation periods 1883-2008, 1937-2008 and 1958-2008.

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[402] R. Mehra, and E. Prescott, 'The equity premium – A puzzle', *Journal of Monetary Economics*, Vol. 15, 1985.

[403] E. Dimson, E., P. Marsh and M.Stauton, *The worldwide equity premium – a smaller puzzle*, London Business School, 2006, p.1.

[404] J. Siegel, 'The shrinking equity premium', *Journal of Portfolio Management*, Fall, 1999.

**Table7.3: Historical excess returns (arithmetic average, relative to 10 year bonds, 'grossed-up' for value of imputation credits distributed, per cent)**

| Utilisation rate | 0.5 | 0.65 |
|---|---|---|
| **1883-2008** | 6.2* | 6.3* |
| **1937-2008** | 5.9* | 5.9* |
| **1958-2008** | 6.4* | 6.5* |
| **1980-2008** | 6.2 | 6.4 |
| **1988-2008** | 5.4 | 5.7 |

Source: Handley (2008), [405] Handley (2008)[406]
*Indicates estimates are statistically significant at the five per cent level based on a two-tailed t-test.

If historical excess returns:

- are 'grossed-up' for a utilisation rate of 0.65
- interpreted in view of the 20 basis points as the likely difference if they had been estimated relative to 5 year CGS, and
- and estimated over a range of estimation periods that the AER considers appropriate (1883-2008, 1937-2008, 1958-2008)

then the estimated historical excess returns would fall within the 6 to 7 per cent range (specifically, 6.1 to 6.7 per cent).

The AER also notes that Gray and Officer (2005) have previously advised in advice commissioned by the ENA that:

> We recognise that it is likely that the MRP is not stationary and likely to vary under different economic conditions. However, the fact that there is no adequate theory underlying the variability of MRPs makes it dangerous to adjust an MRP estimate simply because another year or two or three of data alter the estimated mean. For example, a year ago the 30-year mean excess return was less than 6%, leading some to call for a reduction in the MRP used by Australian regulators. Now, the most recent 30-year mean return is 7.7%. We do not advocate increasing the MRP now for the same reason we did not advocate reducing the MRP estimate last year. The problems of the theory and measurement of MRPs suggest a conservative approach – a regulator should be very careful about making any changes without compelling evidence.[407]

[405] J. C. Handley, , *A note on the historical equity risk premium – Report prepared for the AER*, November 2008, p.14;

[406] J. C. Handley, *Memorandum – Supplement to historical equity risk premium*, 27 November 2008, p.3.

[407] S. Gray, and R.R. Officer, *A report for the Energy Networks Association*, op. cit., 2005 pp.10-11.

That is, even when the latest (30 year) historical estimates were 7.7 per cent, Gray and Officer (2005) did not advocate increasing the MRP from 6 per cent. The AER notes that the 7.7 per cent was not 'grossed-up' for imputation credits. Given the latest historical estimates over a range of long term estimation periods, even after 'grossing-up' for imputation credits, are now substantially less than 7.7 per cent, the AER's proposed conclusion that the evidence to depart from an MRP of 6 per cent is not persuasive is consistent with the approach of Gray and Officer (2005).

The AER also notes the numerous reasons mentioned in this chapter as to why historical estimates are more likely to overstate forward looking expectations of the MRP, rather than understate it. These include:

- Brailsford et al (2008) identify a number of data quality issues with the pre-1958 data that the authors consider likely to bias up estimates using data from this period. This means the above estimates over the 1883-onwards are more likely to overstate, than understate, a forward-looking MRP

- the use of historical equity returns will bias upwards the return on the CAPM market portfolio, which includes all assets in the economy and is not limited to equities. This means that the above estimates for any period are more likely to overstate, than understate, a forward looking MRP, and

- these estimates include several significant and positive one-off or unexpected events that are unlikely to be repeated. That means historical estimates over the periods considered are more likely to overstate, than understate, a forward looking MRP.

Based on this information, the AER does not consider there is persuasive evidence to depart from the previously adopted MRP of 6 per cent, and that this figure is likely to be a reasonable estimate of a forward looking rate of return commensurate with prevailing conditions in the market for funds.

### 7.5.4 Cash flow based measures

Cash flow based measures of the MRP generally employ a dividend discount model. One such model is the dividend growth model (i.e. Gordon growth model or DGM) which values a stock by estimating the next dividend to be paid and then assumes dividends per share will increase in perpetuity by a constant growth rate. Rearranging the equation the implied cost of equity can be derived from the current share price. Replacing individual stock parameters for market parameters implies that the MRP *equals* the next period's market dividend yield *plus* expected market growth rate in dividends per share *minus* the risk free rate.

The merit of this approach then relies on how well these expected parameters can be forecast, and the validity of the underlying model.

**Submissions in response to issues paper**

Officer and Bishop (2008) reference two sources for implied MRPs based on dividend growth models – Harris and Marston (1999) and Bloomberg. According to Officer and Bishop (2008), Harris and Marston (1999) estimated the next dividend to be paid and earnings per share from a consensus of analysts' forecasts for individual

stocks that were then value weighted to form a forward looking MRP estimate, which averaged 7.14 per cent.[408]

Officer and Bishop (2008) understand that Bloomberg is the only source of forward looking MRP estimates in Australia. The authors understand that Bloomberg's estimates do not include any explicit adjustment for imputation credits. These estimates range between 4.5 to 8.6 per cent between 2004-2008, with the upper bound being a recent estimate (though Officer and Bishop (2008) consider this apparent upwards trend could easily change). From a theoretical perspective, the authors note there is nothing wrong with using cash flow measures but consider that it would require great confidence in the derived MRPs. Officer and Bishop (2008) consider cash flow measures do not provide a better forward looking estimate than historical estimates.[409]

The JIA note the advice of Officer and Bishop (2008) and consider that the high variability of forward looking estimates derived from cash flow measures and the relative lack of sources of estimates limits this method to that of a useful 'cross-check' on the reasonableness of the MRP derived from other methods.[410]

**Issues and AER's considerations**

Bloomberg may be the only source of Australian MRP cash flow measures derived from combining the implied cost of equity from individual stocks. However other sources exist that use alternative methods. Other studies begin with market wide forecasts rather then summing of implied values from individual stocks. Generally the expected market growth rate in dividends per share is proxied with analysts' short term forecasts of market wide earnings per share growth, or long term expectations of gross domestic product (GDP) growth (or both, where earnings per share forecasts are expected to converge with GDP growth forecasts over a certain time period).

For example, Davis (1998) bases the market growth rate in dividends per share on the expected GDP growth rate and produces forward looking MRP estimates of between 4.5 to 7.0 per cent.[411] Lally (2002) bases the growth rate on the expected weighted average growth in earnings per share for Australian companies which is then assumed to converge towards the long run expected GDP growth rate over a period of 5 to 20 years. This approach produces forward looking MRP estimates of between 4.0 to 5.7 per cent.[412] These estimates from both Davis (1998) and Lally (2002) are explicitly 'grossed-up' for imputation credits with Davis (1998) adopting an utilisation rate of 0.5 and Lally (2002)adopting 1.0.

The 7.14 per cent estimate from Harris and Marston (1999) referenced by Officer and Bishop (2008) is based on consensus forecasts of earnings per share over five years to derive the growth rate in dividends per share which is then assumed to continue in

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[408] B. Officer, and S. Bishop, op. cit., August 2008, p.14.

[409] ibid., pp.14-15.

[410] JIA, *Submission in response*, op. cit., September 2008, p.96.

[411] K. Davis, *The weighted average cost of capital for the gas industry*, Report prepared for the ACCC and ORG, 18 March 1998, p.15-16.

[412] M. Lally, *The cost of capital under dividend imputation*, Prepared for the ACCC, 2002, pp.29-34.

perpetuity. However Lally (2002) explains why assuming short term earnings forecasts will continue in perpetuity is inappropriate and likely to bias upwards the resulting estimates:

> One commonly used approach to the estimation of the expected growth rate in dividends per share (g) is to employ analysts' forecasts for earnings per share over the next few years (see Harris and Marston, 1992, 2001). However Cornell (1999, Ch.4) observes that these short-term forecasts are typically in excess of reasonable estimates of the long-run growth in GDP. Since dividends are part of GDP, the indefinite extrapolation implies that dividends will eventually exceed GDP, and this is logically impossible.[413]

The estimates from Harris and Marston (1999) are also for the US, not Australia, and this is not clearly explained by either Officer and Bishop (2008), or the JIA.

A more recent estimate is from AMP Capital Investors (2006), who base the growth rate on the expected long-run GDP growth rate, similar to Davis (1998). AMP Capital Investors (2006) estimate the forward looking Australian MRP for the next 5-10 years to be 'around 3.5 per cent' (specifically 3.8 per cent), 1.9 per cent for the US and 2.4 per cent for the 'world'. AMP Capital Investors (2006) considers an extra 1 to 1.5 per cent could be added for imputation credits resulting in a 'grossed-up' Australian MRP of around 4.5 to 5.0 per cent.[414]

On a general point, each of the cash flow measures above employ a long-run expected GDP growth rate as the sole or part proxy for the expected growth rate of dividends per share. Lally (2002) notes:

> Since the long-run growth rate in dividends per share cannot exceed the long-run growth rate in aggregate dividends, and the latter cannot exceed the long-run growth rate in GDP, the resulting estimate of the market risk premium is an upper bound on the true value.[415]

That is, because of the proxy selected for the expected growth rate in dividends per share each of the resulting estimates are an upper bound, rather than a point estimate, of the forward looking MRP derived from cash flow measures. The resulting estimates should therefore be interpreted accordingly.

**AER's conclusion**

Cash flow measures, including measures that have been explicitly 'grossed-up' to include the value of imputation credits, generally produce forward looking estimates of the MRP of around or below 6 per cent. The theoretical basis of using cash flow measures is relatively sound and these measures are arguably more forward looking, as required by the NER, compared to historical estimates. From a practical perspective, however, the resulting estimates can be quite sensitive to the particular forecast assumptions adopted, limiting to some extent the precision that these measures can produce. The AER considers cash flow measures can provide a useful

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413 ibid., p.31.

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

415 M. Lally, *The cost of capital under dividend imputation*, Prepared for the ACCC, 2002, p.31.

'cross-check' on the MRP derived alternative measures, though due to their limitations should be used with caution.

Regard to cash flow measures of the MRP does not provide persuasive evidence to depart from the previously adopted MRP of 6 per cent.

### 7.5.5 Survey measures

Surveys of market practitioners may also be used to estimate the MRP. As participants are generally surveyed on their expectations, surveys have the benefit of being a forward looking measure consistent with the CAPM, and the requirements of the NER.[416] 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 issues paper, the AER asked if there were particular surveys that the AER should consider, and how the AER should determine which surveys to place greater weight on.[417]

**Submissions in response to issues paper**

The JIA consider that checking the reasonableness of historical estimates of the MRP is important due to their low statistical precision, and that surveys of market practitioners can provide such a cross-check.[418] Assuming no value is attributable to imputation credits, the JIA state that surveys of financial professionals, including Chief Financial Officers, independent expert reports and other users of financial data support a MRP of 6 per cent.[419] The JIA reiterate the advice of Officer and Bishop (2008) regarding the range of estimates from surveys and a particular survey that should be avoided.

Officer and Bishop (2008) provide a summary of the following five different surveys:

- Kester, Chang, Echanis, Haikai, Isa, Skully and Wang (1999)
- Jardine Fleming Capital Partners (2001)
- Lonegran (2001)

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416 NER, cls. 6.5.4(e)(1) and 6A.6.2(j)(1).

417 AER, *Issues paper*, op. cit., August 2008, pp.38-52.

418 JIA, *Submission in response*, op. cit., September 2008, p.95.

419 ibid., p.78.

- KPMG (2005), and
- Truong, Partington and Peat (2005).

In general, the Officer and Bishop (2008) do not comment on the relative merits of each survey. The exception to this is that Officer and Bishop (2008) consider the expected MRP from Jardine Fleming Capital Partners (2001) study should not be considered because 'participants were asked the wrong question'. Overall Officer and Bishop (2008) consider that survey evidence is fairly limited, but in the surveys that they reviewed, the MRP commonly fell in the 6-8 per cent range.[420]

The JIA also caution against relying on independent expert reports (i.e. Lonegran (2001), KPMG (2005)), claiming that valuers will tend towards the lower end of plausible estimates as to avoid potential litigation as 'people who rely on valuations will often sue if the value is too high but are exceedingly unlikely to sue if the valuation is too low'.[421]

The MEU consider that little weight should be placed on survey measures as they may only reflect the 'desired outcome' of the surveyed participant.[422]

**Issues and AER's considerations**

Of the surveys mentioned above, the studies by Jardine Fleming Capital Partners (2001), KPMG (2005) and Truong et al (2005, 2008) detail the actual MRP assumption adopted in the valuation report or survey, and accordingly the AER considers it appropriate to focus on these. The remaining two surveys are more general in nature do not detail the assumptions adopted for individual WACC parameters. A fourth survey (Capital Research (2006)) has been identified by the AER since issuing the issues paper and added to the group of surveys considered.[423]

Troung et al (2008) report on their survey of capital-budgeting practices used by Australian listed companies in 2004. Truong et al (2008) found that, of the firms that responded to the survey, 47 per cent adopt an MRP of 6 per cent and 22 per cent adopt an MRP of less than 6 per cent. The average MRP adopted by Australian listed companies was 5.94 per cent. 15 per cent of responses also stated that this MRP was adjusted for the value of imputation tax credits. Of the remaining 85 per cent of responses that did not adjust for imputation credits, the main reasons given were that it was too difficult, should have a very small impact, or was unnecessary as the market already adjusts stock prices for the value of imputation credits and so this will already be reflected in the cost of capital estimate.[424]

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420 B. Officer, and S. Bishop, op. cit., August 2008, pp.16-18.

421 JIA, *Submission in response*, op. cit., p.95.

422 MEU, *Submission in response*, September 2008, p.47.

423 Interested parties may comment on the potential use of this survey in their submissions in response to this explanatory statement.

424 G. Truong, G. Partington and M. Peat, 'Cost of capital estimation and capital budgeting practices in Australia', *Australian Journal of Management*, Vol. 33, No. 1, June 2008, p.155.

**Table 7.4: MRP adopted by Australian firms in capital budgeting**

| MRP (per cent) | No. of responses | % of total |
|---|---|---|
| 3.0 – 5.0 | 4 | 11 |
| 5.0 – 5.5 | 4 | 11 |
| 6.0 | 18 | 47 |
| 6.5 – 7.0 | 7 | 18 |
| 6.0 – 8.0 | 3 | 8 |
| Other | 2 | 2 |
| **Average (5.94%)** | **38** | **100** |

Source: Truong, Partington and Peat (2008)[425]

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.[426]

**Table 7.5: MRP adopted in independent expert valuation reports**

| MRP (per cent) | No. of responses | % of total |
|---|---|---|
| 3.0 – 5.0 | 4 | 11 |
| 5.0 – 5.5 | 4 | 11 |
| 6.0 | 18 | 47 |
| 6.5 – 7.0 | 7 | 18 |
| 6.0 – 8.0 | 3 | 8 |
| Other | 2 | 2 |
| **Average (5.94%)** | **38** | **100** |

Source: KPMG (2005)[427]

Capital Research (2006) report the MRP adopted in a number of broker 'dailies', mostly from 2006. The average MRP adopted in the broker reports cited was

[425] ibid.

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

[427] ibid.

5.09 per cent, with eleven of the twelve reports adopting a MRP less than 6 per cent.[428]

**Table 7.6: MRP adopted in broker 'dailies'**

| Broker | Valuation | MRP (per cent) |
|---|---|---|
| CitiGroup | Wattyl 2006 | 5.0 |
| CitiGroup | Mirvac 2006 | 5.5 |
| Goldman Sachs JB Were | Computershare 2006 | 5.6 |
| JP Morgan | HPA 2006 | 5.4 |
| Merrill Lynch | Sky City 2006 | 4.5 |
| UBS | Funtastic 2006 | 5.0 |
| Macquarie Equities | Great Southern Plantations 2005 | 4.5 |
| Goldman Sachs JB Were | Iluka Resources 2004 | 6.0 |
| ABN Amro | David Jones 2002 | 4.5 |
| CitiGroup | Amcor 2002 | 5.0 |
| BBY | Sirtex Medical 2001 | 5.0 |
| **Average (5.09%)** | | **5.09%** |

Source: Capital Research (2006)[429]

As noted above, the JIA assert that less weight should be placed on independent expert reports as valuers tend to make conservative valuations to avoid potential litigation. However, in order to derive a conservative low valuation, valuers would be using a conservatively high discount rate (or conservatively low cash flow forecasts). Accordingly, if the 6.2 per cent average in MRP values in independent expert reports referenced above are biased, they are biased up not down, and are likely to overstate a forecast looking MRP commensurate with prevailing conditions in the market for funds.

The AER also acknowledges concerns of the MEU that survey results may only reflect the 'desired outcome' of the surveyed participant. The AER considers this would likely be the case if, for example, the AER itself were to survey a range of stakeholders that had a financial interest in the outcome of this WACC parameter review. However, the AER has no reason to believe that the responses to the particular surveys considered here would be biased either positively or negatively.

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428 Capital Research, *Telstra's WACC for network ULLS and the ULLS and SSS businesses – Review of reports by Prof. Bowman – Associated Professor Neville Hathaway*, March 2006, p.17.

429 ibid.

***AER's conclusion***

Surveys measures of the MRP across different years, different survey respondents or sources, and different authors illustrate that the majority of market participants adopt a MRP of 6 per cent, or sometimes less than this estimate. Survey measures generally have the benefit of being forward looking and may better reflect prevailing conditions in the market for funds compared to long term historical averages. Both are desirable attributes and relevant considerations in this review.[430] Surveys measures strongly indicate that a MRP of 6 per cent is by far the most commonly adopted value of market practitioners

## 7.6 AER's conclusion

The premise of the JIA's submission on the MRP seems to be an assertion that the previously adopted MRP of 6 per cent was initially determined by Australian regulators without having regard to the value of imputation credits. Therefore it was 'incorrect' and needs to be 'corrected'. The JIA considers, having had regard to the value of imputation credits, that the MRP should be corrected from the previously adopted 6 per cent to 7 per cent.

The AER accepts the legitimacy of the value of imputation credits forming part of the MRP. However, after examining regulatory determinations from the time 6 per cent was adopted in regulatory practice, the AER considers it is clear that the previously adopted MRP of 6 per cent does not need to be 'corrected' to incorporate the value of imputation credits. Regard was had by Australian regulators to the value of imputation credits in establishing the previously and consistently adopted MRP of 6 per cent. Accordingly, the issue is not whether a 6 per cent MRP needs to be 'corrected' for imputation credits, but rather, after 'grossing-up' historical excess returns for the value of imputation credits, among other measures and matters considered, whether or not 6 per cent remains a reasonable estimate of the MRP having had regard to the relevant factors.

The preceding sections examine issues involved with various individual measures used to estimate the MRP. Rather than placing sole weight on any particular measure of the MRP, it is common practice to have regard to each measure, tempered by an understanding of the strengths and weaknesses of each measure, in determining a 'final' MRP. The AER considers this is an appropriate approach in the context of having had regard to the need for persuasive evidence, and is consistent with past regulatory practice.[431]

The AER notes that historical excess returns:

- 'grossed-up' for a utilisation rate of 0.65

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[430] NER, cls. 6.5.4(e)(1) and 6A.6.2(j)(1).

[431] 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 different methodologies (tempered by an understanding of the strengths and weaknesses of each 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.

- interpreted in view of the 20 basis points as the likely difference if they had been estimated relative to 5 year CGS, and

- over a range of estimation periods that the AER considers appropriate (1883-2008, 1937-2008, 1958-2008)

fall within the 6 to 7 per cent range (specifically, 6.1 to 6.7 per cent), with some more recent estimates below this range.

As outlined in chapter six, the AER is proposing a term of the risk free rate that matches the term of the standard regulatory control period, which in general is five years. As historical returns relative to 5 year CGS are not, at present, statistically significant, the AER is not advocating historical estimates be estimated in this manner. Rather, following Officer and Bishop's estimate of the difference between 10 and 5 year CGS yields, the AER considers that historical estimates should continue to be estimated relative to 10 year CGS, but interpreted with the understanding that these estimates may underestimate historical estimates relative to 5 year CGS by approximately 20 basis points.

The AER notes that historical excess returns, 'grossed-up' for a utilisation rate of 0.65, and interpreted accordingly to the 20 basis points likely difference if they had been estimated relative to 5 year CGS, and over a range of estimation periods that the AER considers appropriate (1883-2008, 1937-2008, 1958-2008) fall within the 6 to 7 per cent range (specifically, 6.1 to 6.7 per cent), with some more recent estimates below this range.

The AER also notes the reasons mentioned in this chapter as to why historical estimates are more likely to overstate forward looking expectations of the MRP, rather than understate it. These include:

- Brailsford et al identify a number of data quality issues with the pre-1958 data that the authors consider likely to bias up estimates using data from this period. This means the above estimates over the 1883-onwards and 1937-onwards periods are more likely to overstate, than understate, a forward-looking MRP

- the use of historical equity returns will bias upwards the return on the CAPM market portfolio, which includes all assets in the economy and is not limited to equities. This means that the above estimates for any period are more likely to overstate, than understate, a forward looking MRP, and

- these estimates include several significant and positive one-off or unexpected events that are unlikely to be repeated. That means historical estimates over the periods considered are more likely to overstate, than understate, a forward looking MRP.

In addition:

- survey measures strongly indicate that a MRP of 6 per cent is by far the most commonly adopted value of market practitioners, and

- cash flow measures generally support an MRP of around or below 6 per cent

**Table 7.7: Measures used to estimate the market risk premium**

| Measure | Support MRP |
|---|---|
| Historical estimates {grossed-up for imputation credits, relative to a 5 year risk free rate) | 6.1 to 6.7 per cent |
| Surveys | Consistently 6 per cent |
| Cash flow based measures | Around or lower than 6 per cent |

Source: AER analysis

Based on this information, the AER does not consider there is sufficient persuasive evidence to justify a departure from the previously adopted MRP of 6 per cent, and that this figure is likely to be a reasonable estimate of a forward looking rate of return commensurate with prevailing conditions in the market for funds. Accordingly, the AER considers that there is no persuasive evidence to depart from a MRP of 6 per cent, and that a MRP of 6 per cent is consistent with the National Electricity Objective.

# 8 Equity beta

## 8.1 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. Sources of non-diversifiable risk may include risk associated with factors such as changes in real GDP, inflation, currency and commodity prices, and real long-term interest rates. A 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 business' returns have the same level of systematic risk as the overall market. An equity beta less than one implies the business' returns are less sensitive to systematic risk than the overall market, and an equity beta greater than one implies the business' returns are more sensitive.

## 8.2 Regulatory requirements

### 8.2.1 National Electricity Rules

In undertaking a review of the WACC parameters, the NER sets out several matters that the AER must have regard to. Of particular relevance to the equity beta are:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing regulated services
- the need for the equity beta to be based on a benchmark efficient service provider, and
- where a value cannot be determined with certainty:
  - the need to achieve an outcome that is consistent with the National Electricity Objective, and
  - the need for persuasive evidence before adopting a value that differs from the value that has previously been adopted for it.[432]

The AER's reasoning as to why these matters appear particularly relevant, while the other matter listed in the NER appear to be of lesser value to the review of the equity beta is discussed in chapter three.

[432] NER, cls. 6.5.4(e) and 6A.6.2(j).

### 8.2.2 Previously adopted value

As with all other WACC parameters, the equity beta is not directly observable. As a result, it must be estimated by reference to proxies and cannot be determined with certainty. Therefore, in addition to the other relevant factors, the AER must have regard to the need for persuasive evidence before adopting a value that differs from the value or method that has previously been adopted for it.

The NER deemed the initial value of the equity beta for all TNSPs and the NSW and ACT DNSPs to be 1.0.[433] For the remaining DNSPs, the NER did not deem an initial value of the equity beta and the previously adopted values in these jurisdictions are those from the most recent distribution determination.

As illustrated in table 8.1, for the purposes of the NER, the previously adopted value of the equity beta for TNSPs in all jurisdictions and DNSPs in NSW, ACT and Victoria is 1.0. The previously adopted value for DNSPs in Tasmania, Queensland and South Australia is 0.9.

**Table 8.1: Previously adopted value – equity beta**

| Service provider | Source | Equity beta |
|---|---|---|
| Transmission (all jurisdictions) | NER | 1.00 |
| Distribution (NSW) | NER | 1.00 |
| Distribution (ACT) | NER | 1.00 |
| Distribution (Tasmania) | OTTER (2007) | 0.90 |
| Distribution (Victoria) | ESC (2006) | 1.00 |
| Distribution (Queensland) | QCA (2005) | 0.90 |
| Distribution (South Australia) | ESCOSA (2005) | 0.90 |
| | | **0.90 or 1.00** |

Source: NER[434], OTTER[435], ESC[436], QCA[437], ESCOSA[438].

Table 8.1 outlines the previously adopted value of the equity beta, for the purposes of the NER, for electricity distribution and transmission network service providers.

In considering whether or not there is persuasive evidence to depart from these values, among the other regulatory requirements, the AER considers it is useful to

[433] NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

[434] NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

[435] OTTER, op. cit., September 2007, p.152.

[436] ESC, op. cit., October 2006, p.332.

[437] QCA, op. cit., April 2005, p.97.

[438] ESCOSA, op. cit., April 2005, p.161.

have regard to past regulatory practice more generally. The AER has taken into account past regulatory practice for both electricity and gas distribution, given the similar (or equivalent) nature of the issues involved across the two sectors. Notwithstanding, the AER recognises that there may be differences between the two sectors in relation to the equity beta subject to this review.

Table 8.2 below outlines the equity beta adopted by jurisdictional regulators in the most recent electricity and gas distribution determinations for each jurisdiction.

**Table 8.2: Past regulatory practice – equity beta in electricity and gas distribution determinations**

| Regulator (year) | Sector | Asset beta[439] | Debt beta | Gearing | Equity beta (range) | Equity beta (final) |
|---|---|---|---|---|---|---|
| ESC (2008) | Gas | N/A | N/A | 60.0% | 0.50-0.80 | 0.70[440] |
| OTTER (2007) | Electricity | N/A | N/A | 60.0% | N/A | 0.90 |
| ESCOSA (2006) | Gas | N/A | N/A | 60.0% | 0.80-1.00 | 0.90 |
| QCA (2006) | Gas | 0.55 | 0.12 | 60.0% | N/A | 1.10 |
| ESC (2006) | Electricity | N/A | 0.00 | 60.0% | N/A | 1.00 |
| QCA (2005) | Electricity | 0.45 | 0.10 | 60.0% | N/A | 0.90 |
| ESCOSA (2005) | Electricity | N/A | 0.00 | 60.0% | N/A | 0.90 |
| IPART (2005) | Gas | 0.30-0.40 | 0.00 | 60.0% | 0.80-1.00 | N/A |
| ICRC (2004) | Gas | 0.40 | 0.06 | 60.0% | 0.90-1.09 | N/A |
| IPART (2004) | Electricity | 0.35-0.45 | 0.00-0.06 | 60.0% | 0.78-1.11 | N/A |
| ICRC (2004) | Electricity | 0.40 | 0.06 | 60.0% | N/A | 0.90 |
| **Estimate (low-high)** | **Energy** | **0.30-0.55** | **0.00-0.12** | **60.0%** | **0.50-1.11** | **0.70-1.10** |

Source: ESC[441], OTTER[442], ESCOSA[443], QCA[444], IPART[445], ICRC[446].

[439] Care should be taken in comparing asset betas adopted by different regulators as these differences may in part reflect different approaches to adjusting for financial leverage (i.e. different de-levering / re-levering approaches). However as regulators have adopted consistent benchmark gearing levels (60 per cent), the resultant equity betas can be broadly compared across regulators.

[440] 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.

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

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

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

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

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.

## 8.3 Summary of issues raised in issues paper

In the issues paper, the AER raised both conceptual and empirical issues in relation to the estimation of the equity beta for a benchmark efficient service provider. The AER sought comments on, from a conceptual perspective, what effect the regulatory regime would be expected to have a benchmark efficient service provider's exposure to systematic risk. The AER also raised a number of issues relating to the empirical estimates of equity betas, including:

- selection of comparator firms
- length of estimation period and frequency of observations
- removal of unrepresentative events and treatment of outliers
- calculation of portfolio betas
- application of the Blume adjustment, and
- consideration of foreign data.

The AER also sought comments on whether there were any other conceptual or empirical issues the AER should have regard to.

## 8.4 Summary of submissions in response to issues paper

The MEU provided data indicating that the financial return (capital gains and dividends) of the utilities sector has consistently outperformed the market average by around 15 to 35 per cent, even though, as the MEU argue, regulated utilities are less risky than the overall market due to their very stable and predictable cash flows. As the risk premium from the regulated return to equity is a multiple of the equity beta and MRP, the MEU argue this clearly implies that either the equity beta or MRP allowed by regulators is too high, or both.[447]

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

446 ICRC, op. cit., October 2004, p.8; ICRC, op. cit., March 2004, p.70.

447 MEU, *Submission in response*, op. cit., September 2008, p.16.

The MEU consider that there is now a trend amongst regulators that an equity beta of 1.0 is too high, and there is persuasive evidence that the equity beta should be no more than 0.7.[448] Specifically, the MEU:

- Considers the new regulatory regime in chapter 6 and 6A of the NER has lead to 'a significant reduction in risk for regulated businesses', and the AER should assess the risks faced by regulated utilities according to the new regime. This reduction is principally caused by the move to an ex ante regime which protects regulated utilities from poor investment decisions – a protection which is not provided in an 'unforgiving' competitive environment. The MEU consider there is clear evidence that the current WACC parameters are too high, and this has lead to regulated utilities requesting and spending an inefficiently high amount of capex in order to increase profits.[449]

- Considers a 'high level of conservatism' has pervaded the setting of the equity beta since the first major review in 1998. The MEU consider that the ACCC has refused to move on an equity beta of 1.0 despite clear evidence that this was too high, and notes that the AER has been prevented from moving on this parameter until now by the NER.[450]

- Recognises that regulatory certainty is important, but considers that regard to regulatory certainty should not be to the exclusion of what it refers to as 'regulatory equity', where parameters that are no longer relevant are maintained purely for the sake of regulatory consistency. The MEU consider that the current equity beta of 1.0 is clearly biased upwards and the jurisdictional regulators that have recently recognised this should be supported.[451]

- Considers there is 'little doubt' that the current parameters are individually biased in favour of the regulated businesses, and that the overall outcome of these biases in the individual parameters has lead to a large aggregate bias in favour of the businesses. The MEU consider there is a concern that the AER, in the interests of regulatory certainty and to avoid price shocks, will consider it appropriate to slowly move towards what might be seen as the correct parameters. The MEU note that the ESC considered the equity beta should be 0.70 but allowed a 'soft landing' to effectively provide an equity beta of 0.80 for the next regulatory period.[452] The MEU consider:

> To take such a step is seen as totally inappropriate. A solution out of this review which is only a trend towards the right answer will condemn consumers to further maintaining a situation of paying monopoly rents for the provision of essential services.[453]

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448 ibid., p.50.

449 ibid., pp.20-24.

450 ibid., p.50.

451 ibid., p.28.

452 ibid., p.29.

453 ibid., p.29.

- Notes that regulators have previously excluded data from the 'tech boom', which had the affect of decreasing equity betas for utilities, on the basis that this was a one-off event that was not be expected to be repeated. The MEU consider there is little doubt that current equity betas are probably higher than 12-18 months ago due to the current credit crisis, yet to be consistent with past regulatory practice (in excluding the 'tech boom') the influence of the current credit crisis should not affect the AER's consideration of a forward looking equity beta.[454]

- Considers that when the reduction in risk due to changes to the NER is combined with the analysis of the ESC and ESCOSA, there is a strong argument that even an equity beta of 0.7 could be too high.[455]

As noted in chapter three, the JIA consider that the previously adopted equity beta for electricity transmission and distribution is 1.0, despite the 'outlier' distribution decisions that adopted a value of 0.9. The JIA consider there is no persuasive evidence to depart from a value of 1.0. The JIA also consider that even if 0.9 was taken to be the previously adopted value for some DNSPs, there is persuasive evidence that the equity beta should be 1.0 for these businesses. The JIA commissioned four consultants reports on the equity beta in the context of this review. One report each was commissioned from ACG and Professor Gray (SFG Consulting). Two reports were commissioned from CEG.

ACG was commissioned to provide an opinion on whether the empirical evidence provides persuasive evidence that the equity beta for a regulated electricity transmission or distribution business should be moved from the previously adopted equity beta which was assumed to be 1.0 (with gearing at 60 per cent). ACG (2008b) considers:

- the empirical point estimates for Australian energy firms, up until May 2008, indicate a range of 0.65 to 0.90, depending on the estimation method applied

- comparison of these results with an earlier report by ACG for the ESC indicates a rising trend in beta estimates. This rising trend is also observed in equity beta estimates for comparable US energy firms, which have increased to a range of 0.5 to 0.7, depending on the estimation methodology, and over a long estimation period

- beta estimates are associated with a high degree of imprecision. Upper bounds on confidence intervals for portfolio estimates of Australian energy firms range from 0.9 to 1.2

- the period between 2002 and early 2007 was a period of 'exceptionally low market volatility'. Emergence from this period is consistent with the rising trend in beta estimates, and

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454 ibid., pp.16-18.

455 ibid., p.50.

- does not consider there is persuasive empirical evidence that the equity beta for a regulated electricity transmission or distribution business is different from one.[456]

Professor Gray was commissioned to provide advice on what reliance can be placed on equity beta estimates for Australian utilities, and if the 95 per cent confidence interval addresses the statistical issues with Australian data. Gray (2008b) considers:

- in regression analysis where the R-squared statistic is low the beta estimate is likely to be significantly less than the true beta, particularly where the R-squared is less than 10 per cent

- as equity beta regressions for Australian utilities are accompanied by low R-squared statistics, no weight should be placed on this data, and

- the Vasicek adjustment should be applied because low beta estimates are also likely to be biased downwards[457]

CEG was commissioned to test whether the actual sensitivity of betas is equal to the sensitivity implied by the Sharpe CAPM, which is the version of the CAPM prescribed by the NER. CEG (2008b) considers:

- the actual sensitivity of equity returns to beta is lower than implied by the Sharpe CAPM, and

- this provides a strong presumption for the adoption of an equity beta close to 1.0 even where the empirical estimates are materially different to 1.0[458]

CEG was also commissioned to estimate the return on equity required by investors in Australian regulated utilities implied by the dividend growth model (DGM). CEG (2008a) considers:

- in mid-2008, for plausible ranges of expected future dividend growth, the market discount rate is higher than the current NER transmission WACC parameters.[459]

## 8.5 Issues and AER's considerations

The AER's considerations in estimating the equity beta of a benchmark efficient service provider involve an analysis of the following conceptual and empirical issues and are set out below in the following order:

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456 ACG, *Beta for regulated electricity transmission and distribution,* Report to ENA, GridAustralia and APIA, 17 September 2008(b).

457 SFG, *The reliability of empirical beta estimates*, 15 September 2008b.

458 CEG, *Estimation of, and correction for, biases inherent in the Sharpe CAPM formula* , A report for the ENA, GridAustralia and APIA, 15 September 2008.

459 CEG, *An analysis of implied market cost of equity for Australian regulated utilities,* A report for the APIA, ENA and GridAustralia, 14 September 2008.

- conceptual issues – the definition of non-diversifiable risk, and the affect of the regulatory regime on a benchmark efficient network service provider's exposure to systematic risk

- empirical estimates (data issues) – selection of Australian and foreign comparator businesses

- empirical estimates (methodological issues) – including length of estimation period, frequency of observations, treatment of outliers, and application of Blume or Vasicek adjustments

- empirical estimates (results and interpretation) – results and interpretation of empirical estimates

- other conceptual or empirical issues – use of the Sharpe-Lintner CAPM, and implied cost of equity using dividend growth models (DGMs)

### 8.5.1 Conceptual issues

The conceptual issues considered in this section are the definition of non-diversifiable risk and the expected degree of exposure of a benchmark efficient network service provider to non-diversifiable risk given the nature of the industry and the regulatory regime.

#### 8.5.1.1 Definition of non-diversifiable risk

For both electricity transmission and distribution network service providers, the NER provides that the WACC, and therefore the equity beta, is only to compensate service providers for non-diversifiable risk – also known as systematic risk. This requirement is provided by the definition of the rate of return in the NER.

> 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…[460]

It is also embodied in the CAPM framework that is mandated by the NER. It is necessary, therefore, to have an understanding of what non-diversifiable (systematic) risk is.

**Submissions in response to issues paper**

The MEU consider:

> The AER makes the (very valid) point that the equity beta should represent the non-diversifiable risk of the regulated firm. This in effect supports the view that the equity beta will be assessed on the basis of a notional business rather than any specific enterprise. Thus the equity beta used should reflect

[460] NER, cls. 6.5.2(b) and 6A.6.2(b).

> how the notional business is impacted by exogenous changes rather than those initiated by a firm.[461]

The JIA note in considering equity betas it needs to be recognised that there are two considerations – asset risk and financial risk. The JIA consider that asset risk for a regulated business is relatively low compared to the market and financial risk is relatively high due to gearing. The JIA state that it should be explicitly recognised that any adjustment to the previously adopted value of the equity beta is implying a change in either asset risk or financial risk.

**Issues and AER's considerations**

An individual risky asset, in this case a service provider, can be characterised by its expected return and its expected level of risk (i.e. expected variability in returns). Both the return and variability in returns of the service provider will be affected by business-specific and market-wide risk factors.

Over a given time period, some business-specific factors would have a positive impact on the return of the service provider, whereas others would have a negative impact. By holding a well-diversified portfolio of risky assets these business-specific factors are expected to cancel each other out. This is the reason a benchmark efficient service provider is not to be compensated for diversifiable (non-systematic) risk through the WACC. The market-wide factors are likely to impact all businesses (though to differing degrees) and cannot be completely eliminated by diversification. Accordingly it is appropriate that investors in a benchmark efficient service provider be compensated for the non-diversifiable risk of the nature and degree faced by a benchmark efficient service provider and commensurate with the risk involved in providing regulated services.

The non-diversifiable or systematic risk of a business will depend on the sensitivity of its returns to these market-wide or macroeconomic risk factors. The degree of this sensitivity is reflected in the equity beta. An equity beta of one implies that the business' returns have the same degree of sensitivity to these factors as the overall market. An equity beta less than one implies the business' returns is less sensitive than the overall market, and an equity beta greater than one implies the business' returns is more sensitive.

The AER agrees with the JIA that a benchmark efficient service provider's sensitivity to non-diversifiable risk, and therefore the equity beta, will be a function of both asset risk and financial risk. However the JIA do not provide much description of what particular risk factors may comprise these risks.

The AER has reviewed the standard finance literature (such as that covered at a graduate or intermediate level in finance courses in Australian universities) covering the macroeconomic risk factors that constitute and therefore affect systematic risk. In the AER's view, this literature indicates that the macroeconomic risk factors that effect systematic risk include changes or volatility in:

- inflation

[461] MEU, *Submission in response*, op. cit., September 2008, p.49.

- gross domestic product (GDP) growth
- interest rates
- commodity prices and exchange rates, and
- tax laws.[462]

The AER agrees with the JIA that a change in the equity beta implies that the AER considers there is persuasive evidence to depart from the assumed exposure of a benchmark efficient service provider to either asset risk or financial risk that is implied by the previously adopted value.

The AER also agrees with the MEU, that the equity beta should reflect the degree of non-diversifiable risk faced by a 'notional' service provider and not an actual individual service provider. In the terminology of the NER, the equity beta should reflect the degree of non-diversifiable risk faced by a benchmark efficient service provider.

**AER's conclusion**

As required by the definition of the rate of return and the CAPM framework mandated by the NER, the equity beta should only compensate service providers for exposure to non-diversifiable (systematic) risk, and not compensate for diversifiable (non-systematic) risk. Non-diversifiable risk refers to the macroeconomic or market-wide risk factors that effect the returns of all businesses in the economy, though to varying degrees, and include factors such as changes or volatility in inflation, GDP growth, interest rates, commodity prices and foreign exchange rates and changes in tax laws. Additionally, the equity beta set by the AER should reflect the exposure of a benchmark efficient service provider's returns to these macroeconomic risk factors, and not that faced by any actual individual TNSP or DNSP.

#### 8.5.1.2 Expected exposure of benchmark efficient service provider to non-diversifiable risk – nature of industry and effect of regulatory regime

In the issues paper, the AER noted some of the features of the regulatory regime such as the CPI-X approach and the rolling forward of the asset base. The AER also noted that a service provider may be under a revenue cap, a price cap, or some combination of the two. The AER sought comments on:

- What influence does the regulatory regime have on a benchmark efficient service provider's sensitivity to non-diversifiable risk? Has this been increasing or decreasing over time?
- What influence (if any) does the control mechanism (revenue cap vs. price cap) have on a benchmark efficient service provider's sensitivity to non-diversifiable risk?

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[462] G. Peirson, R. Brown, S. Easton and P. Howard, *Business finance*, 8th ed., McGraw-Hill, 2002 p.214; F. Reilly, and K. Brown, *Investment analysis and portfolio management*, 7th ed., Thomson South-Western, 2003, p.244.

- From a conceptual basis, would a benchmark efficient service provider's asset beta be expected to be less than, equal to, or greater than the asset beta of the overall market? That is, excluding the effects of financial leverage, what is the sensitivity of returns from a benchmark efficient service provider's business activities to non-diversifiable risk compared to that of the market?

**Submissions in response to issues paper**

On the nature of the industry in which TNSPs and DNSPs operate, the MEU consider that network service providers face virtually no competition risk, very low investment risk, and have very stable cash flows due to the regulatory resets occurring only every five years. Specifically on the recent changes to the regulatory regime, the MEU state:

> In the development of the new Chapters 6 and 6A of the National Electricity Rules, there was a significant reduction in risk for the regulated businesses.
>
> …
>
> The new Rules were designed to insulate TNSPs and now DNSPs from exogenous issues, yet in doing so the changes also insulate errors the regulated businesses make. The competitive environment is unforgiving, but NSPs are now protected from poor investment decisions due to their unique position of having no competition to punish them for errors as well as having the regulator constrained from providing that punishment.[463]

The MEU list a number of changes to the regulatory regime that it considers has lowered the risk faced by service providers. Most of these changes relate to a move from an 'ex post' to 'ex ante' regime, and include:

- The regulator must accept any and all capex incurred which must be automatically rolled into the regulatory asset base, never to be assessed for subsequent prudency. The MEU state:

> Therefore, errors made by the NSP are never brought to account. If capex was imprudently incurred (such as if capex was different to that planned, over ran on cost, was inefficient or timing was deferred to give a better profit) there are no comebacks on the NSP. In a competitive environment, such errors are severely punished by the investors in the business and by its customers. They are, in effect, the driver of efficiency for the business.[464]

- If the regulator approves a capex allowance for a particular project, but the NSP defers that project, it may seek a second allowance for the same project in the next regulatory period.

On the effect of the form of control, the MEU consider:

> At its most basic level, revenue control has a lower risk profile than price control. Under price control, the firm is faced with the risk of lower volume, but equally it has the ability to manage this risk through tariff rebalancing and has the potential to increase its rewards by encouraging greater usage.

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463 MEU, *Submission in response*, op. cit., September 2008, pp.20-21.

464 ibid., p.22.

> Through regulatory gaming the price controlled firm has the incentive to minimise the expected. [465]

On balance, the MEU consider there is only a marginal difference between the two forms of control.

The JIA argue that the existence of regulation creates risk, and these risks are non-diversifiable, though the type of regulation is likely to be a second order consideration. The JIA further consider:

- any attempt to 'quantify' a change in non-diversifiable risk due to a change in the regulatory regime will be lost in estimation error and noise in the data
- though 'perceptions' of risk are likely to have increased since the 1990s due to the departure of US businesses as owners and concerns that regulatory decision-making is being regarded by investors as 'increasingly aggressive'.[466]

Due to a paucity of data, the JIA consider it is not possible to distinguish a difference in exposure to non-diversifiable risk due to a particular control mechanism. Though the JIA note analysis by ACG on the form of regulation in the US provided estimates for incentive regulation and rate-of-return that were 'practically indistinguishable'. The JIA consider this supports a proposition that it is not possible at this stage to discern empirically that the particular control mechanism makes a material difference such as to justify a different equity beta for service providers under different control mechanisms.[467]

The JIA state:

> …it would be reasonable to assume that a utility business is likely to have less non-diversifiable risk than the market, because of the more stable nature of energy demand in relation to the rest of the economy.[468]

However the JIA state that the benchmark level of gearing (60 per cent), is higher than the market average (around 35 per cent), therefore an equity beta of one already recognises that a service provider is exposure to less business risk, but greater financial risk, than the overall market.

**Issues and AER's considerations**

The AER considers that regulated utilities face a lower degree non-diversifiable business risk, compared to the market, primarily driven by the stable cash flows of regulated utilities. This in turn is driven by both the nature of the industry, such as the relatively high demand elasticity of electricity to price, and by the protection of the regulatory regime.

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[465] ibid., p. 51.

[466] JIA, *Submission in response*, op. cit., p.123.

[467] ibid., p.124.

[468] ibid., p.124.

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. This adjustment eliminates near all of a benchmark efficient NSP's exposure to inflation risk, and therefore lowers its exposure to systematic risk.

- The rolling forward of the firm's RAB, rather than the re-valuing or re-optimisation of the RAB at each reset. Under the ex-ante regime actual capex is rolled into the RAB, without any ex post prudency assessment.[469] This approach means that at the end of each regulatory period a benchmark efficient NSP's prices and / or revenues are adjusted back to reflect their underlying cost base. This means that any increase in costs from forecast due to changes in GDP (which may effect the growth in peak demand), or from changes in commodity prices are automatically rolled into the RAB. This is highly likely to reduce exposure to systematic risk compared with the market in general. The AER notes that the initial capex forecast would already include a forecast of commodity prices, such as for example, if commodity prices were expected to increase than allowance for this would already have been made.

- 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 of a new tax or a change in the tax rate of an existing tax. This is likely to reduce exposure to systematic risk compared with the market in general.

Through having regard to both the nature of the industry and regulatory regime, the AER considers there are strong conceptual reasons to suggest that the exposure of a benchmark efficient service provider's to non-diversifiable risk due to business activities would be less than that of the market. That is, the asset beta of a benchmark efficient service provider would be less than the asset beta of the market. There appears to be general agreement, from both the MEU and JIA, on this point.

As noted above, the JIA consider that regulated utilities face higher exposure to financial risk than the market due to the higher leverage. This assumes that a businesses exposure to financial risk is determined by financial leverage alone. The AER notes that an additional aspect of the regulatory regime is that the cost of debt is based on prevailing market conditions as sourced from a reliable data service provider at the time of the determination. This 'pass-through' nature of borrowing costs is likely to reduce exposure to financial risk, compared to an unregulated business (or the market in general) with the same benchmark level of gearing.

[469] In some regimes, such as telecommunications a RAB can potentially be re-optimised at each review, such as under a total service long run incremental cost (TSLRIC) approach, however, this is not the case under the NER.

Accordingly, the AER considers that the exposure of a benchmark efficient service provider to business risk and to financial risk overall, is less than that of the market. That is, that the equity beta is likely to be less than one.

The form of control may also influence a regulated service provider's sensitivity to market-wide factors. The form of control refers to the particular revenue or price control function that determines a regulated firm's total regulated revenue. All TNSPs are under a revenue cap form of control. Whereas, for all DNSPs the form of control mechanism is determined by the AER as part of the reset process.[470]

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 does not change based on 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. Essentially the difference between the control mechanisms is a service provider's sensitivity to volume risk.

The AER notes firstly that the relevant volatility is volatility in returns, rather than volatility in revenue. Accordingly, to the extent that demand and costs are related, then a price cap could lead to a lower, or at least equivalent, exposure to non-diversifiable risk.

Secondly, the relevant risk is non-diversifiable risk not total risk. It is arguable as to whether volume risk is or is not a systematic risk factor as this depends on whether it is industry specific or market wide. For example, volume risk driven by the weather may not be a systematic risk factor. The AER also notes the comment of the MEU that a service provider under a price cap has an incentive to understate its demand forecasts at the time of the reset in order to gain a higher unit price, and consequent higher revenues, and presumably returns, during the period.

The AER notes that neither the MEU nor JIA consider it appropriate to set a different equity beta based on the form of control, though the reasons given appear to differ to some degree. The AER agrees that there is not persuasive evidence to suggest a benchmark efficient service provider's exposure to systematic risk changes under different control mechanisms.

**AER's conclusion**

The AER considers, taking into account the nature of the industry and key features of the ex ante regime under the NER, the AER considers that the exposure of a benchmark efficient service provider to business risk and financial risk overall, is less than that of the market. That is, that the equity beta is likely to be less than one.

[470] For DNSPs, the allowed control mechanisms under cl. 6.2.5 of the NER are: a schedule of fixed prices; caps on the prices of individual services; caps on the revenue to be derived from a particular combination of services; tariff basket price control (i.e. weighted average price cap); revenue yield control (i.e. average revenue cap); or a combination of any of the above.

The AER also considers that there is not compelling evidence to suggest that the equity beta should differ based on the form of control (revenue cap vs. price cap). The MEU and JIA agree on this position.

### 8.5.2 Empirical estimates – choice of comparator businesses

The AER notes that regulators and interested parties have examined equity beta estimates of both Australian businesses and foreign businesses (due to the small number of listed Australian businesses). The AER considers that given foreign businesses are subject to different regulatory regimes and market conditions that the equity beta estimates should be treated as a cross-check.

#### 8.5.2.1 Australian comparators

Consistent with the approach described in section 4.3 the AER considers that 'pure play' electricity networks should be considered the benchmark efficient network service provider. As there are no businesses which reflect this benchmark, the AER has examined the available market evidence from businesses which are considered to be close comparators to the benchmark business to inform the equity beta estimates. As privately-owned and government-owned businesses do not trade on the stock market, it is not possible to empirically estimate the equity betas of these businesses. As a first step, publicly listed electricity businesses were included into the sample. This provided the AER with two businesses (SP AusNet and Spark Infrastructure). The AER then considered other businesses which owned electricity networks (AGL and the DUET group). The AER considers that a sample of four firms is unlikely to provide a robust equity beta estimate and has therefore included gas businesses as it considers that gas businesses are a reasonable but not perfect comparator. The AER has included the following businesses in its sample:

- Alinta (1 January 2002 to 17 August 2007)
- the APA Group (1 January 2002 to 1 September 2008)
- Australian Gas Light (1 January 2002 to 31 October 2006)
- the DUET Group (13 August 2004 to 1 September 2008)
- Envestra (1 January 2002 to 1 September 2008)
- GasNet Australia Group (1 January 2002 to 17 November 2006)
- Hastings Diversified Utilities Fund (17 December 2004 to 1 September 2008),
- SP AusNet (16 December 2005 to 1 September 2008), and
- Spark Infrastructure (2 March 2007 to 1 September 2008).

#### 8.5.2.2 Foreign comparators

The AER notes that it has been standard practice by regulators and interested parties to examine foreign comparators as a cross-check. This is due to the perceived limitations of the data obtained from the Australian market (such as the number of

firms and the reduction in the number of observations due to mergers and acquisition activities). The JIA supported the use of foreign comparators for the purposes of informing the benchmark efficient equity beta in its submission, but also noted the limitations of using foreign comparators.

**Submissions in response to issues paper**

The JIA argue that it is reasonable to place some weight on betas from other comparable nations such as the United States while recognising there are problems in comparing betas from one nation to another. The JIA note the ACG has identified several potential issues with applying the United States data to draw conclusions about Australian equity betas. The ACG attempts to address these by adjusting for different weights of market sectors and different gearing levels.[471]

The JIA consider that the Australian comparables used in the ACG's analysis suffers from problems to differing degrees, including:

- being a gas transmission and/or distribution business
- having a short listing period
- being subject to an acquisition or undertaking an acquisition or acquisitions
- including non-Australian businesses, and
- including non-regulated or non-infrastructure businesses such as electricity generation and energy retailing.[472]

**Issues and AER's considerations**

The AER agrees with the JIA that Australian comparator businesses suffer from a number of problems. However, the AER notes that these problems are not unique to equity beta estimates and that any WACC parameter which is estimated using businesses from an industry sample is likely to be affected by such activities. The AER considers that these limitations need to be recognised and accounted for when analysing any estimate that uses data taken for industry samples. The AER has attempted to address this by excluding observations that are likely to be influenced by mergers and acquisition activities, and selecting businesses which predominantly operate as a regulated network business. Unlike the benchmark efficient level of gearing and the credit rating, the equity beta can only be estimated using data taken from stock prices (and not from government owned or unlisted businesses). Accordingly, the AER has examined equity beta estimates of foreign comparators to ensure that the Australian equity beta estimates are reasonable.

The ACG notes in its report that if the market gearing between two countries vary then comparing equity betas without accounting for the difference in market betas would be inappropriate. The ACG argues that the market gearing in the United States is higher (40 per cent gearing for the United States market and 34 per cent for the

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471 JIA, *Submission in response*, September 2008, p. 109.

472 ibid., p. 110.

Australian market) and therefore the equity betas estimated from the United States data need to be adjusted upwards.[473] The AER recognises that the differences between the average level of gearing in the United States market to the Australian market may provide downwardly biased equity beta estimates. The AER considers the adjustment that the ACG used for difference in market gearing may be inappropriate as it fails to account for any differences in debt betas between the United States and Australia which may offset the bias discussed in the ACG report. Further, the AER notes that the ACG found that accounting for differences between cross sectoral weights between the United States and Australia (the Australian and United States markets have different proportions of industries)[474] offset the upward bias which may have been created by differences in market gearing.[475] Accordingly, the AER considers that the unadjusted equity beta is likely to provide a conservative cross-check for the Australian data.

The AER recognises that differences between market gearing and cross sectoral weights are but two of the many limitations that the United States (or other foreign equity betas) has when comparing equity or equity beta estimates to Australia. The AER notes that differences in the regulation of businesses, the regulation of the domestic economy, geography, business cycles, weather and a number of other different factors are likely to result in differences between equity beta estimates for firms in similar industries but different countries. Therefore, the AER will be exercising extreme caution when examining foreign beta estimates for the purposes of setting a benchmark efficient equity beta.

**AER's conclusion**

Unlike the benchmark efficient level of gearing and the credit rating, the equity beta can only be estimated using data taken from stock prices (and not from government owned or unlisted businesses). Therefore, the AER will be examining equity beta estimates of foreign comparators to ensure that the Australian equity beta estimates are reasonable.

Given that confidence intervals for foreign stocks are likely to be more imprecise than for Australian stocks (due to differences between countries) no weight has been placed on the confidence intervals. The AER considers that it may be appropriate to use the point estimates of foreign equity betas as a cross check.

The AER considers the adjustment that the ACG used for difference in market gearing may be inappropriate as it fails to account for any differences in debt betas between countries which may offset the bias discussed in the ACG report. Further, the AER notes that the ACG found that accounting for differences between cross sectoral weights between the United States and Australia offset the upward bias which may have been created by differences in market gearing. Therefore, the AER

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473 ACG, op. cit, 17 September 2008(b), pp. 40 and 51.

474 Using a simplified example Australia might have even shares of primary, technology and utilities industries in its market index while the United States may have predominantly technology and utilities businesses. The difference in composition is likely to result in differences of systematic risk between markets.

475 ibid., p. 55.

considers that the unadjusted equity beta is likely to provide a conservative cross-check for the Australian data.

The AER notes that differences in the regulation of businesses, the regulation of the domestic economy, geography, business cycles, weather and a number of other different factors are likely to result in differences between equity beta estimates between countries. Therefore, the AER will be exercising extreme caution when examining foreign beta estimates for the purposes of setting a benchmark efficient equity beta. Given these differences the AER considers that using businesses the operate electricity networks obtained from the UBS Utilities Index is sufficient. These businesses include:

- the CH Energy Group Incorporated
- CentrePoint Energy
- Energy East
- NiSource Incorporated
- New Jersey Resources
- NSTAR
- Northeast Utilities
- Pepco Holdings Incorporated
- Sierra Pacific, and
- the UIL Holding Corporation.

The AER considers that examining equity betas of gas businesses that do not also include electricity networks in the United States is unnecessary as there are a sufficient number of electricity businesses (which involve both electricity and gas network activities) to obtain a reliable estimate of the equity betas representative of an electricity network business operating in the United States.

### 8.5.3 Empirical estimates – methodological issues

The AER agrees with the JIA that when examining equity betas that applying a mechanical approach is unlikely to produce a single correct answer.[476] As the following sections outline, the AER has given consideration to a broad range of methodological issues when examining equity beta estimates. The estimation of equity betas requires a number of methodological issues to be addressed before an estimate can be derived. In particular, the following issues must be addressed, the:

- use of discrete or continuous returns

[476] JIA, *Submission in response*, op. cit., September 2008, p. 130.

- method used to de-lever the equity beta from the actual level of gearing (to obtain an asset beta) and re-lever to the benchmark level of gearing
- approach to gearing (e.g. presence of double leveraging, and treatment of stapled securities)
- length of estimation period and frequency of observations
- treatment of outliers
- testing of estimation results
- calculation of portfolio or average equity betas, and
- use of the Blume or Vasicek adjustments.

#### 8.5.3.1 Discrete or continuous returns

Returns are generally calculated as the change in price plus the receipt of dividends, relative to the initial price. Discrete returns assume that the change in price and the receipt of dividends occurs at the end of each time period. Continuous returns assume that the change in price and receipt of dividends occur on a continuous basis through out the period.

The ACG has noted previously that some of the advantages of continuous returns are that:

- continuous returns can be aggregated over different periods of time[477], and
- are more likely to be normally distributed and are therefore less subject to errors.[478]

The ACG has also noted that continuous returns are commonly applied when estimating betas.[479] The AER requested Associate Professor Henry to estimate equity betas using both discrete and continuous returns for the purposes of sensitivity testing The following table shows the equity beta estimates for individual businesses calculated by Associate Professor Henry.

[477] The AER notes that Henry has not used different periods of time in his analysis. However, the ACG uses different periods of time in its analysis which examines equity beta estimates beyond the 'technology boom'.

[478] ACG, *Empirical evidence on proxy beta values for regulated gas distribution activities*, Report to the Essential Services Commission of Victoria, June 2007, p. 30.

[479] ibid., p. 40.

**Table 8.3: Comparison of discrete and continuous returns (raw equity beta estimates)[480]**

| Discrete Returns | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **SP AusNet** | **Envestra** | **APA Group** | **Spark** | **DUET Group** | **Hastings Diversified Utilities Fund** | **AGL[(a)]** | **Origin Energy[(a)]** |
| OLS | 0.26 | 0.34 | 0.65 | 0.48 | 0.60 | 0.74 | 0.41 | 0.59 |
| s.e. | 0.12 | 0.07 | 0.09 | 0.19 | 0.11 | 0.13 | 0.10 | 0.12 |
| LAD | 0.23 | 0.14 | 0.56 | 0.65 | 0.43 | 0.36 | 0.30 | 0.53 |
| s.e. | 0.12 | 0.07 | 0.10 | 0.19 | 0.11 | 0.13 | 0.10 | 0.12 |
| Obs | 142 | 348 | 348 | 79 | 212 | 194 | 252 | 348 |

| Continuous Returns | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **SP AusNet** | **Envestra** | **APA Group** | **Spark** | **DUET Group** | **Hastings Diversified Utilities Fund** | **AGL[(a)]** | **Origin Energy[(a)]** |
| OLS | 0.26 | 0.35 | 0.65 | 0.44 | 0.60 | 0.76 | 0.41 | 0.58 |
| s.e. | 0.12 | 0.07 | 0.09 | 0.19 | 0.11 | 0.13 | 0.10 | 0.11 |
| LAD | 0.23 | 0.14 | 0.56 | 0.64 | 0.42 | 0.37 | 0.30 | 0.53 |
| s.e. | 0.12 | 0.07 | 0.10 | 0.19 | 0.11 | 0.13 | 0.10 | 0.11 |
| Obs | 142 | 348 | 348 | 79 | 212 | 194 | 252 | 348 |

Source: Henry[481]
(a) Henry has used Origin and AGL for the purposes of comparison but it is not included in any of his portfolio estimations.

The AER observes that there is not a significant difference between the estimated equity beta using continuous and discrete returns. As noted above, the ACG considers that continuous returns are the standard approach when estimating equity betas.[482]

Given that the differences between estimating equity betas using discrete and continuous returns are minimal, the AER considers it that is appropriate to use the standard approach, which is to use continuous returns.

480 s.e. is the standard error of the regression and Obs is the number of observations.

481 O. Henry, *Econometric advice and beta estimation*, Report to ACCC/AER, November 2008, p. 5.

482 ibid., p. 40.

### 8.5.3.2 Accounting for leverage

***De-levering / re-levering***

As discussed above, the equity beta of a business reflects both the business risk of its assets, and the financial risk from the business' level of financial leverage or gearing. Payments to debt holders are generally obligatory, independent of a business' contemporaneous revenue, and have precedence over payments to equity holders. Therefore the higher a business' financial leverage, the greater the volatility of its free cash flows are assumed to be, leading to more volatile returns to equity holders. An increase in a business' gearing is expected to lead to a higher exposure to systematic risk and consequent higher equity beta, all else being equal.

As the equity betas of comparator businesses will reflect varying levels of actual financial leverage between the businesses, these equity betas can be 'de-levered', to obtain the asset beta of the business. The result of 'de-levering' is the underlying beta of the asset, which is the beta of the asset if the asset was financed 100 per cent by equity, with zero debt. The resulting asset beta would reflect only the underlying business risk of the business' assets. These asset betas can then be 're-levered', based on the benchmark gearing level adopted by the regulator to obtain an equity beta based on the benchmark level of gearing.

In general, the preferred approach of the AER and ACCC to de-levering and re-levering is to use the Monkhouse formula, with an assumed debt beta of zero. The Monkhouse formula stated with a debt beta of zero is:

$$\beta_e = \beta_a + \beta_a \left[ 1 - \left( \frac{r_d}{1 + r_d} \right) (1 - \gamma) T_e \right] \times \frac{D}{E}$$

where:

$\beta_e$ = equity beta

$\beta_a$ = asset beta

$\beta_d$ = debt beta

$r_d$ = cost of debt

$\gamma$ = gamma – value of imputation credits

$T_e$ = the effective tax rate

$D$ = market value of debt, and

$E$ = market value of equity.

However, the AER notes that the ACG prefers a simplified de-levering and re-levering formula (the Brealey and Myers formula with a debt beta of zero), and has adopted this approach in recent reports. This approach has also been adopted by Associate Professor Henry.

The de-levering and re-levering formula under the approach preferred by the ACG and adopted by Associate Professor Henry is:

$$\beta_e = \beta_a\left(1+\frac{D}{E}\right)$$

Where each of the parameters are as defined above.

The AER notes that it is generally accepted that the choice of de-levering and re-levering formula, in general, does not make a significant difference to the resultant estimates, so long as the same formula is adopted for both de-levering and re-levering. The AER also notes that the use of the same formula across the ACG's current and recent reports, and Associate Professor Henry's report, also allows for ease of comparison across the various reports[483]

To implement this approach, the ACG and Associate Professor Henry, have multiplied the raw equity beta estimates by the following factor (omega):

$$\omega = \frac{\left(1-\overline{G}\right)}{\left(1-0.60\right)} \quad \Rightarrow \quad \overline{G} = \frac{\overline{D}}{\left(\overline{D}+\overline{E}\right)}$$

where:

D = the book value of net debt

E = the market value of equity

While the market value of equity can be observed continuously, the book value of debt can only be observed in reports from the businesses, which are published semi-annually. Associate Professor Henry has utilised these published book values of debt and market values of equity at the time of publication of the book values of debt. The data was sourced from Bloomberg and provided by the AER. The ACG has adopted the same approach, however has interpolated monthly book values of debt for the periods in between publication. The AER considers both methods are acceptable and should make little difference to the resultant estimates.

***Double leveraging and stapled securities***

The issue of double leveraging and stapled securities relates to the adjustment of reported levels of gearing. The AER has discussed this issue in section 5.5.1 Double leveraging arises where businesses have owners which take out company loans on the

[483] The AER notes that in its current report for the JIA, the ACG also present equity betas de-levered and re-levered using the Monkhouse formula. However, the ACG adopted a debt beta of 0.1 in this report, rather than the preferred debt beta of the AER and ACCC of zero.

behalf of the businesses. This creates an additional layer of debt which is unaccounted for in annual reports. The ACG has made adjustments or accounted for double leveraging in its recent work for the ESC and the JIA.[484]

Stapled securities refer to businesses where the shareholders hold loan notes stapled to shares in the business. The owner pays the loan note holder interest. However, in the event of default all debts and moneys owed by the company have to be paid before the holder of loan note is paid. Therefore, the holder of the loan note bears residual risk and on this basis some businesses treat loan notes stapled to securities as equity. On the other hand other businesses (e.g. Spark Infrastructure and Envestra) record loan notes as debt. The ACG in its analysis has adjusted the values of net debt to account for companies that record stapled securities as debt (by treating the stapled security as equity rather than debt). The AER has examined the impact of double leveraging and loan notes on re-levered equity beta estimates using the ratios calculated in chapter 5 (i.e. 64.0 per cent for Envestra and 58.5 per cent for Spark Infrastructure).

***Calculation of gearing***

As discussed in section 5.5.1, the AER considers that the book valuation of gearing is an equally valid proxy as the 'market gearing' measures taken from Bloomberg. However, the AER notes that the Standard and Poor's Industry Report Cards do not list levels of gearing for all the businesses required for this analysis (e.g. Spark Infrastructure, Hasting Diversified Utilities Fund, etc.). Therefore, the AER has used the 'market gearing' ratios recorder in the Bloomberg database. The AER notes that the ACG has used the average level of gearing of each business over the return window that the equity beta has been measured.[485] The AER notes that Henry has used the averaging approach to re-lever the equity beta estimates.

#### 8.5.3.3 Treatment of outliers

As equity betas examine the systematic risk of an individual stock or a portfolio of stocks relative to the market's systematic risk there are generally two recognised sources that may create outlier observations, these include:

- business-specific events (e.g. merger announcements) and
- events that are 'unrepresentative' of the market (e.g. the 'technology bubble'),

Accordingly, if there are any outlier observations in either the market data related to the returns of the business and the returns of the equity portfolio, the estimates of the equity beta estimate may not be reliable.

***Business-specific outliers***

Given that outliers can bias the estimate of the equity beta, there are different approaches that have been used to remove these observations. One approach has been to remove observations based upon prior knowledge. An example, of this approach

[484] ACG, op. cit., June 2007, p. 56; ACG, op. cit., 17 September 2008 (b), p. 22; and ACG, op. cit., 17 September 2008(a), p. 21

[485] ACG , op. cit., 17 September 2008 (b), p. 33.

would be removing observations from Alinta over a specified period of time given that the speculation over the buyout of the business was likely to create biased observations. However, the AER considers that caution should be exercised as this approach can be subjective and if such an approach is taken it is preferable to compare estimates with and without the outlier observations. The other approach that has been adopted in past regulatory practice involves using econometric techniques which attempt to reduce the impact of outlier observations. Examples of these techniques include:

- Re-weighted Ordinary Least Squares (re-weighted OLS – applies weights to outlier observations), and

- Least Absolute Deviation (LAD – rather than minimising the sum of squared errors, LAD minimises the absolute value of the residuals).[486]

**Submissions in response to issues paper**

The JIA support employing econometric techniques to account for the presence of outliers.[487]

The JIA argue that their consultants have illustrated the importance of improving the precision of beta estimates using methods that remove outliers. In particular, the JIA submit that re-weighted OLS and LAV all have their place in refining raw OLS estimates. Further, the JIA submit that what is required is to be able to discern the meaning of different results from each method.[488]

**Issues and AER's considerations**

The ACG on behalf of the JIA have used both LAD and re-weighted OLS in its analysis to account for outlier observations. The AER observes that the ACG did not remove observations on the basis of prior belief that takeover or merger activity may have resulted in observations that are considered to be unrepresentative of a forward looking equity beta estimate. The AER notes that the results of the ACG report indicate that the equity beta estimates provided by the re-weighted OLS technique generally result in a lower estimate of the equity beta than the OLS or LAD estimates.[489]

The AER considers that accounting for outlier observations is likely to assist with informing the AER of the equity beta of a benchmark efficient service provider. For example, accounting for outliers by using re-weighted OLS or LAD where the stock prices may be affected by merger and acquisition activity may decrease the likelihood of a biased equity beta estimate. However, given that these techniques may be arbitrary in nature, the AER considers it is appropriate to compare the sample with and without the suspected outlier observations removed. Further, the AER agrees with the JIA that when dealing with techniques that attempt to address outliers that the ability to discern the meaning of the different results is important.

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[486] This is also referred to as least absolute variation (LAV).

[487] JIA, *Submission in response*, op. cit., September 2008, p. 127.

[488] JIA, *Submission in response*, op. cit., September 2008, p. 127.

[489] ACG, op. cit., 17 September 2008(b), p.42.

**AER's conclusion**

To account for possible business-specific outliers the AER considers it is appropriate to:

- examine OLS results that include and exclude observations or businesses which may be biased by the acquisition announcements (by removing businesses from portfolios), or

- by applying the LAD and re-weighted OLS[490] approaches and examine the results against the OLS results.

The AER considers that these approaches assist in assessing the impact of outlier observations on equity beta estimates.

***Events that are 'unrepresentative' of the market***

Events are considered 'unrepresentative' when the market conditions during this period are unlikely to be reflective of the market going forward. Accordingly, 'unrepresentative events' are generally removed from the sample, or a sampling period that does not overlap with unrepresentative events in estimating forward looking estimates of equity betas. For example, it has been argued that in the United States, the 'technology bubble', where market indices were driven upwards by telecommunications, media and technology stock prices from the late 1990s to 2001 resulted in a period where equity betas for energy businesses reached historical lows. During this period it has been considered that the prices of energy businesses were not driven by technology stock prices, unlike the market index. As a result, regulators have treated this period as a one-off unrepresentative event and excluded this period for the purposes of estimating the corresponding period for both the market and businesses/portfolio being examined.

**Submissions in response to issues paper**

The MEU consider there is a strong argument that the 'technology bubble' should never have been excluded by regulators, as second guessing the market is fraught with danger. However, it argues that changing approaches now would create regulatory inconsistency.[491]

The MEU argue that the sub-prime crisis has biased the equity beta upwards due to electricity businesses being highly geared (despite having stable cash flows). It considers that the last 12 to 18 months should be excluded.[492]

The JIA support excluding 'unrepresentative events, while the MEU argue there are strong arguments against excluding unrepresentative events.[493]

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490 The AER notes that it has not requested that Olan Henry conduct re-weighted OLS regressions. That said, the AER has considered the re-weighted OLS regressions provided by the ACG in support of the JIA's submission.

491 MEU, *Submission in response*, op. cit., September 2008, p. 52.

492 MEU, *Submission in response*, op. cit., September 2008, pp. 13-18.

The JIA argue that the period associated with the 'technology bubble' is relevant to the extent that a single term CAPM continues to be applied. The JIA also state that it is a matter for judgement as to when the 'bubble' started and finished. Based on advice from the ACG the JIA consider that the period would be approximately July 1998 to December 2001 for Australia.[494]

The JIA recognise that the 'commodity boom' is continuing although the period of low volatility has ceased, and as such, it is difficult to identify whether it is a structural change or an 'unrepresentative event' and does not suggest an adjustment be made for this event at this time.[495]

**Issues and AER's considerations**

Consistent with the approach taken by the ACG on the behalf of the JIA[496], the AER has not considered estimates that include data from the 'technology bubble' period. However, the AER considers that ideally market observations should not be excluded and it is preferable to use a longer time series to account for variation in market data or use estimation techniques which account for outliers. That said, as it has been standard regulatory practice to remove observations that are considered to relate to the period of the technology bubble, the AER agrees with the MEU that to now consider market data from this period would lead to regulatory inconsistency.

The AER has used more than six years of observations (starting after the 'technology bubble') for to estimate the equity beta. The AER observes that for the majority of the period prior to the technology boom that only two energy network businesses (AGL and Envestra) traded on the stock market and is therefore unlikely to provide a robust average of equity beta estimates. The AER also observes that the ACG used this approach for the ESC, however, in its most recent report it chose to use a return window of five years, which is used by a number of commercial services.

The AER considers that neither the JIA nor the MEU have provided evidence demonstrating that the 'commodities boom' or the 'sub-prime crisis', respectively should be considered as 'unrepresentative events'. The AER notes that the JIA submitted that it was difficult to identify whether the 'commodity boom' was a structural change (i.e. affecting both the market and businesses in a similar manner) or an 'unrepresentative event'.

The ACG has argued in its report that the low level of market volatility (driven by the absence of macroeconomic factors) has resulted in the equity beta that is to be downwardly biased.[497] The AER considers that the ACG has failed to demonstrate how this may be the case. Further, from a conceptual standpoint, if the volatility of returns for stocks remains unchanged and the market volatility is historically low, it is unclear to the AER whether this would create upwardly or downwardly biased

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493 JIA, *Submission in response*, op. cit., September 2008, p. 198; and MEU, *Submission in response*, op. cit., September 2008, p. 52.

494 JIA, *Submission in response*, op. cit., September 2008, p. 198.

495 JIA, *Submission in response*, op. cit., September 2008, p. 127.

496 ACG, op. cit., 17 September 2008(b), p. 34.

497 ACG, op. cit., 17 September 2008(b), p. 57.

estimates. However, the AER considers the fact that the volatility experienced during this period is below the average is not sufficient for removing an event, as this argument would then be equally appropriate for periods where the volatility was above the historical average.

**AER's conclusion**

In examining longer period data (i.e. greater than six years), the AER considers it is appropriate to treat the 'technology bubble' as an 'unrepresentative event' and exclude it from the sample as this is consistent with previous regulatory practice. That said, the AER observes that for the majority of the period prior to the technology boom that only two energy network businesses (AGL and Envestra) traded on the stock market and is therefore the period prior to the technology bubble may not provide a robust industry average of equity beta estimates.

The AER considers that as the available evidence does not conclusively indicate whether the impacts of the 'commodities boom' or 'sub-prime crisis' should be considered as structural changes or 'unrepresentative events'. To the extent that these events may be unrepresentative, the application of re-weighted OLS and the LAD techniques should address the presence of shorter-term unrepresentative events.

#### 8.5.3.4 Length of estimation period

In determining an appropriate length of the estimation period, there is generally considered to be a trade-off between the potential loss in relevance of older data in reflecting forward looking expectations (which would suggest a shorter period), and having sufficient observations in order to obtain a robust and statistically reliable equity beta estimate (which would suggest a longer period). In estimating equity betas, the common data series providers generally use an estimation period of five years (using monthly observations). In the issues paper the AER sought comments on the appropriate length of the estimation period.

The appropriate frequency of observations is addressed in the section 8.5.3.5.

**Submissions in response to issues paper**

The MEU recommend adopting an estimation period using data subsequent to the 'tech boom'.[498]

The JIA argue that Gray, Hall, Bowman, Brailsford, Faff and Officer (2005) provide 'a very clear rationale for the use of periods of between 7 and 10 years as being optimal'. The JIA argue that where periods of this length are not available, this causes problems with unreliability of the results, which must be recognised. Following which the extent to which such data can be relied upon, 'if at all', is an issue that must be determined.[499]

[498] MEU, *Submission in response*, op. cit., September 2008, p.52.

[499] JIA, *Submission in response*, op. cit., September 2008, p.119.

**Issues and AER's considerations**

The AER notes that the JIA do not reference the views of their consultants (ACG) on this issue, whom they commissioned in the context of this review. ACG (2008b) estimate equity betas using both the last five years of data (following standard practice), and using all the data available for each stock excluding the 'tech boom' (resulting in a combined estimation period of 1990 to July 1998 and January 2002 to May 2008).

ACG (2008b) notes the trade-off between statistical precision and the relevance of the data in determining the length of the estimation period, noting that 5 years is generally considered to satisfy both requirements. However, ACG (2008b) further notes:

> For regulated businesses it is unlikely that company activities will have changed, therefore the disadvantage of a long time period of data does not apply. Therefore, we have in the past recommended that regard should be paid to the longest set of data available for regulated businesses, and remain of this view.[500]

The AER agrees with the ACG, subject to there remaining a sufficient number of comparable firms to construct a representative portfolio or average. However, it is not clear to the AER as to how ACG (2008b)'s advice reconciles with the estimates it has calculated. For the post-tech boom period, ACG (2008b) has calculated equity betas using only the last five years of data, rather than all data available post-2002. In contrast, the AER has utilised all available data post-2002, which seems more consistent with ACG's (2008b) advice.[501] Following the same principle, in previous advice (ACG (2007)), ACG included all available data post-tech boom and did not limit its estimation period to the past 5 years of data.[502]

The AER notes that where ACG (2008b), have included all available data (that is, including data prior to the tech boom), this leads to a substantial weight being placed on AGL in the average and portfolio estimates. For the pre-tech boom period (1990 to July 1998), only data from AGL and Envestra is available. In the pre-tech boom period, for around 7 years only data for AGL is available, with data for AGL and Envestra available for around one year. ACG (2007) noted:

> For beta estimates estimated with all of the monthly data, AGL is responsible for approximately one third of the outcome, while observations for the relatively new entrant, Spark Infrastructure are responsible for only 2.9 per cent of the total outcome.[503]

The AER considers such a heavy weighting towards one firm is inappropriate as it reduces the benefits of pooling estimates, such as to cancel out some of the estimation errors in individual equity beta estimates. Such a heavy weighting to AGL is particularly problematic, given AGL's non-regulated network activities which are

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500 ACG, op. cit., 17 September 2008(b), p.31.

501 The AER has also extended the end date of ACG (2008(b))'s estimation period, from May 2008 to September 2008, to include more recent data.

502 ACG, op. cit., June 2007.

503 ACG, op. cit., June 2007, p.47.

likely to be more risky and therefore bias the beta estimate upwards. Accordingly, the AER considers greater regard should be had to the post-tech boom period where a larger sample of comparator firms is available.

As noted above, the JIA consider an estimation period of 7-10 years is optimal, referencing Gray et al (2005) in support of this period. Gray et al (2005) test the predictive power of equity betas estimated over estimation periods ranging from 4 to 10 years to predict the equity beta for the following quarter. Gray et al (2005) consider that an optimal estimation period is 8 years.[504]

The AER questions the extent to which Gray et al (2005)'s tests are relevant to the current context, given that the appropriate equity beta is one that reflects forward-looking expectations over at least the next 5 years, not the next quarter. Furthermore, the AER notes that whilst a longer estimation period increased the predictive power of historical estimates, the increased predictive power appears relatively minor. For example, whilst a 6 year estimation period 'beat' a 5 year estimation period in its predictive power, it did so only 50.73 per cent of the time, whilst is only marginally greater than a random result. Similarly a 7 year estimation period 'beat' a 6 year estimation period, but only 50.45 per cent of the time.[505] The AER considers that these results do not provide compelling evidence that estimation periods less than 7 to 10 years are insufficient.

Furthermore, as discussed above, the AER has adopted an estimation period using all available data post-tech boom, resulting in an estimation period of 6 years and 8 months (noting that data for all comparator businesses is not available for the full duration of this period). This is close to 7 years and Gray et al (2005) found that there was no significant difference in the predictive power of betas estimated over 7, 8, 9 or 10 years. The AER further notes that Gray et al (2005) do not question whether 'any' weight should be placed on equity betas estimated over a period less than 7 to 10 years, as the JIA appear to imply that the authors do.

**AER's conclusion**

In determining the appropriate estimation period, the AER recognises the balance that needs to be struck between statistical precision (suggesting a longer period) and data relevance (suggesting a shorter period). The AER also considers that an appropriate period is one for which a reasonable number of comparator firms are available for the purpose of constructing averages and portfolio estimates. The AER considers using all available data subsequent to the 'tech boom' provides the appropriate balance. This results in an estimation period from 1 January 2002 to 1 September 2008.

#### 8.5.3.5 Frequency of observations and thin and thick trading

The frequency of observations is commonly referred to as the return period. The most commonly used return period is monthly. However, given the number of sample firms

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504 S. Gray, J. Hall, J. Bowman, T. Brailsford, R. Faff, and B. Officer, B., *The performance of alternative techniques for estimating equity betas of Australian firms*, Report prepared for the ENA, May 2005, pp.23-25.

505 ibid.

for the Australian market and the length of the estimation period, it is likely that a weekly or daily return period may improve the precision of equity beta estimates.

The AER notes that under most circumstances (except in the presence of thick trading) increasing the frequency of the data to weekly or daily data is likely to increase the precision of the estimated equity beta. However, a daily return period is likely to be influenced by once off event, or due to the presence of 'thick' or 'thin' trading, contain more noise than less frequent data. This creates a trade off between noise and precision when considering the precision of the equity beta estimate.)

**Submissions in response to issues paper**

The JIA argue monthly observations strike the best balance between the number of observations and noise.[506]

The JIA consider that weekly data may be useful as a cross-check on the estimated equity beta using monthly data. However, it notes that larger numbers of observations will be needed for weekly data and that it is likely to use am estimation period which is similar the length of estimation period to that recommended for monthly data. The JIA note that Gray[507] has previously suggested that 84 to 120 monthly observations provide more robust equity beta estimates.

**Issues and AER's considerations**

***Frequency of observations***

Due to the small number of sample businesses in the Australian sample and the shorter listing period of some of the businesses the AER considered the use of weekly and daily return periods as alternatives to a monthly return period.

Given the small number of sample businesses in the Australian sample and that not all businesses used in the sample have been trading over the last six years, the AER considers it appropriate to examine monthly, weekly and daily return periods to determine which sampling frequency provides the most statistically robust estimates of the equity beta of a benchmark efficient service provider.

The AER disagrees with the JIA that the estimation period would necessarily have to be the same if weekly or daily data. The AER notes that the study that the JIA referred to only examined simulations which used monthly observations. The AER considers that it would be inappropriate for it to determine the estimation period using weekly and daily observations to provide a robust estimate of equity betas by using a study which examined estimation periods using monthly observations. That said, the AER considers that given the nature of the data that an estimation period starting after the 'technology bubble' is preferred, irrespective of the return period, given the number of businesses in the sample.

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506 JIA, *Submission in response*, op. cit., September 2008, p. 125.

507 ibid.

The AER requested Henry to examine data using monthly, weekly and daily observations. In contrast, the ACG used monthly data. The following table reports Henry's results for each of the sampling frequencies:

**Table 8.4: Comparison of sampling frequencies (raw equity beta estimates)** [508]

| Daily | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **SP AusNet** | **Envestra** | **APA Group** | **Spark** | **DUET Group** | **Hastings Diversified Utilities Fund** | **AGL[(a)]** | **Origin Energy[(a)]** |
| OLS | 0.46 | 0.49 | 0.69 | 0.62 | 0.63 | 0.84 | 0.43 | 0.65 |
| s.e | 0.05 | 0.04 | 0.04 | 0.07 | 0.05 | 0.05 | 0.04 | 0.05 |
| LAD | 0.39 | 0.37 | 0.61 | 0.56 | 0.66 | 0.68 | 0.41 | 0.69 |
| s.e | 0.05 | 0.04 | 0.04 | 0.07 | 0.05 | 0.05 | 0.04 | 0.05 |
| Obs | 708 | 1739 | 1739 | 392 | 1056 | 970 | 1260 | 1739 |

| Weekly | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **SP AusNet** | **Envestra** | **APA Group** | **Spark** | **DUET Group** | **Hastings Diversified Utilities Fund** | **AGL[(a)]** | **Origin Energy[(a)]** |
| OLS | 0.26 | 0.35 | 0.65 | 0.44 | 0.60 | 0.76 | 0.41 | 0.58 |
| s.e | 0.12 | 0.07 | 0.09 | 0.19 | 0.11 | 0.13 | 0.10 | 0.11 |
| LAD | 0.23 | 0.14 | 0.56 | 0.64 | 0.42 | 0.37 | 0.30 | 0.53 |
| s.e | 0.12 | 0.08 | 0.10 | 0.19 | 0.11 | 0.13 | 0.10 | 0.11 |
| Obs | 142 | 348 | 348 | 79 | 212 | 194 | 252 | 348 |

[508] s.e. is the standard error of the regression and Obs is the number of observations.

| | Monthly | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **SP AusNet** | **Envestra** | **APA Group** | **Spark** | **DUET Group** | **Hastings Diversified Utilities Fund** | **AGL[(a)]** | **Origin Energy[(a)]** |
| OLS | 0.34 | 0.40 | 0.58 | 0.69 | 0.68 | 0.63 | 0.25 | 0.43 |
| s.e | 0.16 | 0.14 | 0.18 | 0.18 | 0.20 | 0.23 | 0.16 | 0.23 |
| LAD | 0.17 | 0.21 | 0.66 | 0.52 | 0.32 | 0.49 | 0.11 | 0.30 |
| s.e | 0.17 | 0.14 | 0.18 | 0.18 | 0.21 | 0.23 | 0.16 | 0.23 |
| Obs | 32 | 80 | 80 | 18 | 48 | 44 | 57 | 80 |

Source: Henry[509]
(a) Henry has used Origin and AGL for the purposes of comparison but it is not included in any of his portfolio estimations.

The number of observations (Obs) using monthly observations is quite small (e.g. 32 observations for SP AusNet).[510] Further, Henry notes that estimates which use less than 30 observations are unlikely to provide reliable results.[511] On the other hand, Henry considers that using daily estimates are likely to be too noisy and therefore considers the use of weekly observations as the best compromise.[512]

***Thin and thick trading***

When estimating equity betas an issue that may create biases in equity beta estimates is the issue of thin and thick trading. 'Thin trading' refers to stocks that are traded infrequently and therefore the return on the stock remains unchanged from one period to the next while the return of the market changes. In this circumstance the relative systematic risk of the stock to the market is likely to be understated and will therefore likely provide a downwardly biased equity beta estimate. In the presence of 'thinly traded' stocks, those ('thickly traded') stocks which are relatively traded more often than the 'thinly traded' stocks are more likely to provide upwardly biased equity beta estimates.

In the finance literature there are two popular approaches to adjusting for thin trading; the Scholes-Williams approach[513] and the Dimson approach.

In relation to the Scholes-Williams approach Henry notes:

> While the Scholes-Williams measure of $\beta$ has the advantage of simplicity, it relies on estimates of $\hat{\beta}_i^{-1}$ and $\hat{\beta}_i^{+1}$ that are obtained from regressions

509 O. Henry, op. cit., November 2008, p. 14.

510 Henry notes that it was inappropriate to conduct the above analysis for GasNet and Alinta due to the takeover announcements. See O. Henry, op. cit., November 2008, p. 13.

511 O. Henry,, op. cit., November 2008, p. 13.

512 ibid.

513 M. Scholes and J. Williams, 'Estimating betas from nonsynchronous data', *Journal of Financial Economcis*, vol. 5, no. 3, 1977, pp. 309-327.

> whose theoretical foundation suggests a potential for omitted variable bias. Moreover, calculation of a standard error for (7) is a non-trivial task.[514]

Given the potential for omitted variables bias in the Scholes-Williams approach, Henry has applied the Dimson approach.[515]

The Dimson estimate of the equity beta is obtained from the sum of the lagging and leading coefficients. If there is no presence of thin or thick trading, then the coefficients for the leading and lagging variables are statistically insignificant. Henry notes in his work that the inclusion of these variables may lead to inefficient equity beta estimates. However, this approach reduces the likelihood of omitted variables bias that is present in the Scholes-Williams approach. Furthermore, the AER notes that an advantage of the Dimson approach is that the calculation of a standard error for is straightforward.[516] Accordingly, the AER has followed the advice of Henry the Dimson approach in examining the effects of thin and thick trading.

**AER's conclusion**

The AER has followed the recommendation of Associate Professor Henry and focused on weekly observations. That said, given it is standard practice to examine monthly data, the AER has also considered the ACG's estimates in forming a view on the equity beta.

AER has followed the recommendations of Associate Professor Henry that the Dimson approach in examining the effects of thin and thick trading.

#### 8.5.3.6 Robustness, precision and stability of equity beta estimates

The AER recognises that empirically derived equity betas are based upon estimation techniques using historical data. If all the factors driving systematic risk remained constant over time, then it is likely that the historical estimates of the equity beta could be considered a reliable forward looking estimate. However, when examining the systematic risk of businesses or portfolios relative to the market is unlikely to be perfectly constant over time, as different events (i.e. economic shocks) are likely to have different effects on the systematic risk of both businesses and the market. Therefore a number of different techniques have been used to test the precision and stability of beta estimates. These are:

- examining the adjusted R-squared of the estimates[517]
- using confidence intervals to generate an upper bound estimate of the equity beta
- testing for the presence of autocorrelation and heteroskedasticity in the errors of the regression

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514 O. Henry, op. cit., November 2008, p. 15.

515 E. Dimson, and P. Marsh, 'The stability of UK risk measures and the problem in thin trading', *Journal of Finance*, vol. 38, no. 3, 1983, pp. 753-784.

516 O. Henry, op. cit., November 2008, p. 15.

517 The AER notes that the adjusted R-squared or R-squared cannot be used to examine the precision or stability of estimates, however, suggestions have been made that it could.

- testing for thin and thick trading effects (used to examine the robustness of the point estimate), and

- examining the stability of equity beta estimates over time.

***R-squared***

The R-squared statistic measures the percentage of variation in the dependent variable that can be explained by movements in the independent variables in the regression. Similar to the issue with outlier observations and unrepresentative events it has been argued that a low R-squared statistic represents that there is a significant amount of noise which is likely to provide a biased estimate.

**Submissions in response to issues paper**

The JIA argue that high levels of noise (i.e. low R-squared) make the equity beta estimate unreliable.[518]

The JIA argue that it would be misleading to rely on beta estimates derived from the available data without taking into account the analysis of SFG, which the JIA argues that the results demonstrate that point estimates of equity beta have to be adjusted upwards (when the R-squared is less than 10 per cent).[519]

The JIA note that SFG demonstrated that R-squared statistics provide a measure of the 'signal-to-noise ratio' in a set of data. In relation to beta data, it is a measure of how much the variation in the return on the specific equity can be explained by changes in market returns. The JIA argue the lower the value of R-squared the less the 'signal' can be clearly heard through the 'noise', and the less the regression estimate provides a reliable reflection of the true correlation (actual beta).[520]

**Issues and AER's considerations**

SFG notes that the R-squared statistic has two interpretations, one in the context of finance theory and the other statistical.[521] It describes the finance theory interpretation as the percentage of business-specific risk. Where a business has a high percentage of business-specific risk it will have a low R-squared (business-specific risk cannot be explained by the market risk) and where it has a high percentage of market-specific risk it will have a high R-squared. However, SFG place more weight on its statistical interpretation, which it claims describes the signal-to-noise ratio, where a low signal-to-noise ratio means that it is harder to reliably recover the signal.[522]

The AER notes that the concept of a signal-to-noise ratio is derived from an e-mail from the Australian Graduate School of Management Risk Measurement Service (AGSM-RMS). The AGSM-RMS, states in the e-mail prompted by queries from Gray:

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518 JIA, *Submission in response*, op. cit., September 2008, p. 113.

519 JIA, *Submission in response*, op. cit., September 2008, p. 113.

520 ibid.

521 SFG, op. cit., 15 September 2008, pp. 9-10.

522 ibid., p. 10.

> The fact that we see several regressions with very low R-squared statistics does not imply that they are wrong or in any way inconsistent with finance theory. A low R-squared indicates that more of the variation in the variables is noise that is unrelated to the effect that is being measured, making it more difficult to obtain statistically reliable estimates.[523]

The AER notes a couple of features of the AGSM's response to Gray's queries. First, a low R-squared value may imply that it will be harder to pick a signal out of noise but it does not mean that the signal itself is wrong or in any way inconsistent with finance theory. Importantly this means that a low R-squared does not indicate that the beta estimate is any way biased. Second, it also confirms the financial theory interpretation that a low R-squared value will tend to be associated with a higher proportion of firm specific risk ie a low beta.

That said, in discussing the relationship between a low R-squared and the point estimate of the equity beta, SFG has focused on the equity beta estimate being biased. The AER observes that the JIA argue that an R-squared value below 10 per cent would suggest bias in the equity beta. However, SFG does not explicitly or implicitly state this position. The AER notes that SFG attempts to demonstrate the presence of bias in the point estimate through use of a simulation. The conclusion that equity betas are biased is based upon the assumption that the 'true value' of the equity beta is known (1.0 from regulatory decisions) and focuses on a sub-sample of results where the R-squared statistic is deemed to be low – i.e. approximately 10 per cent. Further, it assumes that true values for the R-squared statistic and specific R-squared statistics) and the level of bias are known for the population. This would suggest that there is prior knowledge of the population from where the sample is drawn.

The AER considers that it would inappropriate to assume that values from regulatory processes are true values or the values representing the population from which the sample is drawn. As the AER has noted above, the choice of equity betas between regulators has not been consistent and it would therefore be inappropriate to assume a 'true value'. Further, the AER observes that SFG has chosen to focus on a sample of results (with 'low' R-squared values) in its simulation and does not comment on whether there may be bias when conducting the experiment for 'high' R-squared results.

Further, when discussing the impact of noise, SFG seems to ignore the cause of the noise. As SFG recognises in its report, this noise is being created by business-specific factors. In other words the signal coming from market risk has not changed rather it is other signals that are evident.

In any event, the model used is not designed to explain as much of total risk as possible. If it was, it may include non-systematic risk factors. Instead the model is a single factor model designed to estimate beta (the sensitivity to market risk). Consequently, the R-squared statistic, while a measure of the model's power to explain total risk, is not a direct measure of the precision or stability of the beta point estimate. These are better assessed by sequential and recursive estimates, Hansen's test, and, confidence intervals.

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[523] ibid.

**AER's conclusion**

The AER considers that the simulation analysis of equity beta conducted by the SFG cannot be applied to the empirical estimation of beta since the true value of the equity beta is assumed in the former but truly unknown in the latter.

The AER considers that it is inappropriate to consider that empirical equity beta estimates with an R-squared value of less than ten per cent are negatively biased when the 'true value' of the R-squared for a regression examining equity betas is not known. Given the unknown nature of the 'true value', the AER considers that it is not known as whether the point estimate of the equity beta is positively or negatively biased (if at all).

The AER considers that the model is specified to estimate systematic market risk related to the business but not the total business risk. Consequently, the R-squared is a measure of the model's power to explain total risk but not a direct measure of the precision or stability of the beta point estimate. These are better assessed by sequential and recursive estimates, Hansen's test, and, confidence intervals.

***Confidence intervals***

In general, the AER has focused on the point estimate of the equity beta in informing its view. However, the width of the confidence interval is an indicator of the precision of the point estimate. The precision of a point estimate is inversely related to its variance or standard error. That is, estimates with lower variance are estimated more precisely and have narrower confidence intervals.

There a number of issues when examining confidence intervals, these are the presence of:

- outliers has the potential to affect both the point estimated and the associated confidence intervals, and

- autocorrelation (i.e. the errors in the regression in the present have a relationship or trend with errors in the past) and heteroskedasticity (i.e. variance in the errors over time is not constant).

**Submissions in response to issues paper**

The AER notes that the JIA argue based on the advice of consultants that the confidence intervals needed to be widened as the estimated confidence intervals understate the uncertainty. [524]

The JIA note from the ACG report that 95 per cent confidence intervals describe the range which an estimate has a 95 per cent probability of being a correct estimate. However, they argue that this is based on the assumption that the normal distribution estimated from the data is an accurate reflection of the actual distribution that represents a true equity beta.[525]

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[524] JIA, *Submission in response*, op. cit., September 2008, p. 110.

[525] JIA, *Submission in response*, op. cit., September 2008, p. 110.

The JIA argue based upon advice from SFG that confidence intervals generally understate the true uncertainty surrounding beta estimates as they do not account for uncertainty surrounding re-levering, gearing and whether the firms are appropriate comparators.[526]

**Issues and AER's considerations**

In response to SFG view as to the uncertainty regarding comparator firms, the AER has used the same businesses as proposed by the JIA to obtain a benchmark efficient level of gearing and equity beta. Further, the AER has discussed in sections 5.6 that the market valuation of gearing remains unchanged at 60 per cent and tends to be relatively stable over time. On the issue of re-levering, the AER is unaware of re-levering approaches used by regulators resulting in significantly different equity beta estimates. Accordingly, the AER does not consider that the uncertainties flagged by SFG report are likely to be significant to the extent that the range of true values of equity beta (represented by confidence intervals) should be widened.

SFG attempt to demonstrate the imprecision of confidence intervals by comparing AGSM-RMS estimates of beta (i.e. four years of monthly observations) for December 2005 and March 2008 and noting that the confidence intervals for Envestra do not overlap.[527] The AER considers that it is inappropriate to examine individual equity betas as discussed in section 6.5.3.8. The AER is cognisant of the fact that individual equity betas can provide imprecise estimates. Accordingly, to make conclusions about the precision of confidence intervals based solely upon individual businesses is likely to be inappropriate.

The JIA discuss the relationship of normality of the distribution with the size of the confidence intervals. However, it is important to understand the relationship between the nature of the errors in an estimation output and standard errors estimated by the approach when examining the width of confidence intervals. In the presence of issues such as heteroskedasticity (i.e. the size of the errors do not remain constant over time) and/or autocorrelation of errors (i.e. errors in the present are positively or negatively correlated to errors in the past) the standard errors that are estimated may overstate or understate the size of the confidence interval. The AER notes that these problems only have an impact on the standard errors and confidence intervals, and not on the point estimate.

The ACG recognise the presence of these problems and address the issue by applying a (Newey-West) technique which adjusts the standard errors for both autocorrelation and heteroskedasticity.[528] Although the AER considers that the standard errors are likely to be heteroskedastic in nature it considers that this approach may be inappropriate as this adjustment assumes a specific term structure for the autocorrelation.[529] It is not evident to the AER which term structure the ACG has

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526 ibid.

527 SFG, op. cit., 15 September 2008, p. 28.

528 ACG, op. cit., 17 September 2008(b), p. 4.

529 'Term structure' in the context of the autocorrelation of errors refers to the relationship between the error in the regression in the current period to the number of periods in the past (lags). For example, the error in the current period may relate to the errors in only the previous period, previous two periods, etc.

selected and the basis for selecting a specific term structure. The AER has commissioned Associate Professor Henry to report on issues relating to the estimation of equity betas. Henry has examined the standard errors generated by the Newey-West approach against Whites approach (which adjusts standard errors for an unknown form of heteroskedasticity) and applying no adjustment whatsoever. Table 8.5 reports his analysis.

**Table 8.5: Henry – Comparison of standard errors of raw equity betas (2002 - 2008**

| | Weekly | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **SP AusNet** | **Envestra** | **APA Group** | **Spark** | **DUET Group** | **Hastings Diversified Utilities Fund** | **AGL[a]** | **Origin Energy [a]** |
| Beta | 0.26 | 0.35 | 0.65 | 0.49 | 0.60 | 0.76 | 0.41 | 0.58 |
| s.e.[b] | 0.12 | 0.07 | 0.09 | **0.19** | 0.11 | 0.13 | 0.10 | **0.11** |
| Whites | *0.14* | **0.11** | **0.13** | *0.17* | **0.15** | **0.19** | *0.12* | **0.11** |
| Newey-West | **0.16** | *0.10* | **0.13** | 0.13 | **0.15** | *0.18* | **0.14** | **0.11** |

Source: Henry[530]
Bold values represent largest standard errors, italicised values represent middle values and underlined values represent lowest value.
(a) Henry has used Origin and AGL for the purposes of comparison but it is not included in any of his portfolio estimations.
(b) No adjustment has been made to the standard errors.

In general, no adjustment to the standard errors results in lower standard errors and the Newey-West adjustment leads to the highest standard errors. While, Whites adjustment, estimates standard errors which tend to be larger than no adjustment is applied but are smaller than the Newey-West adjustment. In his analysis of the above table, Henry notes:

> However, given the problems associated with the choice of q in the Newey-West estimator our preference is not to adjust the standard errors for the potential presence of heteroscedasticity using the Newey-West estimator. Were an adjustment to be made, the White estimator would appear to be more appropriate.
>
> However, given the lack of clear motivation for any adjustment, and the associated difficulties choosing the appropriate method of adjustment, the unadjusted OLS standard errors will be reported in all subsequent tables.[531]

The AER reiterates that irrespective of the technique used to adjust confidence intervals that the point estimates are unchanged. On the basis of Henry's advice, the AER finds no compelling reasons to favour the Newey-West adjustment approach

[530] O. Henry, op. cit., November 2008, p. 6.

[531] O. Henry, op. cit., November 2008, pp. 6-7.

adopted by the ACG in its analysis or Whites approach to adjusting standard errors or making no adjustment to standard errors when examining confidence intervals.[532]

The ACG has argued in its report that the low level of market volatility (driven by macroeconomic stability) has resulted in the level of uncertainty to be understated in the confidence intervals.[533] The AER considers that the ACG has not demonstrated the link between market volatility and macroeconomic stability, and the impact on confidence intervals.

The AER does not consider that having regard to the need for persuasive evidence translates into a specific statistical hypothesis that would require the selection of a particular set of standard errors to create confidence intervals for the purposes of testing the unknown true value of the equity beta. Further, the AER considers that equity beta estimates should not be based upon the lower and upper bounds of the estimated range of likely values but rather on a value which best represents the forward-looking estimate. That is, it is likely that a forward-looking equity beta will be represented by a the point estimate of the equity beta rather than the upper and lower bounds.

**AER's conclusion**

Given the possibility of the presence of heteroskedasticity and autocorrelation in the errors of the equity beta estimation it is difficult to discern whether confidence intervals overstate or understate the upper bound of an estimate of the benchmark efficient equity beta. Further, the AER finds no compelling reasons to favour the Newey-West adjustment approach adopted by the ACG in its analysis or Whites approach to adjusting standard errors or making no adjustment to standard errors when examining confidence intervals. Further, the AER does not consider that having regard to the need for persuasive evidence translates into a specific statistical hypothesis that would require the selection of a particular set of standard errors to create confidence intervals for the purposes of testing the unknown true value of the equity beta.

That said, the AER notes even if it were to consider confidence intervals it would be appropriate to consider both the lower and upper bounds generated by the estimation as it is equally likely that a 'true' equity beta point estimate may be observed at the lower or upper bound. Given that upper and lower bounds are less likely to represent the 'true' point estimate the AER has had regard to the point estimates rather than the range of possible estimates within confidence intervals.

***Examining the stability of equity beta estimates over time***

Consistent with the methodology adopted by the ACG, Henry has examined the stability of equity beta estimates over time. In its analysis the ACG has used recursive estimates using a fixed window. This approach involves estimating equity betas over a specified time window (e.g. 60 observations) and moving the fixed window forward by one month/week/day at a time. This effectively removes the first observation from

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[532] A solution to addressing the issue of heteroskedasticity would be to identify where the breaks in variance have occurred and to adjust the errors in the estimation to account for the breaks.

[533] ACG, op. cit., 17 September 2008(b), p. 57.

the window and adds an observation after the last observation of the previous window. The equity beta estimates and confidence interval results are then plotted on a graph to examine whether the equity beta estimates have remained stable over time.

In addition to this approach Henry has used recursive estimates with an expanding window. This approach begins with a set window and expands the size of the window by one observation at a time without removing any observations from the window. (e.g. the first window will contain 60 observations, the second window will contain 61 observations) As was the case with a fixed window, this approach involves plotting the estimation results on a graph to examine whether the equity beta estimates have remained stable over time. As the window is expanding over time, it is likely the size of confidence intervals will shrink over time.

The AER considers that methods that examine graphs may be open to different interpretations. Further, as Henry notes in his report as these approaches use windows to examine the stability of equity betas over time they may not be sufficient in testing parameter stability as they do not employ all available information.[534] Another approach that can be used to examine parameter stability is the Hansen test for structural stability which conducts statistical tests on the stability of the variance of errors, the constant in the equation, and the estimated equity beta over the sampling period. The AER considers that the Hansen test is equally appropriate to the graphical approaches (recursive approaches) for the purpose of examining the stability of equity beta estimates over time.

#### 8.5.3.7 Blume and Vasicek adjustments

Given the general imprecision of beta estimates for individual firms, some of the commercial beta estimation services apply either of two adjustments. These adjustments are:

- the Blume adjustment which as typically applied adjusts 'raw' beta estimates towards the average of the market by applying a weight of 0.67 to the raw beta estimate and a weight of 0.33 to the average beta of the market being 1.0, and

- the Vasicek adjustment which adjusts 'raw' beta estimates towards the beta of a prior distribution or 'prior belief' with the weights applied based on the relative precision of the two estimates. The greater is the relative imprecision of the raw beta estimate the more weight that is placed on the prior distribution. Typically the average or portfolio beta estimate of the industry to which the individual firm belongs is used as the prior distribution.

Where the raw beta estimate is above or below one, applying the Blume adjustment will always 'push' the beta estimate closer to one. Similarly, where the raw beta estimate is above or below the 'prior belief', applying the Vasicek adjustment will always 'push' the beta estimate closer to that of the 'prior belief'.

Some empirical studies (including Blume (1971)) have found a tendency for equity beta estimates to regress towards one over time.[535] A rationale given for this has been

[534] O. Henry, op. cit., November 2008, p. 20.

[535] M. Blune, 'On the assessment of risk', *The Journal of Finance*, Vol.26, No.1, 1971.

that the management of firms with projects of extreme risk (either high or low) may seek to diversify the operations of the firm, such as expanding into industries of less extreme risk. Or similarly, that the management of firms with extreme levels of gearing (either high or low) may seek less extreme levels of gearing over time. That is, through conscious management initiatives, the true beta of a firm of either extreme high or low risk may become less extreme over time and converge towards one.

As a benchmark efficient service provider is generally assumed to be 'pure play', so assumed to have no opportunities to diversify activities across industries, and with a fixed level of gearing, the AER sought comments in the issues paper on whether there was any validity in applying the Blume adjustment in a regulatory setting. The AER did not raise the Vasicek adjustment in the issues paper.

***Submissions in response to issues paper***

The MEU consider the Blume adjustment has 'little relevance' to regulated monopolies and is 'not a valid approach' as the risk profile of the notional regulated business does not change.[536]

The JIA consider that there is validity in applying the Blume adjustment, the rationale being set out in Gray, Hall, Bowman, Brailsford, Faff and Officer (2005).[537] According to the JIA, Gray et. al. (2005) demonstrate that application of the Blume adjustment 'improves' beta estimates, particularly where there is uncertainty about the quality of data and wide confidence intervals.[538]

The JIA note ACG's views against applying the Blume adjustment. However, they state that this is because ACG associates the Blume adjustment purely with mean reversion, which is not the only reason for applying the adjustment, though the JIA concede this limits the role of the Blume adjustment.[539]

According to the JIA, the Vasicek adjustment should also be applied because the concept of a prior assumption is useful. The JIA argue:

> The problem in the current review is that application of a prior assumption is problematic unless it is accepted that the appropriate prior value is 1.0.[540]

As noted above the JIA commissioned two reports on beta estimation in the context of this review (ACG (2008b), Gray (2008b)).[541] Both reports comment on the Blume and Vasicek adjustments. These comments are outlined and analysed in the following section.

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536 MEU, *Submission in response*, op. cit., September 2008, pp.52-53.

537 S. Gray, J. Hall, J. Bowman, T. Brailsford, R. Faff and B. Officer, op. cit., May 2005.

538 JIA, *Submission in response*, op. cit. September 2008, p.129.

539 JIA, *Submission in response*, op. cit. September 2008, p.129. The JIA associates the Blume adjustment with applying weights of 70:30 between the raw beta estimate and one. The AER notes the Blume adjustment as typically applied applies weights of 67:33 between the raw beta estimate and one.

540 JIA, *Submission in response*, op. cit. September 2008, p.128.

541 ACG, op. cit., 17 September 2008(b), p.45; SFG, op. cit., 15 September 2008.

***Issues and AER's considerations***

*Blume adjustment*

Gray (2008b) notes and agrees with the AER's reasoning in the issues paper, that if the tendency for beta estimates to mean revert towards one is caused by management initiatives, application of the Blume adjustment in a regulatory context is 'not relevant'.[542] However Gray argues that this is not the only reason for applying the Blume adjustment, noting that the AER's reasoning in the issues paper:

> …does not address the bias in beta estimates which results purely from the statistical properties of beta estimation. …OLS beta *estimates* exhibit mean-reversion as a result of statistical bias, even if the firm makes no change in asset base or leverage whatsoever and the *true* (but unobservable) beta remains constant.[543]

This second rationale for applying the Blume adjustment is described by Blume (1975) as the 'order bias'. He outlines the frequently given intuitive explanation of this bias through an example. Assume all firms in the market are partitioned into portfolios with similar beta estimates, with each portfolio containing 100 firms. Next consider the possibilities as to how a firm might happen to have one of the lowest 100 beta estimates. There are two possible explanations (either, or a combination of):

- the true beta of the firm is in the lowest 100, and the beta is estimated with a relatively small estimation error. If this is the case, the tendency for beta estimates to mean revert over time may reflect changes in the true beta of the firm, or

- the true beta of the firm is not in the lowest 100, but the estimated beta might still be in the lowest 100 estimates if it were estimated with a sufficiently large negative error (known as 'order bias'). If this is the case, the tendency for beta estimates to mean revert over time may reflect the unwinding of this estimation error. [544]

Whilst the AER notes the Blume adjustment is also applied to correct for order bias, in Blume (1975)'s original research studying the stock price movements on the NYSE over 1933-68, Blume considered that the tendency for beta estimates to mean revert towards one was due to 'real non-stationarities' in the true betas and that the 'order bias' explanation was 'not of overwhelming importance'.[545]

As noted above, the JIA state that the rationale for applying the Blume adjustment is set out in Gray, Hall, Bowman, Brailsford, Faff and Officer (2005).[546] Gray et al (2005) accept that one explanation proposed why estimated betas exhibit a tendency for mean reversion over time toward unity is that this reflects the conscious decisions by management to keep the risk level of the firm around the average for the market. However, Gray et. al. (2005) note that an alternative and 'perhaps more intuitive'

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542 ibid., p.24.

543 ibid.

544 M. Blume, 'Betas and their regression tendencies', *The Journal of Finance*, Vol.30, No.3, 1975, pp.787-788.

545 ibid., p.794.

546 S. Gray, J. Hall, J. Bowman, T. Brailsford, R. Faff and B. Officer, op. cit., May 2005.

explanation is due to the unwinding of estimation error over time. The authors do not explicitly state that they endorse the application of the Blume adjustment in a regulatory setting, but rather state:

> Given the fact that it is widely accepted that betas contain estimation error, and given that the Blume adjustment can be viewed as a way to reduce such errors, and since it is used by a number of leading data service providers, we include this estimation technique in our empirical estimations.[547]

However, the authors do not address the issue that application of the Blume adjustment may adjust the raw beta estimate to reflect both expected changes in the true beta due to management initiatives (which is accepted is not appropriate in a regulatory setting) and to correct for the 'order bias'. If the tendency for beta estimates to mean revert over time was predominantly due to the unwinding of estimation error, then this may not be so problematic. However the authors do not provide any evidence to substantiate that this is so, simply stating that the second rationale is 'perhaps more intuitive'. As noted above, Blume (1975) mainly attributed this mean reversion to 'real non-stationarities' in the true betas and found that the 'order bias' explanation was 'not of overwhelming importance'.[548] ACG (2002) also stated that studies that found a tendency for beta estimates to mean revert over time attributed this to conscious management initiatives and not to the unwinding of estimation error.[549] ACG (2002) notes that two such studies are Brailsford, Faff and Oliver (2000) and Sheutrim (1998).[550]

Gray et al (2005) also perform tests of the ability of betas, estimated over estimation periods of varying length, and with and without the Blume adjustment, to predict the beta estimate for the following quarter. The authors found that the Blume adjusted beta outperformed the unadjusted beta. However, ACG (2007) has previously noted that the tests performed by Gray et al (2005) were 'not particularly convincing' for a number of reasons. These reasons included that:

> While the Blume adjustment was found to improve the forecasting of future equity returns to a statistically significant amount, it only did so for 52.7 per cent of the time – which is barely more than a random result and is not economically significant.[551]

Further, Gray et al (2005) only consider the Blume adjustment and do not compare this with the Vasicek adjustment. By contrast, in Gray (2008b), Professor Gray considers both the Blume and Vasicek adjustments and now appears to advocate

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547 ibid., p.11.

548 M. Blume, 'Betas and their regression tendencies', *The Journal of Finance*, Vol.30, No.3, 1975, p.794.

549 ACG, *Empirical evidence on proxy beta values for regulated gas transmission activities – Final report*, Report to the ACCC, July 2002, p.32.

550 T. Brailsford, R. Faff, and B. Oliver, 'Research design issues in the estimation of beta', McGraw-Hill series in *Advanced finance volume 1*, Sydney, McGraw-Hill, p.28; Sheutrim, G. (1998), *Systematic risk characteristics of corporate equity – Research discussion paper 9802*, Reserve Bank of Australia, Sydney, 2000, p.8.

551 ACG, op. cit., June 2007, p.33.

applying the Vasicek adjustment rather than the Blume adjustment. Professor Gray's arguments in favour of applying the Vasicek adjustment are analysed below.[552]

Accordingly, the AER does not consider that Gray et al (2005), which is the report referenced by the JIA to support the Blume adjustment, provides convincing reasons for the application of the Blume adjustment in a regulatory setting.

As noted above, the JIA state that ACG do not support the Blume adjustment because ACG 'associates Blume purely with mean reversion'.[553] The AER considers that the JIA appear to have misunderstood the reasons given for applying the Blume adjustment and ACG's reasons for not applying it. As discussed above, applying the Blume adjustment may adjust for both expected future changes in the true beta due to management initiatives, and to correct for estimation error. Both relate to mean reversion and are rather different explanations for the observed mean reversion of beta estimates over time. It appears that the JIA are referring to the view that the ACG do not support the Blume adjustment because they associate this mean reversion purely with management initiatives and not with the unwinding of estimation error. However ACG has continually had regard to this second potential rationale before advising against the Blume adjustment in a regulatory setting, as is evident from ACG (2002, 2007, 2008a, 2008b). For example, ACG (2008b) states that if the objective of the Blume adjustment is to reduce estimation error:

- it is an imprecise adjustment for achieving this, with the 0.67:0.33 weights 'derived from another market in another time'

- it cannot be determined how much (if any) of the observed regression tendency in betas is due to a change in the true beta over time and how much (if any) is due to the effects of errors in estimates[554], and

- it applies the same predetermined weights irrespective of the precision of the particular beta estimate.[555]

In ACG (2008a), it states that it did not ignore the issue of estimation error, but rather addressed this through:

- calculating industry portfolio betas (mean, median) to reduce the estimation error in individual beta estimates

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552 SFG, op. cit., 15 September 2008, pp.22-26.

553 JIA, *Submission in response*, op. cit. September 2008, p.129.

554 While the AER agrees with ACG on the first and third dot points, it does not agree with the second dot point which implies that the degree to which the tendency for beta estimates to mean revert to be explained by changes in the true betas and the unwinding of estimation error is completely unknown. As noted above, Blume (1975)'s empirical studies attributed the tendency to the movements in true betas finding that the order bias rationale was not of overwhelming importance. In previous advice, ACG (2002) also stated that studies that found a tendency for beta estimates to mean revert attributed this to the conscious management initiatives and not to the unwinding of estimation error. ACG (2002) notes that two such studies are Brailsford, Faff and Oliver (2000) and Sheutrim (1998).

555 ACG, op. cit., 17 September 2008(b), p.36.

- reporting 95 per cent confidence intervals around the point estimates of both the individual and portfolio betas
- applying a number of different beta estimation techniques (OLS, re-weighted OLS, least absolute deviation (LAV)), and other techniques to deal with outliers
- estimating betas across extended time periods
- providing additional information about the nature of the operations of the businesses in the sample, and
- excluding data from the 'tech bubble'[556]

The AER considers it is clear that ACG has had regard to the unwinding of estimation error rationale before advising against applying the Blume adjustment in a regulatory setting. The AER agrees with the views of ACG as to why the Blume adjustment should not be applied.[557]

Additionally, Lally (1998) explains how applying the Blume adjustment can cause, rather than remedy, bias in beta estimates, such as applying the Blume adjustment to an industry where the beta is expected to be low is likely to overestimate the beta, and vice versa. He gives the following example:

> A dramatic example of this is in the U.S. electric utilities. A typical such firm has an estimated beta (unadjusted) of around 0.4 (Value Line, 1993). By virtue of being typical, the Vasicek estimate, with prior corresponding to this industry, will also be 0.4. By contrast, Blume adjusts the 0.4 to 0.6 [i.e. 0.33 + 0.67(0.4)]. The result is a dramatic overestimate by Blume, because a singularly relevant fact is ignored, i.e., membership of an industry whose average estimated, and therefore presumably also true, beta is well below one. Given that these firms have output prices that are set so as to recover costs, including the cost of equity, and then have substantial equity investment, then the implications of using Blume betas (i.e., not partitioning into industries) for measuring costs of equity are particularly severe.[558]

ACG (2007) considered that given the majority of beta estimates for Australian energy stocks are below one, and this pattern is repeated in the US, applying the Blume adjustment may well result in such a bias. Whilst beta estimates of Australian energy stocks have risen since ACG's advice, the majority remain below one, and this pattern is still present in the US. Accordingly, the AER considers applying the Blume adjustment may lead to an upwards bias in the beta estimates of Australian energy stocks.

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556 ACG,, op. cit., February 2008, p.4.

557 As explained in section 8.5.3.6, the AER considers little regard should be has the confidence intervals of beta estimates and greater regard should be had to the point estimates. However the AER agrees with the remaining approaches ACG has taken to address the issue of imprecision in beta estimates.

558 M. Lally, 'An examination of Blume and Vasicek betas', *The Financial Review*, Vol.33, 1998, p.192.

In a regulatory setting, the AER considers the Blume adjustment is not an appropriate method to address the general imprecision of beta estimates and may lead to an upwards bias in beta estimates when applied to Australian energy stocks.

*Vasicek adjustment*

As noted above, the JIA also support applying the Vasicek adjustment, referencing ACG (2008b) to support this position. ACG (2008b) considers that the Vasicek adjustment has 'a number of desirable aspects' compared to the Blume adjustment, including that the adjustment is only motivated by the relative precision of the 'prior belief' and not to account for movement on true betas. ACG notes that the difficult question for the Vasicek adjustment is the assumed prior belief and the assumed precision of that prior belief. ACG (2008b) considers that the only practicable prior belief is one based on the average beta for the market, following the method applied by the London Business School. ACG (2008b) notes:

> While it may be argued that a prior of an equity beta of 1 will bias upwards the beta estimate, we do not consider there to be strong grounds for this view.[559]

This contrasts with previous advice by ACG. ACG (2002) states:

> In contrast, the London Business School service uses all listed companies as the peer group, which may introduce bias in the beta estimate.[560]

ACG (2002) further notes:

> …the use of a prior distribution that includes all firms may introduce bias into the proxy beta that is derived. Certainly, taking account of information from all firms is somewhat at odds with carefully selecting the group of comparable entities that is used to derive the proxy beta. [561]

The ACG (2008b) notes that in its previous advice it assumed that the prior distribution would be based on the average of a set of comparable entities, and concluded this would add little if the same set were used when estimating the beta for regulated activities. However since then:

> …the reliability and stability of the beta estimates in Australia has remained depressingly poor, notwithstanding our predictions that the situation would improve.[562]

It is unclear to the AER how this statement justifies a departure from ACG's previous advice that assuming a prior belief of one may introduce bias in the beta estimates. The AER supports ACG's previous advice, that the Vasicek adjustment assuming a prior distribution of one may introduce a bias, and that a better way to address the issue of imprecision in beta estimates is to use the methods outlined above which include forming portfolio betas that cancel out some of the estimation error in individual beta estimates and to apply different estimation techniques to deal with

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559 ACG, op. cit., 17 September 2008(b), p.38.

560 ACG, op. cit., July 2002, p.31.

561 ibid., p.32.

562 ACG, op. cit., 17 September 2008(b), p.38.

outliers. The exception to this is having regard to the confidence intervals of the beta estimates. As explained in section 8.5.3.6, the AER considers greater weight should be placed on the point estimates.

It is generally considered that applying the Blume adjustment is motivated by adjusting for expected changes in the true betas (which is accepted is not valid in a regulatory setting), and reducing estimation error, while the Vasicek adjustment is only motivated by reducing estimation error. The AER considers that this description of the Vasicek adjustment is correct where it is applied in the typical manner, being to adjust individual beta estimates towards an industry average with the weights determined based on the relative precision of the two estimates. However applying the Vasicek adjustment (with assumed prior distribution of one) makes this adjustment very similar to the Blume adjustment, with the only difference between the weights applied. As such, the same issue of bias as for the Blume adjustment is introduced.

As acknowledged by ACG, a further problem is determining the precision of the prior belief. ACG recommends three different options based on the variance of the whole market, the variance of the 100 largest firms, and the variance of the 100 most precise firms. The manner in which ACG recommends the Vasicek adjustment be applied has only a very minor impact on the estimated betas, as displayed in the following table.

**Table 8.6: ACG – Australian energy related securities – latest 5 year monthly beta estimates (2003-2008) – OLS and Vasicek adjusted**

| | Average portfolio | | Median portfolio | |
|---|---|---|---|---|
| | **Point estimate** | **95% confidence interval** | **Point estimate** | **95% confidence interval** |
| OLS | 0.65 | 0.46-0.85 | 0.65 | 0.36-0.94 |
| Vasicek (1) | 0.66 | 0.46-0.86 | 0.66 | 0.38-0.95 |
| Vasicek (2) | 0.66 | 0.47-0.86 | 0.67 | 0.39-0.95 |
| Vasicek (3) | 0.67 | 0.48-0.87 | 0.69 | 0.42-0.97 |
| Vasicek (1) – OLS | 0.01 | 0.01 | 0.01 | -0.01 |
| Vasicek (2) – OLS | 0.01 | 0.00 | 0.02 | -0.02 |
| Vasicek (3) – OLS | 0.02 | 0.00 | 0.04 | -0.03 |

Source: ACG[563]

As is seen in table 8.6, applying the Vasicek adjustment in the manner recommended by ACG has had little impact on the point estimates of the estimated betas, leading to

[563] ibid., p.46.

an increase of 0.01-0.04, depending on how the Vasicek adjustment is applied and whether applied to the average or median portfolio. The impact on the 95 per cent confidence intervals is also very minor, ranging from a minor widening of 0.01 to a minor narrowing of 0.03. In other words, putting aside the conceptual concerns the AER has in applying the Vasicek adjustment (with assumed prior belief of one) in the regulatory setting, the practical outcome is that applying the Vasicek adjustment in the manner recommended by ACG makes little to no difference on the estimated betas.

Accordingly the AER does not consider that ACG has presented compelling reasons to apply the Vasicek adjustment in the current context. The AER considers that the imprecision of the individual beta estimates can better be addressed following the approach outlined above.

In the other beta estimation report commissioned by the JIA, Gray (2008b) also recommends applying the Vasicek adjustment with an assumed prior distribution of one to correct for estimation error. He argues that:

> I demonstrate that beta estimates derived from an OLS regression of stock returns against market returns are systematically biased in that low estimates have a high probability of understating the true risk of the stock, and that high estimates are just as likely to overstate the true risk of the stock.
>
> Importantly, I show that this statistical bias exists even though "noise" or "random error" in the data is perfectly symmetric – being equally likely to increase or decrease stock prices.[564]

This demonstration is by means of a simulation where one million simulations were run. It is assumed that each observation has a *true* beta drawn from a normal distribution with mean of one and standard deviation of 0.5 and a beta *estimate* drawn from a normal distribution with mean equal to its true beta estimate and standard deviation equal of 0.8. Gray (2008b) then presents the results of this simulation in an attempt to demonstrate that beta estimates less than one are more likely to understate, than overstate, the true beta estimate, and vice versa. Applying the Vasicek adjustment to the simulated beta estimates results in each adjusted beta estimate having an equal probability of understating or overstating the true beta.

However both results are an artefact of the simulation. In the simulation, a beta estimate below one is only more likely to underestimate the true beta because it is known that the estimate is drawn from a distribution with a mean of one. If, for example, the distribution of true betas was known to have a mean of 0.7, and all the rest of Professor Gray's assumptions were held constant, this result would be markedly different. In this simulation, all beta estimates between 0.7 and 1.0 (or greater) would be more likely to overestimate the true beta than overestimate it. The higher the beta estimate above 0.7, the more likely the beta estimate would be to overestimate the true beta.

Assuming the mean of the distribution is one may be a reasonable assumption when the beta is randomly selected from the market at large, but that is not the case here.

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[564] SFG, op. cit., 15 September 2008, p.20.

The population is not the entire market but a small set of comparator firms that have been carefully selected. Whilst the mean of the true betas from this population cannot be observed, strong empirical and conceptual evidence, as outlined above, would suggest that the mean of the true betas is less than 1.0. Accordingly it is incorrect to infer that a beta estimate from any of the carefully selected comparator firms less than one is more likely to understate than overstate the true beta.

In determining the appropriate 'prior belief' to be adopted in applying the Vasicek adjustment, Gray (2008b) considers three options:

- a prior distribution based on all betas in the market
- a prior distribution based on regulatory precedent, or
- a prior distribution based on the average beta of comparable stocks

He argues that a prior distribution based on all betas in the market, that is, one, is the 'most obvious' option and would naturally be appropriate for a 'randomly-selected stock'. However, as noted above, in this context the comparator firms have been carefully selected and not simply selected at random. As also previously noted, Lally (1998) explains how industry is an important determinant of the true beta of a stock, and ignoring this may bias the beta estimate. Accordingly, the AER does not consider a prior distribution of one based on the market average to be appropriate in this context.

Gray (2008b) also argues in favour of a prior distribution of one based on regulatory precedent. He states that it seems natural to move from this value only to the extent that is warranted by the available data. One of the NER requirements is that, where a parameter cannot be determined with certainty, the AER should have regard to the need for persuasive evidence before departing from this value. However in considering whether or not there is persuasive evidence to depart from one, it appears to the AER to make little sense to weight the beta estimate partly on market data and partly on the previously adopted value. Such an approach would only seem appropriate if the final equity beta adopted was mechanistically based on the adjusted betas. Neither the AER nor JIA support a mechanistic approach and so the AER does not consider a prior distribution of one based on regulatory precedent to be appropriate.

Gray (2008) accepts that a prior distribution based on the average of comparable firms 'makes little sense in the present context' as a reliable industry average is what is being sought in the first place. If this was already known, then this estimate could simply be used. Additionally, he notes that a prior distribution based on the same set of comparable firms would be 'entirely circular' implying that the portfolio betas derived from these adjusted betas would be close to or exactly the same as portfolio betas derived from unadjusted betas. He appears to conclude from this that a prior distribution of one, therefore, must be used but does not consider the possibility that this might suggest that the Vasicek adjustment should not be applied.

The AER also notes that in parts of the report, Gray (2008b) appears to imply that the Vasicek adjustment assumes that the prior distribution and variance of the prior distribution are that of the market.[565] In contrast, Vasicek (1973) recommends that the parameters of the distribution 'are chosen to reflect *all* the information on beta available prior to sampling.'[566]

***AER's conclusion***

Neither the Blume adjustment nor Vasicek adjustment (where the 'prior belief' is assumed to be one) are appropriate to apply to the raw beta estimates of energy stocks in a regulatory setting.

If the true equity beta of a benchmark efficient service provider is below one then application of either adjustment is likely to bias beta estimates upwards. While the true beta of any stock is unobservable, the persistence of beta estimates for energy stocks to be below one strongly suggests that the true beta for these firms is below one.

Rejecting these adjustments, which are intended, in part, to improve the precision of beta estimates, does not mean that the AER has not had regard to the issue of precision. Rather, the AER considers that the issue of precision can better be improved through other methods which are unlikely to introduce a bias, such as:

- calculating industry portfolio betas to reduce the estimation error in individual beta estimates
- applying a number of different beta estimation techniques to deal with outliers
- estimating betas across extended time periods
- excluding data from the 'tech bubble', and
- using foreign betas of comparable firms as a 'cross-check'

Another important aspect of the AER's approach to the imprecision of beta estimates is not to adopt the empirical estimates 'mechanistically'. While the empirical estimates would suggest a beta in the range of 0.44 to 0.68, the AER has adopted an equity beta of 0.8.

Additionally, if the objective of the Blume adjustment is to reduce estimation error, it seems at odds to apply the weights typically adopted which have no regard to the precision of the raw beta estimates to which it is being applied. While the Vasicek adjustment does have regard to the relative precision, applied in the manner recommended by ACG has little effect on the beta estimates increasing them in the range of 0.01-0.04.

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[565] For example, in setting out the formula for the Vasicek adjustment the prior distribution is simply stated as '1', without making it clear that this was the choice of the author and was not part of the Vasicek adjustment as developed by Vasicek.

[566] A. Vasicek, 'A note on using cross-sectional information in Bayesian estimation of security betas', *The Journal of Finance*, Vol. 28, No. 5, 1973, p.1238.

#### 8.5.3.8 Use of portfolio, average and median beta estimates

When examining equity beta estimates there a number of different approaches that can be taken to obtain equity beta estimates that are reflective of the benchmark efficient business, these are:

- comparing the re-levered equity beta estimates of individual stocks
- obtaining individual re-levered equity beta estimates of the businesses that are representative of the benchmark efficient business and calculating an estimate of the equity beta using a median
- obtaining individual re-levered equity beta estimates of the businesses that are representative of the benchmark efficient business and calculating an estimate of the equity beta using a simple average
- calculating returns for a portfolio of stocks – using an equal-weighted portfolio (which assumes the investor will have share holdings of equal value in each business) or value-weighted portfolio (which assumes the investor will have an equal number shares per business that have different prices and therefore different values) – and then estimating a portfolio equity beta, and
- calculating returns for a portfolio of stocks using median returns and then estimating a portfolio equity beta.

**Submissions in response to issues paper**

In response to the WACC issues paper interested parties have demonstrated a preference for relying on an equity beta estimated based upon an equally-weighted average portfolio.

The JIA note that the methodologies applied by both SFG and the ACG involve the use of the unweighted average, as each business is likely to be as representative in the market as any other.[567]

The JIA argue that substantial weight should not placed on any single beta estimate on the basis of the ACG's advice, and note that the ACG presented its data using both means and medians.[568]

The MEU argue that using a value-weighted portfolio gives a greater weight to larger businesses which is not representative of the sector. It considers that a simple averaging approach provides a more representative sample of the sector.[569]

**Issues and AER's considerations**

The AER agrees with the JIA that a range of beta estimates should be considered when trying to determine a benchmark efficient equity beta. The AER considers that to be consistent with approaches on other industry specific parameters it is important

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567 JIA, *Submission in response*, op. cit., September 2008, p. 130.
568 ibid.
569 MEU, *Submission in response*, op. cit., September 2008, p. 53.

to consider different approaches in order to ensure that the data provides reliable estimates of equity betas. [570]

The AER also agrees with the JIA and the ACG that estimates of equity betas for individual businesses, if examined separately, are unlikely to provide the AER with sufficient guidance as to what the benchmark efficient equity beta. The AER considers that it is likely to be inappropriate to consider that an equity beta for any individual business will be superior to a completely different estimate of an equity beta from another business. The AER considers it appropriate, as noted in the ACG report[571], to either pool equity beta estimates (examining averages) or generate an equity beta estimate using a series which contains a portfolio of stocks. Using these approaches are likely to increase the quality of the information provided by the pooled or portfolio equity beta estimates. Consistent with the ACG report[572] the AER will examine a simple average of equity betas.

The ACG notes in its report that another benefit of estimating a portfolio equity beta is that you can obtain an estimate of the standard error.[573] As noted in section 8.5.3.6, standard errors are used to provide confidence intervals around the point estimates of equity betas. A simple average of equity betas is unlikely to provide an accurate reflection of the standard error of the portfolio. However, as discussed in section 8.5.3.6 the AER considers it is difficult to discern whether confidence intervals overstate or understate the upper or lower bounds of the 95 per cent confidence interval of the equity beta for the benchmark efficient NSP. Therefore, the AER will be placing greater weight on the point estimates of the portfolio equity beta.

The AER agrees with the MEU and the JIA that only a simple average should be used when examining portfolio equity betas. The AER considers that it is important to acknowledge that a portfolio may be equal-weighted (same weight applied to each stock) or value-weighted (weight commensurate with market capitalisation).[574] The AER has compared the equity beta estimates of equal-weighted and value-weighted portfolios to inform its views on the benchmark efficient equity beta.

The AER notes that the ACG has used average returns and median returns to construct its portfolio. Generally, expected returns from a portfolio are constructed using averages as medians are less likely to represent the point estimate of expected returns on a portfolio. The main reason for median returns being considered is when a portfolio's returns have been positively or negatively skewed and therefore the average returns may provide an accurate estimate of expected returns. The AER considers that the ACG has not demonstrated its basis for using median returns but will nonetheless examine the estimates provided by median returns in addition to average returns.

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570 JIA, *Submission in response*, op. cit., September 2008, p. 130.
571 ACG, op. cit., 17 September 2008(b), pp. 34-35.
572 ibid., p. 35.
573 ibid.
574 The AER notes that equity beta estimates of individual businesses comprise only one stock in the 'portfolio' and therefore the weight applied to one stock is effectively 100 per cent. Therefore, the issue of using a simple average or weighted average to construct returns for individual equity betas is irrelevant.

**AER's conclusion**

The AER considers that to be consistent with approaches to other industry specific parameters it is important to consider different approaches in order to ensure that the data provides reliable estimates of equity betas.

The AER agrees with the JIA and the ACG that estimates of equity betas for individual businesses, if examined separately, are unlikely to provide the AER with sufficient guidance on the equity beta of a benchmark efficient service provider.

The AER considers it appropriate, as noted in the ACG report[575], to either pool equity beta estimates or generate a series which contains a portfolio of stocks. Consistent with the ACG report[576] the AER will examine a simple average of equity betas.

The AER disagrees with the MEU and the JIA, which consider that only a simple average (and not a value-weighted average) should be used when examining portfolio equity betas. The AER will compare the equity beta estimates of portfolios that use simple averages or value-weights to inform its views on the benchmark efficient equity beta.

The AER considers that the ACG has not demonstrated its basis for using median portfolio returns but will nonetheless examine the estimates provided by median returns in addition to average returns.

### 8.5.4 Empirical estimates – results and interpretation

The AER has examined the results reported by the ACG (submitted on the behalf of the JIA) and Associate Professor Henry (commissioned on the behalf of the AER). This section is a summary of the results provided by both authors. The AER notes that the conclusions of Associate Professor Henry and the ACG are different. Henry concludes that the balance of the evidence points towards the point estimate of the equity beta of the benchmark efficient service provider lying in the range of 0.4 to 0.7 (having regard to the average individual estimates a number of portfolios of different compositions and lengths). [577] The ACG concludes that with its updated estimates that there is no persuasive evidence that the equity beta is different from one.[578] On the basis of the positions discussed in sections 8.5.2 to 8.5.3 the AER will use the information provided to inform its position on the equity beta of a benchmark efficient service provider.

#### 8.5.4.1 Australian equity beta estimates

Both Henry and the ACG estimated equity betas for the same set of businesses. The AER notes that Henry has relied upon weekly observations while the ACG used monthly observations. Further, both the ACG and Henry find that the presence of (if any at all) thin trading is unlikely to affect the overall equity beta estimates.[579]

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575 ibid. 34-35.
576 ibid., p. 35.
577 O. Henry, op. cit., November 2008, p. 21.
578 ACG, op. cit., 17 September 2008(b), p. 57.
579 The ACG noted the point estimate did not change much, see ACG, op. cit., 17 September 2008(b), p. 55; and O. Henry, op. cit., November 2008, p. 16.

***Individual equity beta estimates***

The following tables report the ACG's and Henry's re-levered (using the simple leveraging formula which does not account for tax or imputation) equity beta estimates for the individual comparator businesses.

**Table 8.7: Re-levered equity beta estimates – Henry's results (2002 – 2008)** [580]

| | SP AusNet | Envestra | APA Group | Spark | DUET Group | Hastings Diversified Utilities Fund | AGL | Alinta | GasNet | Average[(a)] |
|---|---|---|---|---|---|---|---|---|---|---|
| OLS | 0.27 | 0.25 | 0.73 | 0.59 | 0.35 | 1.01 | 0.74 | 0.93 | 0.32 | **0.58** |
| s.e | 0.12 | 0.05 | 0.11 | 0.22 | 0.07 | 0.17 | 0.20 | 0.18 | 0.09 | N/A |
| LAD | 0.23 | 0.10 | 0.63 | 0.76 | 0.25 | 0.50 | 0.54 | 0.59 | 0.24 | **0.43** |
| s.e | 0.12 | 0.06 | 0.11 | 0.22 | 0.07 | 0.18 | 0.18 | 0.19 | 0.09 | N/A |

Source: Henry[581]
(a) Averages calculated by the AER.

**Table 8.8: Re-levered equity beta estimates – ACG's results (2003 – 2008)** [582]

| | SP AusNet | Envestra | APA Group | Spark | DUET Group | Hastings Diversified Utilities Fund | AGL | Alinta | GasNet | Average[(a)] |
|---|---|---|---|---|---|---|---|---|---|---|
| OLS | 0.25 | 0.51 | 0.87 | 0.57 | 0.51 | 0.54 | 0.57 | 1.29 | 0.38 | **0.61** |
| s.e | 0.18 | 0.18 | 0.23 | 0.17 | 0.28 | 0.32 | 0.88 | 0.58 | 0.14 | N/A |
| Re-OLS | 0.23 | 0.46 | 0.89 | 0.56 | 0.42 | 0.64 | -0.39 | 1.26 | 0.30 | **0.49** |
| s.e. | 0.17 | 0.17 | 0.22 | 0.17 | 0.25 | 0.28 | 0.61 | 0.56 | 0.09 | N/A |
| LAD | 0.06 | 0.61 | 0.85 | 0.59 | 0.27 | 0.80 | 0.13 | 1.29 | 0.38 | **0.55** |
| s.e | 0.39 | 0.20 | 0.25 | 0.26 | 0.26 | 0.34 | 0.80 | 0.57 | 0.18 | N/A |

Source: ACG[583]

Table 8.7 and table 8.8 indicate that the range of individual equity beta estimates by both the ACG and Henry generate a large range of values. Henry's results provide a range of estimated equity betas from 0.10 (Envestra) to 1.01 (Hastings Diversified

[580] s.e. is the standard error of the regression.

[581] O. Henry, op. cit., November 2008, p. 18.

[582] s.e. is the standard error of the regressions. This value was calculated by subtracting the point estimate from the confidence interval and dividing this amount by 1.96.

[583] ACG, op. cit., 17 September 2008(b), p. 44.

Utilities Fund). The ACG's results provide a range of equity beta estimates; from -0.39 (Australian Gas Light) to 1.29 (Alinta Limited). As discussed in section 8.3.8, the AER considers it is inappropriate to rely upon individual equity beta estimates to estimate the equity beta.

The AER notes that the average of the point estimates of the equity betas for Henry's report range from 0.43 to 0.58, while for the ACG's report, the range is from 0.49 to 0.61. The AER considers that the difference between these Henry's and the ACG's averages can be reconciled by the differences in:

- estimation periods (i.e. period commencing after the 'technology bubble' to September 2008 versus five years (commencing May 2003) after the 'technology bubble' to May 2008)
- leveraging approaches and
- the sampling frequencies (weekly versus monthly).

The AER also considers that given that these stocks have not been listed for the same period of time, the averages of point estimates (or confidence intervals) that have been calculated should be considered with caution.

While recognising that caution that should be exercised when examining averages of individual equity beta estimates, the AER observes that the highest average (0.61) is well below the previously adopted equity betas of either 0.9 or 1.0.

***Portfolio equity beta estimates***

The AER notes that the ACG estimates different portfolio equity betas. In particular the ACG estimate:

- equity beta estimates ranging from 0.65 to 0.80 over the period June 1990 to May 2008 (excluding the 'technology bubble') and 0.64 to 0.65 using the last five years ending May 2008) using average returns , and
- equity beta estimates ranging from 0.65 to 0.87 and 0.64 to 0.68 using the last five years ending May 2008) using median returns.[584]

As noted in section 5.3.8, the AER considers that the use of median returns for the purposes of portfolio estimations may not add further value as the ACG has not demonstrated that the average is not reflective of the central tendency of the returns from a portfolio. Nonetheless, the AER observes that the highest point estimate is 0.87 using median returns over the longer period. As discussed in section 6.5.3.4 the AER considers that the longer term data for the Australian market is likely to be inappropriate, as it contains a period where there were only two businesses in the sample. Accordingly, the AER does not consider that the estimate of 0.87 is representative of a forward looking estimate.

[584] Range covers all three estimation techniques (OLS, LAD and re-weighted OLS).

The AER notes that Henry did not include GasNet and Alinta in the analysis as Henry has concerns about the impact of merger and acquisition activity and the quality of the data available.[585] The AER observes that the estimated betas derived from the portfolios that Henry constructed (to ensure a balanced sample of businesses was used) include varying estimation periods and sample businesses in each portfolio. In addition, the AER has adopted an approach which pools each of these businesses over the AER's preferred estimation period (1 January 2002 to September 2008). This approach is similar to the ACG's average portfolio estimation approach but differs in the selection of sample businesses (excludes GasNet and Alinta) and the estimation period.[586] The following table is a summary of the results.

**Table 8.9: Re-levered portfolio equity beta estimates – AER's results (2002 – 2008) [587]**

| | Raw | Re-levered |
|---|---|---|
| OLS | 0.46 | 0.44 |
| s.e | 0.05 | 0.05 |
| LAD | 0.46 | 0.44 |
| s.e | 0.05 | 0.04 |
| N | 348 | 348 |

Source: AER analysis.

The AER observes that both approaches (OLS and LAD) provide the same portfolio estimate of 0.44. The AER notes that the above portfolio estimate is consistent with the point estimates estimated by the ACG for the ESC as part of the Victorian gas access arrangements (0.33 using average returns).[588] Noting that caution should be given when interpreting confidence intervals the AER observes that the highest upper bound for the average portfolio is 0.54.

When examining the AER's preferred estimation period post 'technology bubble', the AER' equity beta point estimate in conjunction with the ACG's estimates for the JIA,

[585] O. Henry, op. cit., November 2008, p. 8.

[586] Note that the AER considers that for the purposes of examining the stability of equity beta point estimates that the results from the Hansen's test demonstrate that the point estimates are stable over time.

[587] For the above portfolio, each weekly observation is based on the average return of the companies in existence in that week ie an equally weighted portfolio of the companies in existence in that week. Companies considered are APA Group, DUET Group, Envestra, Hastings Diversified Utilities Fund, SP AusNet and Spark Infrastructure. Timeframe considered: 1 Jan 2002 to 1 Sep 2008. These are weekly continuous returns. Accordingly the 1st observation for which some firms are included is 1 week later than the firm's 1st return index entry. LAD is estimated using the LAV estimate of β using Stata module qreg. Gearing of portfolio is 61.88 per cent. s.e. is the standard error of the coefficient estimate.

[588] ACG, op. cit., June 2007, p. 17.

provides a range of estimates from 0.44 to 0.68. The AER notes that the highest estimate (0.68) is well below the previously adopted equity betas of 0.9 or 1.0.

***Stability of equity beta estimates***

The AER observes that the ACG has not relied upon its visual test (examining recursive estimates) to determine that equity beta estimates are unstable. Rather, it notes the difference between the equity beta estimates conducted for the ESC (0.71, 1991-1998 and 2002-2007, using average portfolio returns and LAD)[589] and for the JIA (0.80, 1990-1998 and 2002-2008, using average portfolio returns and LAD) to demonstrate that the equity beta estimates are unstable and rising.[590] The AER considers that it is more appropriate to examine recursive estimates or Hansen's test rather than a few individual point estimates to determine whether there are trends or parameter instability. Examining the ACG's rolling estimates for the Australian portfolio in Appendix C of the ACG's report to the JIA demonstrates that it is unclear whether there is upward trend.

Henry has conducted recursive estimates of the Australian portfolios[591] and Hansen's test for structural stability. The following table is a summary of his results.

**Table 8.10: Hansen's test portfolio equity beta estimates – Henry's results (2002 – 2008)**

| | P1 | P2 | P3 | P4 | P5 |
|---|---|---|---|---|---|
| Sample | 1 Jan2002 – 1 Sep 2008 | 13 Aug 2004 – 1 Sep 2008 | 17 Dec 2004 – 1 Sep 2008 | 16 Dec 2005 – 1 Sep 2008 | 2 Mar 2007 – 1 Sep 2008 |
| Companies | Envestra, APA | Envestra, APA Group, DUET | Envestra, APA, DUET, Hastings Diversified | Envestra, APA, DUET, Hastings Diversified, SP AusNet | Envestra, APA, DUET, Hastings Diversified, SP AusNet, Spark |
| Joint test | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 |
| Variance | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Constant | 0.18 | 0.79 | 0.88 | 0.85 | 0.76 |
| Equity beta | 0.06 | 0.20 | 0.06 | 0.41 | 0.73 |

Source: Henry[592]

The above table demonstrates that the null of no structural instability for the estimated equity betas and constants is not rejected at the 5 per cent level of significance. However the null of no instability is rejected at the 5 per cent level for the variance, which is the likely primary contributor to the instability suggested by the

589 ibid., p. 13.

590 ACG, op. cit., 17 September 2008 (b), p. 43.

591 O. Henry, op. cit., November 2008, p. 33.

592 ibid., p. 9.

results of the joint tests. This instability in the variance in turn implies instability in the width of the confidence intervals associated with the point estimates. On examining the Hansen's test and the recursive estimates, Henry finds:

> Neither of the recursive least squares estimators appears to demonstrate convincing evidence of parameter instability. It is important to note that these estimators are not sufficient in the sense that they do not employ all available information. The use of the Hansen (1992) test for parameter instability produces systematic evidence of instability in the regression models. Where this instability is detected it is almost uniformly due to a change in the error variance in the regression model. There is no evidence of parameter instability associated with the coefficients of the regression models themselves.[593]

Given the ACG's and Henry's analysis the AER considers that there is little evidence of parameter instability in the point estimate of the equity beta. However, the AER considers, as mentioned previously, that extreme caution should be taken when considering confidence intervals.

The AER has not conducted a Hansen test on the AER's portfolio equity beta estimates. It appears likely that given Henry's results for each of his portfolios, that the results for the AER's portfolio is likely to be stable.[594]

#### 8.5.4.2 Foreign equity beta estimates

As discussed in section 8.5.2, the AER has also examined the point estimates of foreign equity betas as a cross check.

The ACG has examined gas and electricity networks for the United States as its foreign comparator to the Australian estimates. The ACG found that the re-levered equity betas using the last five years ranged between 0.97 (for the portfolio betas using average returns) and 1.0 (for the average of individual betas).[595] When accounting for differences in market gearing and cross sectoral issues, this range dropped to 0.86 (for the portfolio betas using average returns) and 0.89 (for the portfolio betas using average returns).[596]

As discussed in sections 8.5.3 and 8.5.4, the AER considers there are a sufficient number of businesses in the United States to examine equity beta estimates which include data prior to the 'technology bubble'. Further, the AER considers that using a longer estimation period is likely to provide more precise equity beta estimates. The AER observes that the ACG' re-levered equity betas using the last five years ranged between 0.54 (for the portfolio betas using median returns) and 0.73 (for the average of individual OLS equity beta estimates).[597]

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593 ibid., p. 20.

594 The AER's portfolio equity beta estimate has been derived from the same businesses and end dates, as used by Henry's portfolios.

595 ACG, op. cit., 17 September 2008 (b), p. 52.

596 ibid., p. 53.

597 ibid., p. 48.

As discussed in section 8.5.2, the AER considers that there is a sufficient number of electricity networks (electricity, and hybrid gas and electricity), with longer trading histories, to determine an informative estimate of the equity beta of a benchmark efficient electricity network service provider, without the inclusion of 'pure play' gas businesses in the sample. The AER observes that electricity businesses in the United States provide generally lower equity beta estimates than gas businesses.

Henry has estimated the raw equity betas using the last six years for the United States, the following table reports his results.

**Table 8.11: AER's re-levered equity beta estimates for United States – using Henry's raw results (2002 – 2008)[598]**

| Weekly | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **CHG** | **CNP** | **EAS** | **NI** | **NJ** | **NST** | **NU** | **SRP** | **UIL** | **POM** | **Average[(a)]** |
| OLS | 1.19 | 0.41 | 0.56 | 0.76 | 1.66 | 0.69 | 0.58 | 0.57 | 1.01 | 0.75 | 0.82 |
| s.e | 0.11 | 0.11 | 0.07 | 0.07 | 0.21 | 0.07 | 0.06 | 0.10 | 0.11 | 0.06 | N/A |
| LAD | 1.17 | 0.61 | 0.51 | 0.89 | 1.67 | 0.60 | 0.60 | 0.51 | 1.06 | 0.81 | 0.84 |
| s.e | 0.11 | 0.11 | 0.07 | 0.07 | 0.21 | 0.07 | 0.06 | 0.10 | 0.11 | 0.06 | N/A |
| Obs | 347 | 347 | 347 | 347 | 347 | 347 | 347 | 347 | 347 | 347 | N/A |
| **Monthly** | | | | | | | | | | | |
| | **CHG** | **CNP** | **EAS** | **NI** | **NJ** | **NST** | **NU** | **SRP** | **UIL** | **POM** | **Average[(a)]** |
| OLS | 0.74 | 0.97 | 0.42 | 0.68 | 1.52 | 0.60 | 0.50 | 1.06 | 1.63 | 0.61 | 0.87 |
| s.e | 0.25 | 0.22 | 0.17 | 0.18 | 0.42 | 0.17 | 0.16 | 0.24 | 0.29 | 0.16 | N/A |
| LAD | 0.79 | 0.68 | 0.07 | 0.75 | 1.18 | 0.73 | 0.46 | 0.81 | 1.48 | 0.59 | 0.75 |
| s.e | 0.70 | 0.23 | 0.18 | 0.18 | 0.43 | 0.17 | 0.16 | 0.24 | 0.30 | 0.16 | N/A |
| Obs | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | N/A |

Source: Henry[599] Estimates de-levered and re-levered by the AER using Bloomberg.
(a) Averages calculated by the AER.

The AER has re-levered Henry's raw equity beta estimates using an average of quarterly gearing observations from 2002 to 2006. As most businesses in the US sample are consistently present in the estimation period, some weight can be placed on the simple average of the individual beta estimates for these businesses. This

[598] CH Energy Group Incorporated (CHG), CentrePoint Energy (CNP), Energy East (EAS), NiSource Incorporated (NI), New Jersey Resources (NJ), NSTAR (NST), Northeast Utilities (NU), Pepco Holdings Incorporated (POM), Sierra Pacific (SRP), and the UIL Holding Corporation (UIL).

[599] O. Henry, op. cit., November 2008, p. 17.

contrasts with the Australian businesses, where most businesses in the sample are not consistency present for the duration of the estimation periods.

For the purposes of comparison the AER has compared the ACG's shorter-term US data to AER's results. However, the AER considers the longer-term data (which the ACG has also estimated) is more appropriate for the purposes of providing a cross-check on the Australian estimates (due to the larger number of firms in the Australian data. That said, the re-levered equity beta average for the same United States businesses in the ACG report using a five-year period is 0.95 for OLS, and in the AER's results is 0.87 for OLS (using monthly observations and period beginning post 'technology bubble' to September 2008). The re-levered equity beta average for the same United States businesses in the ACG report is 0.82 for LAD, and in the AER's results is 0.75 for LAD (using monthly observations).

The AER recognises that the United States has differences to the Australian economy and therefore the equity beta estimates should be considered as a cross-check. Further, the AER has chosen not to adjust the foreign re-levered equity beta estimates given its concerns noted in section 6.5.2. However, as noted by the ACG the difference between the US and Australia would tend to increase US estimates. However, it also finds that this is more than offset by the sectoral weighting adjustment.

As discussed previously, the AER considers that portfolio equity beta estimates are more robust than individual estimates or averages. Although, Henry has not examined portfolio equity beta estimates for foreign businesses, the ACG has estimated portfolio equity beta estimates. The AER notes that the ACG's highest portfolio equity beta estimate using the longest term (pre and post 'technology bubble' data) is 0.68. This confirms that the highest point estimate of the Australian portfolios of 0.68 (which uses the AER's preferred estimation period for Australian beta estimates) is reasonable. Further, considering that the ACG's estimates are likely to overstate the domestic electricity equity beta estimates, as it included:

- gas only networks in addition to electricity, and, gas and electricity networks, and
- the sensitivities that the ACG conducted on foreign data (which lowered the United States estimate , which used a five-year period, from 0.97 to 0.86).[600]

The AER considers that an equity beta of less than 0.7 for a benchmark efficient service provider, based upon market evidence could be considered reasonable.

### 8.5.5 Other conceptual or empirical issues

In addition to the issues already raised, in the issues paper the AER asked if there were any other conceptual or empirical issues that are relevant in setting an equity beta for regulatory purposes

[600] ACG, 17 September 2008(b), p. 53. The AER observes that the AC did not conduct similar analysis for the longer termed data.

**Submissions in response to issues paper**

Two additional issues were raised by the JIA. According to the JIA:

- the Sharpe-Linter CAPM, as mandated by the NER, underestimates the true cost of capital for beta estimates less than one due to 'flaws' in the assumptions underpinning the model which need to be recognised in setting the equity beta, and

- in mid-2008, the cost equity based on the previously adopted WACC parameters in the NER was lower than the implied cost of equity in stock prices as demonstrated through dividend growth model (DGM) analysis.[601]

Both of these positions were based on reports from CEG that the JIA commissioned in the context of this review.[602] The JIA consider that the outcomes of the DGM analysis are consistent with the problems identified with the Sharpe-Lintner CAPM.[603]

#### 8.5.5.1 Sharpe-Lintner CAPM

The NER provides that the cost of equity ($k_e$) is to be determined using the capital asset pricing model (CAPM), and is calculated as:

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

where:

$r_f$ = the nominal risk free rate for the regulatory control period[604]

$\beta_e$ = the equity beta

MRP = the market risk premium[605]

Whilst the NER does not 'name' this version of the CAPM, the formula specified is that of the version known as the Sharpe-Lintner CAPM (or simply, the Sharpe CAPM).

**Submissions in response to issues paper**

The JIA recognise that the Sharpe CAPM is mandated by the NER, noting that:

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601 JIA, *Submission in response*, op. cit. September 2008, pp.130-131. In response to this question the JIA also raised two further issues – one relating to 'data inadequacy' such the interpretation of beta estimates with low R-squared statistics, and the other being a statement that a change in the equity beta should be explicitly recognised as implying either a change in asset risk or financial risk. Both issues have been addressed previously in this chapter and so are not repeated here.

602 CEG, op. cit., 15 September 2008; CEG, op. cit., 14 September 2008.

603 JIA, *Submission in response*, op. cit. September 2008, p.130.

604 The AER notes that CEG erroneously states that the NER prescribes a real risk free rate.

605 NER, cls. 6.5.2(b) and 6A.6.2(b).

> The Sharpe-Lintner CAPM is the original and most widely recognised version of the CAPM and is the version of the CAPM required to be applied under the NER.[606]

However, based on the advice of CEG, the JIA further note:

> To make a sound estimate of the return on equity in accordance with the requirements of the NER, the deficiencies of the Sharpe-Lintner CAPM must be recognised.[607]

The particular NER requirement the JIA are referring to is the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing prescribed transmission or direct control (standard control) services (as the case may be).[608] Read together, the above statements suggest that the JIA consider that there is a conflict between the regulatory requirement to use the Sharpe CAPM and the requirement to set a forward looking rate of return commensurate with prevailing conditions in the market for funds and the risk involved in providing regulated services. As noted above, the JIA's position on the 'deficiencies' of the Sharpe CAPM is based on a report it commissioned by CEG.

CEG argues on both theoretical and empirical grounds against using the Sharpe CAPM. It states that the Sharpe CAPM is based on a number of unrealistic assumptions, some of which have been relaxed in subsequent versions of the CAPM. In particular:

- the Black CAPM relaxes the assumption that investors can borrow (and lend) at the risk free rate, and

- the Merton (or intertemporal) CAPM relaxes the 'single period' assumption, and introduces the concept that investors also care about the correlation between returns in this period and the profitability of reinvesting those returns in the next period (reinvestment opportunities). Under the Merton CAPM, factors other than the equity beta drive equity returns.

CEG argue that forecasts based on the Sharpe CAPM result in biased estimates of the returns actually observed in capital markets. It considers the Sharpe CAPM underestimates returns for betas less than one and overestimates returns for betas greater than one. In other words, the sensitivities of observed returns to beta are less than that predicted by the Sharpe CAPM. CEG cites several overseas studies, including Black, Jensen and Scholes (1972) and Fama and MacBeth (1973), which it claims find that the Black CAPM outperforms the Sharpe CAPM as a predictor of returns. CEG state that it has replicated the approach of Fama and MacBeth (1973) to Australian equities and finds similar results. CEG finds that there does not appear to be any significant relation between equity betas and returns in the Australian market.

CEG recommends that the AER either:

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606 JIA, *Submission in response*, op. cit. September 2008, p.101.

607 ibid., p.122.

608 ibid., p.119.

- rejects the use of the Sharpe CAPM and replaces this with the Black CAPM, or
- makes an adjustment to the Sharpe CAPM to make it mathematically equivalent to the Black CAPM.

CEG notes that implemented consistently, either approach will give the same result. Accordingly which option is adopted 'is a matter of form and not substance'.[609]

**Issues and AER's considerations**

The AER agrees with the JIA that the NER mandates the use of the Sharpe CAPM in determining the cost of equity. Essentially this means that neither recommendation of CEG, both of which are a departure from the Sharpe CAPM, is permissible under the NER. This could present a dilemma if this requirement was in conflict with other requirements of the NER, however the AER does not consider the JIA or CEG have provided persuasive evidence that there is a conflict with the use of the Sharpe CAPM and the other requirements of the NER.

Additionally, while the AER has concerns over some of CEG's critique of the Sharpe CAPM, the AER has not adopted a 'mechanical' approach in applying the empirical beta estimates derived from regression analysis using the Sharpe CAPM. Empirical estimates suggest an equity beta in the range of 0.44 and 0.68, however taking all considerations into account, the AER has adopted an equity beta of 0.8. Accordingly, to the extent that there are potential limitations of the Sharpe CAPM in estimating the cost of equity these concerns are likely to have been addressed by the AER adopting an equity beta between 0.12 and 0.36 higher than what empirical estimates would suggest.

The AER's concerns with CEG's analysis and position is outlined in the rest of this section.

As Handley (2008) states, the empirical evidence presented by CEG is not new (excluding CEG's own analysis).[610] CEG notes that the seminal papers on the issues it is raising were published in the early 1970's – Black, Jensen and Scholes (1972) and Fama and MacBeth (1973).[611] Despite these possible limitations of the Sharpe CAPM being known for decades, it has been consistently and constantly adopted by regulators and market practitioners. The AER is not aware of any Australian regulator to have adopted an alternative model. As displayed in the following table, Truong, Partington and Peat (2008) found that 72 per cent of Australian firms who responded to their survey adopt the (Sharpe) CAPM in formulating their capital budgeting decisions. Only one firm used a multi-factor asset pricing model and no firm adopted the Fama and French three factor model.[612]

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609 CEG, op. it., 15 September2008; CEG, op. cit., 14 September 2008, p.50.

610 J. Handley, *Comments on the CEG reports: "estimation of, correction for, biases inherent in the Sharpe CAPM formula" and "an analysis of implied market cost of equity for Australian regulated utilities"*, Report prepared for the AER, 20 November 2008, p.4.

611 CEG, op. cit., 15 September 2008; CEG, op. cit., 14 September 2008, p.7.

612 G. Truong, G. Partington and M. Peat, 'Cost of capital estimation and capital budgeting practices in Australia', *Australian Journal of Management*, Vol. 33, No. 1, June 2008, p.108.

**Table 8.12: Practices adopted by Australian firms in estimating the cost of capital for capital budgeting**

| Method | No. of responses | % of total |
|---|---|---|
| (Sharpe) CAPM[613] | 53 | 72 |
| Cost of debt plus some premium for equity | 35 | 47 |
| Cost of debt | 25 | 34 |
| E/P ratio | 11 | 15 |
| Average historical returns | 8 | 11 |
| Dividend yields plus forecast growth rate | 7 | 9 |
| By regulatory decisions | 3 | 4 |
| Multi-factor asset pricing model | 1 | 1 |
| Fama and French three factor model | 0 | 0 |
| Other technique | 0 | 0 |
| | **74** | |

Source: Truong, Partington and Peat (2008)[614]

While it would be difficult to state the Sharpe CAPM is without limitations, a likely reason why it has been adopted by all Australian regulators and is the dominant approach adopted by Australian firms is that there is no consensus on an alternative model which is better than the Sharpe CAPM.

Noting the studies cited by CEG that test the Sharpe CAPM, Handley (2008) further states '[t]here is no consensus as to how the empirical evidence should be interpreted.'

> For example, Roll (1977) argues the choice between alternative forms of the CAPM is extremely sensitive to the choice of the proxy for the market portfolio and in particular, while the results of Black, Jensen and Scholes (1972) and Fama and MacBeth (1973) appear to support the Black CAPM over the Sharpe CAPM, "their results are fully compatible with the Sharpe-Lintner model and a specification error in the measured 'market' portfolio" (p.131).
>
> …
>
> Roll (1977) argues that the market portfolio, which includes all assets, can never be empirically identified and therefore the CAPM can never be

[613] While Truong, Partington and Peat (2008) do not explicitly state this survey results relate to the Sharpe CAPM, it appears reasonable that this is so as in other parts of the report the authors simply refer to the Sharpe CAPM as 'the CAPM'.

[614] G. Truong, G. Partington and M. Peat, 'Cost of capital estimation and capital budgeting practices in Australia', *Australian Journal of Management*, Vol. 33, No. 1, June 2008, p.108.

> empirically tested. This limitation is recognised by Fama and French (2004, p.25)… [615]

CEG test the predictive power of the Sharpe CAPM on Australian equities, finding a relationship between beta and returns that is flatter than that predicted by the Sharpe CAPM. CEG considers that these results suggest that the Black CAPM may be a better predictor of returns than the Sharpe CAPM, however it does not test the predictive power the Black CAPM. Furthermore, CEG finds that there does not appear to be any significant relation between equity beta and equity returns in the Australian market. Accordingly, the AER considers that little, if any, useful information can be obtained from the shape of the slope (which was not found to be statistically significant).

As Handley (2008) notes:

> …there is an implicit inconsistency in arguing on the one hand that beta and therefore the Sharpe CAPM is irrelevant, but then seeking to use the empirical results of a regression of (portfolio) returns against (portfolio) betas as the basis for estimating equity returns. As Fama and French (2004) state, "If betas do not suffice to explain expected returns, the market portfolio is not efficient and the CAPM is dead in its tracks" (p.36) – in other words, if beta is deemed irrelevant, then any analysis of returns based on beta is also irrelevant.[616]

Furthermore, of the six different data sets used by CEG to test the Sharpe CAPM – five comprise equal-weighted portfolios and one comprises value-weighted portfolios. As the market portfolio in the Sharpe CAPM is value-weighted, this may mean that the five regressions based on equal-weighted portfolios are not a test of the Sharpe CAPM. Of the one regression that adopts value-weighted portfolios, CEG finds a slightly negative, though also statistically insignificant, relationship between the equity beta and returns. This is driven by the intercept which CEG interprets as the return on the zero-beta portfolio being higher than the return on the market portfolio. Yet a conclusion of the Black CAPM, assuming restrictions on borrowing at the risk free rate but not lending, is that the expected return on the zero-beta portfolio must less than the expected return on the market portfolio (and greater than the risk free rate). On a result like that found by CEG, Black (1972) states:

> But if this is possible, it means that the market portfolio is not efficient. Thus the inequality must hold.[617]

Accordingly, while CEG's results may suggest a relation between beta and returns that is flatter than the Sharpe CAPM would predict, these results may not necessary support the Black CAPM.

CEG also discusses the Merton (intertemporal) CAPM and the Consumption CAPM, suggesting that the Merton CAPM may be able to explain the movement of utility stock betas during the 'tech bubble' and 'commodity boom'. However, CEG does not

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615 J. Handley,op. cit., 20 November 2008, p.4.

616 ibid,, 20 November 2008, p.6.

617 F. Black, 'Capital market equilibrium with restricted borrowing', *The Journal of Business*, Vol.45, No.3, 1972, p.454.

test the predictive power of either of these versions of the CAPM either. It is also not clear how CEG formed the view that the Sharpe CAPM should be rejected in favour of the Black CAPM, rather than either the Merton CAPM or Consumption CAPM.

While CEG's overall recommendation is to reject the Sharpe CAPM and adopt the Black CAPM (or equivalent thereof), CEG also notes:

> …more recent empirical tests of the CAPM have rejected the use of any model that has equity beta as the sole determinant of relative risk (this includes the Black CAPM).[618]

While recommending the AER adopt the Black CAPM, CEG does not appear to consider the Black CAPM is the best predictor of returns. Rather CEG appears to consider that the Fama and French three factor model is the best predictor of equity returns. This model adds two additional risk factors, being firm size and book-to-market ratio, onto the equity beta to explain equity returns.

Given CEG's opinion of the Fama and French three factor model, the AER is unsure why CEG did not recommend replacing the Sharpe CAPM with this model, which it seems to consider to be the best predictor of equity returns. In essence, CEG recommends replacing what it considers to be an inferior asset pricing model which is near universally used by regulators and market practitioners (the Sharpe CAPM), with what it considers to be another inferior asset pricing model, which is used neither by regulators nor market practitioners (the Black CAPM).[619]

While CEG consider that the Fama and French three factor model is superior among asset pricing models, the AER notes that this is not a view without controversy. For example, Handley (2008) states:

> Roll and Ross (1994) similarly suggest the results on Fama and French (1992) can alternatively be explained by an inefficient market proxy while Kothari, Shaken and Sloan (1995) suggest the Fama-French results are partly explained by data frequency and survivorship bias.[620]

Even if the Sharpe CAPM was so fundamentally flawed as to be inappropriate as a basis for setting regulatory returns (which the AER disagrees with and which has not been adequately demonstrated by CEG), the appropriate response would be a policy response to change the framework, rather than the regulator manipulating the regulatory framework to deal with the alleged fundamental flaws in the framework. As acknowledged by the JIA and CEG, the NER mandates the use of the Sharpe CAPM in determining the cost of equity. The AER is unable to review the use of the Sharpe CAPM. 'Locking-in' the Sharpe CAPM into the NER was one of the measures that was intended to provide greater regulatory certainty to industry stakeholders and other stakeholders.

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618 CEG, op. cit., 15 September 2008; CEG,,op. cit., 14 September 2008, p.17.

619 While acknowledging that the Sharpe CAPM is mandated by the NER, CEG appears to believe that the AER could adopt alternative versions of the CAPM so long as beta was the sole determinant of risk, but that the AER could not adopt alternative asset pricing models where beta was not the sole determinant of risk. The AER is unsure how CEG came to this position.

620 J. Handley,op. cit., 20 November 2008, p.4.

Most significantly, even if the AER was able to depart from the Sharpe CAPM, given the lack of consensus on an alternative, switching between different asset pricing models at each review as various alternative models fall in and out of favour would be highly likely to increase regulatory uncertainty. Such an outcome would not be consistent with the National Electricity Objective. A departure from the Sharpe CAPM should only be to an alternative that is clearly superior to other models and well-accepted. Such an alternative does not exist.

In relation to a policy response, the AER is surprised that no industry association objected to the use of the Sharpe CAPM when the chapter 6A or chapter 6 frameworks were being developed. This is particularly so given the significant influence that the methodology used to determine the cost of equity has over regulated returns, and in context that the issues raised now are not new but have been well known for several decades ago, and therefore would have been known to industry associations at the time.

The same issues that CEG are raising now were recently raised with the ESC in its latest review of distribution gas access arrangements. In response, the ESC acknowledged that the Sharpe CAPM may not be the 'best' predictor of returns but was not satisfied that it is 'positively' the case that the Sharpe CAPM is not a 'good' predictor of returns. CEG has responded to this in its current report, by stating:

> Ignoring the probable existence of bias on the basis that it was not conclusive/definitely/positively proven will, other things equal, deny regulated businesses a reasonable opportunity to recover their efficient costs.[621]

CEG further states:

> The most important conclusion to come out of this analysis is that it would be a mistake to simply take the best estimate of beta for utilities and insert this into the Sharpe CAPM formula.[622]

The AER considers that the first statement by CEG is reasonable. Rather than completely ignoring a potential bias until it is conclusively proven, a more reasonable approach would be to have regard to a potential bias, and to react to this potential bias commensurate with the probability the bias is valid and magnitude of the potential bias. The AER considers that it has applied this approach both in the current context and throughout the rest of this review.

While the AER has concerns over some of CEG's analysis on the alleged biases of the Sharpe CAPM, even if these biases were valid, and as noted above the AER has not adopted a 'mechanical' approach in applying the empirical beta estimates derived from regression analysis using the Sharpe CAPM. Empirical estimates suggest an equity beta in the range of 0.44 to 0.68, however taking all considerations into account, the AER has adopted an equity beta of 0.8. Accordingly, even if the Sharpe CAPM did underestimate the beta these concerns are likely to have been addressed by

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621 CEG, op. cit., 15 September 2008; CEG, op. cit., 14 September 2008, p.38.

622 CEG op. cit., 15 September 2008; CEG, op. cit., 14 September 2008, p.49.

the AER adopting an equity beta between 0.12 to 0.36 higher than what empirical estimates would suggest.

**AER's conclusion**

As acknowledged by the JIA and CEG, the NER mandates the use of the Sharpe CAPM in determining the cost of equity. Accordingly, CEG's recommendation to reject the Sharpe CAPM and adopt the Black CAPM is not permissible under the NER.

At any rate, the AER does not consider that CEG has provided persuasive evidence that the Sharpe CAPM is an inappropriate approach to setting the cost of equity, and results in a downwards biased estimate. Even if these concerns were valid, the AER notes that the equity beta it has adopted is 0.12 to 0.36 higher than suggested by regression analysis using the Sharpe CAPM, being that any possible issue of bias is likely to have been negated.

#### 8.5.5.2 Dividend growth model

The dividend growth model (DGM) is typically used as a valuation tool. Used in this way, dividends for a particular stock are forecast into perpetuity and then discounted by an appropriate discount rate to estimate the present value of that stock. Alternatively, for a given forecast of dividends into perpetuity, the DGM can be used to estimate the market's implied cost of equity for that stock from the 'current' share price.

**Submissions in response to issues paper**

The JIA submitted a report from CEG that estimated the implied cost of equity from the stock price of several Australian energy utilities, as at mid-2008, using DGM analysis. CEG argues that for plausible ranges of expected future dividend growth, the market discount rate is higher than the discount rate that would be derived using the current 'locked-in' WACC parameters for electricity transmission (i.e. equity beta of 1.0; MRP of 6 per cent).

CEG's approach involves taking the mean of analysts' distribution forecasts for each year over the 2008-2012 period for six Australian energy utilities (average 4.1 per cent), and then 'gross-up' these distributions for a gamma of 0.5. Beyond 2012, CEG applies a range of assumptions about different distribution growth forecasts, ranging from the 'pessimistic' assumption of negative 2 per cent annual decline to the 'optimistic' assumption of annual growth consistent with forecast GDP growth (which CEG considers to be 5.5 per cent). CEG then equates the distribution stream back to the average share price in mid-2008 to derive what it considers to be a market implied cost of equity. This results in a market implied cost of equity of 12.7-17.3 per cent, which is higher than the 12.5 per cent derived using the NER WACC assumptions as at 30 June 2008.[623] CEG states this is equivalent to an equity beta in the range of 1.05-1.81 (assuming 6 per cent MRP) or a MRP in the range of 6.3-10.8 per cent (assuming an equity beta of 1.0).

[623] CEG calculated the 12.5 per cent cost of equity (under the current NER parameters) by taking the 10 year CGS yield as at 30 June 2008 (6.5 per cent), a equity beta of 1.0, and MRP of 6.0 per cent.

CEG considers it would be very usual for the market to be expecting a 4.1 per cent annual growth in distributions per share to 2012, followed by a decline of 2 per cent thereafter. CEG concludes its DGM analysis provides:

- 'strong support' that the cost of equity on 30 June 2008 under the current NER parameters for TNSPs was lower than the market's cost of equity on the same date, and

- 'very strong support' that a reasonable range for the market cost of equity for regulated energy utilities extends materially above the current NER parameters for TNSPs.[624]

**Issues and AER's considerations**

The AER engaged Associate Professor Handley to review the analysis by CEG. Handley (2008): found that:

> There are two serious limitations with the CEG analysis[625]

The first serious limitation Handley (2008) states is:

> …the DGM model is an inappropriate model to use in the absence of information concerning the underlying free cash flow of the firm.[626]

Handley (2008) states that the standard approach to discounted cash flow valuation involves discounting the forecast free cash flow generated by a firm. The DGM approach may be used to verify the free cash flow approach, or vice versa. However CEG provides insufficient information concerning the free cash flows of each utility to assess the appropriateness of the distribution forecasts.

Second, Handley (2008) states that the DGM analysis can be very sensitive to the assumed inputs. He provides an example where a small change in the assumed inputs can lead to the implied market cost of equity going from above to below the discount rate based on the current NER transmission WACC parameters.

Handley (2008) concludes:

> In summary, in my opinion the DGM is only appropriate for "back of the envelope" type valuations and in any case, should be treated with much caution.[627]

The AER agrees with the analysis by Handley (2008) that the DGM should be used with much caution, due to the high sensitivity in outcomes to small changes in inputs, and the lack of corroborating information provided by CEG, such as free cash flow forecasts, on the distribution forecasts. To Handley (2008)'s analysis, the AER adds the following points.

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624 CEG, op. cit., 14 September 2008, p.18.

625 J. Handley, op. cit., 20 November 2008, p.7.

626 ibid., p.7.

627 ibid., p.8.

CEG states that the 'great strength' of DGM is that it does not rely on a particular theoretical model of investor behaviour, and that it does not rely on any assumptions about what determines the market return. However, DGM does heavily rely on other assumptions, principally that markets are perfectly priced at all times and that the forecast distributions accurately represent the market's expectations.

CEG emphasises that each input into the DGM analysis 'must' be sampled or determined at the same time, though CEG do not strictly follow this principle. For example:

- the risk free rate proxy is sampled on one particular day – 30 June 2008
- the share prices are an average over two months – June and July 2008
- CEG does not state the dates on which the analysts' forecasts were made for each firm. But does state '[w]hile each forecast was made on a different date the middle of the range for forecasts was June and July 2008'.[628] This implies the forecasts were made over a period of greater than two months.

CEG's claim that it's analysis provides 'very strong support' that the cost of equity for regulated energy utilities is above the current NER transmission WACC parameters is based on the following statement following on from its analysis:

> It would be very unusual for the market to be anticipating a 4.1% pa increase in dividends out to 2012 followed by a more than 2% pa fall in dividends in every year thereafter.[629]

Among other things, this statement assumes that the market's distribution forecasts exactly equal the mean of the analyst's forecasts CEG sourced. The reasonableness of the analysts' forecasts adopted by CEG is particularly difficult to assess as CEG has provided little information on these forecasts. For example, no information has been provided about the number of forecasts for each stock, the range of forecasts for each stock, or other information on the distribution of these forecasts such as the median.

CEG also reference some work previously done by NERA for the Victorian gas distribution businesses, in the context of the recent gas access arrangement review. The work cited is NERA's DGM analysis backing out an implied equity beta from US regulatory determinations (rather than the backing out the implied equity beta or cost of equity from the current share price). The AER notes that ACG has previously stated in response to NERA's work:

> Costs of capital for US gas and electricity utilities are typically estimated using what is generally referred to in Australian as the 'dividend growth model' or DGM (and in the US is referred to as the 'discounted cash flow' or DCF method). The DGM does not imply a bottom-up estimate of a cost of capital as implied by the CAPM. That is, the DGM/DCF method does not require an equity beta, market risk premium and risk free rate to be estimated. Rather, a cost of capital is implied by forecasting future dividends per share and noting that the present value of these distributions equates to the share

628 CEG, op. cit., 14 September 2008, pp.4-6.

629 ibid., pp.4-6.

price. As such, it is not possible to make direct comparisons between betas implicitly adopted by US regulators and those adopted in Australia.[630]

**AER's conclusion**

CEG's DGM analysis has not provided persuasive evidence that the cost of equity following the current NER transmission WACC parameters is less than the market's implied required rate of return on equity for Australian energy utilities.

## 8.6 AER's conclusion

Taking into account the nature of the industry and key features of the ex ante regulatory regime under the NER, the AER considers that the exposure of a benchmark efficient service provider to the systematic risk components of business risk and financial risk is, overall, less than that of the market. That is, that the equity beta is likely to be less than one.

The AER also considers that there is not compelling evidence to suggest that the equity beta should differ based on the form of control (revenue cap vs. price cap). The MEU and JIA agree on this position.

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

- Given the differences between estimating equity betas using discrete and continuous returns are minimal, it is appropriate to use the standard approach, which is to use continuous returns.
- It is appropriate to examine Australian data from the post 'technology bubble' period onwards.
- It is appropriate to examine equity beta estimates using weekly observations as well as equity beta estimates that use monthly observations.
- Regard should be had to foreign estimates of equity betas as a cross check on the estimate of the equity beta estimated from domestic data.
- Individual equity beta estimates should not be used to inform a forward looking equity beta for a benchmark efficient network service provider. Rather, primary weight should be placed on portfolio estimates of equity betas.
- If confidence intervals were to be considered it would be appropriate to consider both the lower and upper bounds generated by the estimation as it is equally likely that a 'true' equity beta point estimate may be observed at the lower or upper bound. Given that the point estimates generated by regressions are more likely to represent the 'true' point estimate the AER has given greater weight to point estimates than confidence intervals.

[630] ACG, op. cit., February 2008, p.16.

- Neither the Blume nor Vasicek adjustments (assuming a 'prior belief' of one) should be applied in a regulatory context as either adjustment is likely to introduce an upwards bias in the beta estimates.

- The AER does not consider that having regard to the need for persuasive evidence translates into a specific statistical hypothesis that would require the selection of a particular set of standard errors to create confidence intervals for the equity beta point estimates.

- The empirical evidence considered by the AER suggests that the equity beta of a benchmark efficient service provider is in the range of 0.44 (average portfolio estimated by the AER for Australian businesses post 'technology bubble') to 0.68 (average portfolio estimated by the ACG for the JIA using a five-year estimation period).

- In considering the empirical evidence, the AER's approach to reviewing the equity beta is to take a balanced approach to the application and interpretation of market data by having regard to the strengths and weaknesses of the market data available. In a practical sense this means that the AER does not propose to change the equity beta value as far as the market data would suggest, even though the market data suggests the value is substantially different to the previously adopted value(s). In reviewing the equity beta, as for the other parameters, the AER has given consideration to other factors, such as the importance of regulatory stability, in order to promote efficient investment, so as to contribute to the National Electricity Objective. Consequently, whilst the market data in isolation presents a strong case for establishing an equity beta at a point consistent with above range, the AER has taken a broader view in the context of the National Electricity Objective and having regard to the current financial environment.

- Finally, the AER notes the JIA submits that the use of the Sharpe Lintner CAPM may understate an equity beta which less than one. While, the AER has concerns over some of this analysis on the alleged biases of the Sharpe CAPM, the AER considers that even if these biases are valid, the AER has not adopted a 'mechanical' approach in applying the empirical beta estimates derived from regression analysis using the Sharpe CAPM.

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

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

- is supported by the most recent available and reliable empirical evidence, which the AER considers is persuasive in support of adopting a lower equity beta

- is an appropriate estimate of a forward looking rate commensurate with prevailing conditions in the market for funds for a benchmark efficient network service provider, and

- is likely to promote efficient investment in providing prescribed transmission services or standard control services in current market conditions.

On this basis the AER considers that its proposed equity beta value is consistent with the National Electricity Objective.[631]

[631] NER, cls. 6A.6.2(j) and 6.5.4(e).

# 9 Credit rating level

## 9.1 Introduction

The credit rating is an input into deriving the debt risk premium (DRP) which is defined in cl 6.5.2 (e) of the NER as the difference between the Australian benchmark corporate bond rate and the risk free rate. The purpose of including a DRP within the expected cost of debt is to compensate a regulated firm for the benchmark cost of debt capital.

The AER considers that both the term structure of the benchmark corporate bond 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 (lenders) require increased (decreased) compensation before committing funds from the debt issuer due to the higher (lower) risk of default. Chapter six includes a discussion of issues relating to the selection of the appropriate term to maturity for the risk free rate and by implication the term to maturity used to derive the DRP.

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

## 9.2 Regulatory requirements

### 9.2.1 National Electricity Rules

In undertaking a review of the WACC parameters, the NER sets out several matters that the AER must have regard to. Of particular relevance to the credit rating level are:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds
- the need for the return on debt to reflect the current cost of borrowings for comparable debt.
- the need for the credit rating level to be based on a benchmark efficient service provider, and
- where a credit rating level cannot be determined with certainty:
    - the need to achieve an outcome that is consistent with the National Electricity Objective, and

- the need for persuasive evidence before adopting a credit rating level that differs from the credit rating level that has previously been adopted for it.[632]

The AER's reasoning as to why these matters appear particularly relevant to the review of the credit rating level is discussed in chapter three.

### 9.2.2 Previously adopted value

As with all other WACC parameters, the credit rating level of a benchmark efficient service provider is not directly observable. As a result, it must be estimated and cannot be determined with certainty. Therefore, in addition to the other relevant factors, the AER must have regard to the need for persuasive evidence before adopting a credit rating level that differs from the credit rating level that has previously been adopted for it.

The NER deemed the initial credit rating level for TNSPs in all jurisdictions and the DNSPs in NSW and the ACT to be BBB+.[633] For the remaining DNSPs, the NER did not deem an initial credit rating level and the previously adopted credit rating level in these jurisdictions are those from the most recent distribution determination.

As illustrated in table 9.1, for the purposes of the NER, the previously adopted credit rating level for TNSPs and DNSPs in all jurisdictions is BBB+.

**Table 9.1: Previously adopted value – credit rating level**

| Service provider | Source | Credit rating level |
|---|---|---|
| Transmission (all jurisdictions) | NER | BBB+ |
| Distribution (NSW) | NER | BBB+ |
| Distribution (ACT) | NER | BBB+ |
| Distribution (Tasmania) | OTTER (2007) | BBB+ |
| Distribution (Victoria) | ESC (2006) | BBB+ |
| Distribution (Queensland) | QCA (2005) | BBB+ |
| Distribution (South Australia) | ESCOSA (2005) | BBB+ |
| | | **BBB+** |

Source: NER[634], OTTER[635], ESC636, QCA[637], ESCOSA[638].

632 NER, cls. 6.5.4(e) and 6A.6.2(j).

633 NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

634 NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

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

636 ESC, op. cit., October 2006, p.332.

637 QCA, op. cit., April 2005, p.97.

638 ESCOSA, op. cit., April 2005, p.161.

The AER notes that in setting the initial credit rating for transmission determinations, the AEMC noted that the specification of a credit rating of BBB+ in the NER was made on the basis of analysis in various submissions (i.e. analysis by Lally and the ACG on the behalf of the AER and ETNOF, respectively), previous regulatory decisions, credit rating agency methods, model assumptions, and observed credit ratings.[639]

## 9.3 Summary of issues raised in issues paper

In the issues paper the AER raised the following issues on the benchmark credit rating, the:

- selection of sample businesses and the impact of ownership (government or private) on credit ratings
- selection and weight given to credit rating metrics when evaluating a benchmark credit rating, and
- different analytical techniques used and/or weight given to each approach to obtain a benchmark credit rating.[640]

## 9.4 Summary of submissions in response to issues paper

In response to the issues paper, the AER received submissions on the benchmark credit rating from:

- the APIA
- Citipower, ETSA Utilities and Powercor
- Energy Australia
- Grid Australia
- Integral Energy
- the JIA
- the MEU
- the Queensland Government, and
- SP AusNet.

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639 AEMC, National Electricity Amendment (Economic Regulation of Transmission Services) Rule 2006 No. 18, Rule Determination, 16 November 2006, p. 89.

640 AER, *Issues Paper*, op. cit., August 2008, pp. 64-71.

The MEU argue that the benchmark credit rating should be set at A+.[641] By contrast, the JIA propose that there is no persuasive evidence to depart from a benchmark credit rating of BBB+.[642] The JIA's submission is supported by previous advice provided by the ACG to the ETNOF which examined the benchmark credit rating for transmission businesses.[643]

Submissions from the APIA, CitiPower, Energy Australia, ETSA Utilities, Grid Australia, Integral Energy, Powercor and SP AusNet supported the positions taken in the JIA submission. Submissions mainly focused on the characteristics of the firms that should be included in the sample businesses. The APIA submits that asset specific variables (such as the equity beta and credit rating) are not transferable to gas decisions and should be considered under the relevant regulatory framework.[644]

The JIA argue in its submission that upcoming financial risks are likely to result in a lower credit rating for electricity networks.[645]

The Queensland Government's raised issues related to refinancing risk.[646] Refinancing risk is discussed in chapter six (on the risk-free rate). The Queensland Government also raises the issue that there is a lack of liquidity in the market which may have an impact on the price of debt. [647] The AER considers this issue relates to the underpricing of debt securities associated with issuing debt. The issue of underpricing of debt securities is not within the scope of this review and is being considered in the context of current transmission and distribution determinations, following submissions on the matter from the affected businesses, which examine the costs of issuing debt. As noted in section 1.3, the AER has decided not to include debt raising costs in the review to focus on those matters that must be included (WACC parameters). The AER's current views on forecast inflation and transaction costs are set out in the AER's recently released draft decisions on the NSW and ACT transmission and distribution determinations.

## 9.5 Issues and AER's considerations

In response to the JIA's assertion that upcoming financial risks are likely to result in a lower credit rating for electricity networks the AER assumes that the JIA are referring to the current state of global financial markets. The AER notes that while regulated businesses are highly geared, the current financial market conditions are not expected to impact on the credit rating of businesses as electricity network service providers receive debt risk premia which are reflective of current market conditions at each regulatory reset. The impact of current financial market conditions and the regulated benchmark cost of debt is discussed in section 2.5.

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641 MEU, *Submission in response*, op. cit., September 2008, p. 4.

642 JIA, *Submission in response*, op. cit., September 2008, p. 132.

643 ibid., p. 141.

644 APIA, *Submission in response*, *op. cit.,* September 2008, pp. 4-7.

645 JIA, *Submission in response*, op. cit. September 2008, p. 141.

646 Queensland Government, *Submission in response*, op. cit., September 2008.

647 ibid.

### 9.5.1 Analytical methods

The AER noted in the issues paper that there have been three analytical methods adopted by Regulators in the past to examine the benchmark credit rating. These include:

- obtaining a simple average or median credit rating from a sample of comparator businesses
- applying a statistical regression to a sample of comparator businesses (as developed by Lally), and
- the 'best comparators' approach which attempts to replicate a credit rating decision process (as developed by the ACG).

#### 9.5.1.1 Submissions in response to issues paper

The MEU argue that all of the businesses should be included and weighted on the assets involved to reach a notional (median) business credit rating.[648]

The JIA submit the simple averaging of comparator business credit ratings is not appropriate when determining a benchmark credit rating as the sum of the constituent businesses in combination may not equate to the mean, median or mode of the standalone credit ratings. In addition, the JIA submit that any evidence to support a change to the credit rating assumption should be based on a number of approaches and information sources. This reflects the inherent uncertainty associated with determining a benchmark credit rating, and the inappropriateness of using a simplistic, mechanistic or formulistic approach.[649]

The JIA note there is a number of quantitative techniques that have been used in considering credit ratings including regression analysis; selecting the average from the observed sample of comparators; and the 'best comparators' approach.[650] The JIA consider that ideally evidence from the application of a number of techniques should be assessed, taking account of the advantages and disadvantages of each approach.[651]

The JIA consider that the use of regression techniques can incorrectly suggest there is some precision in the approach to determining credit ratings, on the basis that, regression results can be influenced by:

- the statistical methods used (applying ordinary least squares techniques to a discrete variable will result in biased coefficient estimates)
- the choice of comparator businesses and

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[648] MEU, *Submission in response*, op. cit., September 2008, pp. 58-59.

[649] JIA, *Submission in response*, op. cit., September 2008, p. 134.

[650] ibid., p. 141.

[651] ibid., p. 142.

- the measures of cash flows (credit rating metrics) used.[652]

The JIA also submit that taking an average of credit ratings of comparator businesses is problematic as the result can be heavily influenced by one or two outlier businesses, leading to an 'average' that is not representative of any one comparator business (particularly for small samples).[653]

#### 9.5.1.2 Issues and AER's considerations

**Simple average and median approach**

***Simple average value of credit ratings***

The AER considers that applying a simple average to credit ratings may be inappropriate as credit ratings are discrete variables and may have a non-normal distribution, as noted by the JIA. [654] Further, it is unclear whether the 'distance' or gaps between credit ratings are uniformly distributed (e.g. whether the distance between BBB+ and A-, and A- and A is similar). Accordingly, the AER considers that caution should be exercised in making any inferences about the credit rating for the benchmark efficient service provider based on applying a simple average approach.

In addition, the presence of outlier observations in a small sample of businesses is more likely to bias the outcome. That said, whilst the MEU argue that only median credit ratings should be examined, the AER considers that evidence from a number of techniques as argued by the JIA should be used to inform the AER's assessment of the benchmark credit rating. On this basis, the AER considers that average credit rating values should only be used as a cross check as to primary estimates of the credit rating for the benchmark efficient service provider.

***Median value of credit ratings***

The AER disagrees with the JIA submission that a limitation of using a median credit rating that the sum of the businesses may not equate to the benchmark credit rating.

The AER considers that the selection of the sample comparator businesses is guided, amongst other factors, to the extent that the sample business are considered to be close comparators of the benchmark efficient business as discussed in section 4.3. The AER notes that the JIA consider, amongst other factors, that businesses with significant unregulated activities should be excluded from the comparator businesses.[655] The AER considers that ultimately it is a matter of judgment as to whether businesses have characteristics which are sufficiently similar to the benchmark efficient business to warrant their inclusion in the sample of businesses used to inform the benchmark credit rating.

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652 ibid., p. 141.

653 ibid., pp. 141-142.

654 The AER notes that the normality of the distribution is driven by how the sample is constructed (e.g. balanced sample versus unbalanced, types of businesses in the sample, and single versus multiple years); JIA, *Submission in response*, op. cit., September 2008, p. 141.

655 ibid., p. 140.

Further, the AER considers the median credit rating is not examining the sum of businesses but rather the median decision applied to the comparator businesses considered to be closely representative of the benchmark efficient business facing levels of business and financial risk as those observed for regulated electricity businesses.[656]

**Regression analysis**

Regression analysis involves examining the relationship between the dependent variable (in this case the credit rating) and independent variables (such as financial cash flow measures and qualitative variables).[657] In statistics there are a number of different regression approaches that can be used to analyse the relationships between different variables (from raw data). Ordinary Least Squares (OLS) regressions[658] are often used as an initial approach when examining statistical relationships. Another approach that is used when examining decision making processes is the logit approach.

The AER considers that ideally an ordered logit regression approach is more appropriate than an OLS regression approach for the purposes of examining credit rating decisions. The ordered logit regression estimates the probability of a specific decision being made (i.e. Standard and Poor's giving a credit rating of BBB+, A-, A, etc.) assuming that the business' credit rating metrics are currently at benchmark (i.e. 60 per cent gearing). The benchmark credit rating would be informed by the estimated probabilities (with the highest probability credit rating decision being used as the benchmark).[659] However, the AER considers it is likely that there will be an insufficient number of observations relating to energy networks for an ordered logit approach to reliably inform the AER on the credit rating for the benchmark efficient service provider. On this basis, the AER has decided to conduct OLS regressions, acknowledging the limitations of such an approach.

The AER has previously used regression analysis to estimate the benchmark credit rating for transmission businesses (e.g. Lally estimated the benchmark credit rating of an electricity transmission business to be in the range of BBB/BBB+ to A/A+).[660] Lally's analysis used gearing as a financial indicator for determining credit ratings. In

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656 The AER notes if the distribution of credit ratings were separated into two extreme values (having two peaks at for example BBB- and AAA) the median obtained would be unreliable. However, this is not the case as the peaks in the credit rating are A- and AA.

657 When applied to credit ratings the regression analysis assumes that the independent variables are set to zero and that the remaining value in the analysis apart from the dependent variable (also known as the constant) provides the numerical representation of the credit rating.

658 The OLS approach attempts to get a line of best fit by minimising the squared difference between actual observations and averages (means).

659 The AER considers that a binary logit approach is inappropriate as it is open to manipulation depending on the question being examined. The only requirement for an ordered logit regression is that each decision have a unique value, whether the values are in a specific order is of less relevance. The AER has conducted a ordered logit analysis which demonstrates that if a business has a benchmark level of gearing of 60 per cent or interest coverage meeting the utilities' industry average that a credit rating of AA or A- is the most likely outcome. See Appendix C for the ordered logit results.

660 Lally, *The Appropriate Credit Rating for Australian Electricity Transmission Businesses*, Paper to AER, 13 March 2006, p. 15.

addition, Lally applied a numerical value to each credit rating from Standard and Poor's (e.g. '5' for A- and '6' for BBB+).

In contrast, the ACG applied Lally's regression approach and argued 'that the available empirical evidence implies that an Australian regulated electricity transmission business would be expected to have the capacity to maintain a credit rating of BBB+.'[661] The ACG also concluded that superior financial cash flow measures to gearing that are most relevant to credit ratings should also be tested (e.g. funds from operations (FFO) to total debt) and that using these measures have a material effect on the empirical results.[662] In addition, the ACG considered that Lally applied an incorrect measure of gearing in the regression analysis.

The JIA have relied on the previous views of the ACG report to critique the use of a regression approach. It argues that shortcomings of Lally's regression approach stem from the numerical representation of credit ratings and not accounting for cash flow measures.[663] It argues the numerical representation of a qualitative factor (credit ratings) is non-normal in nature and that the regression approach suggests that there is some precision in the approach to determining credit ratings (when there is no precision).[664]

The AER agrees with the views of the ACG that the regression approach should not only rely on the benchmark level of gearing as factors such as cash flow measures and qualitative factors[665] (such as industry or business specific factors) should be considered in the analysis.[666] In particular, the AER considers that given that the credit rating is a proxy measure for the probability of default risk it is important to examine the same cash flow measures that the ACG used as these cash flow measures take into account a business' ability to meet its long-term and short-term cash requirements (for servicing debt, interest payment or capital expenditure programs). Accordingly, the AER has used cash flow measures as well as gearing in separate regressions to estimate the benchmark credit rating (section 9.5.3). The AER has also used discrete variables to account for industry specific, and/or ownership specific factors (section 9.6.4), and cross-sectional weights to analyse the impact of undefined business specific factors (section 9.6.4).

However, the AER disagrees with the ACG that Lally used the incorrect measurement of gearing when examining credit ratings.[667] The purpose of the regression analysis for credit ratings is to estimate a benchmark efficient credit rating

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

662 ibid., pp. iv-vii.

663 JIA, *Submission in response*, op. cit., September 2008, p. 141.

664 ibid., p. 141.

665 The AER considers that an advantage of using a median approach compared to an estimation via a regression approach to inform the benchmark credit rating is that to some extent qualitative factors will already be taken into account by Standard and Poor's in determining the credit ratings for each business.

666 The JIA consider that qualitative factors include regulatory stability, support from related companies (e.g. parent owners or sister businesses), and the management of the business.

667 ACG, op. cit., May 2006, p. 17.

based upon the measures which Standard and Poor's uses. Given that Standard and Poor's focuses on book valuations of gearing in assessing corporate credit ratings, it would be inappropriate to incorporate an inconsistent measure of gearing in the analysis.

In response to the JIA's views on the limitations of a regression approach, the AER considers that the usage of confidence intervals and the splitting of numerical values into credit rating groupings (e.g. BBB+/A, cusp of BBB+) is inappropriate due to the nature of the credit rating parameter (potential non-normal distribution as noted by the JIA[668] and non-uniform distances as discussed by the AER about simple averages). This means that the use of OLS regression techniques can incorrectly suggest there is some precision in the approach to determining credit ratings. Accordingly, the AER considers the point estimates of the regression analysis should only be used as another cross check to ensure the benchmark median credit rating is reasonable.

**Best comparators approach**

The ACG has previously noted that the regression approach used by Lally suffers from two challenges. First, there are a myriad of factors that may affect credit ratings and many of these cannot be measured. Second, even if the relevant variables could be measured, there may be insufficient credit-rated Australian firms to establish a reliable estimate.[669] Given these challenges, the ACG developed the 'best comparators approach' to conduct further analysis of benchmark credit ratings.

The 'best comparators approach' involves undertaking a comparison of the values of different credit rating metrics (cash-flow and accounting measures) of selected businesses which are considered to be the closest comparators to the representative benchmark efficient business. The ACG then selects the credit rating as the benchmark credit rating of the comparator business with the credit rating metrics which are the closest match to the representative benchmark or representative business. This approach attempts to simulate a credit rating decision.[670]

The ACG compared the credit rating metrics of these sample businesses to a benchmark business based upon the ACCC's most recent transmission decision at the time (i.e. Transgrid). The credit rating metrics selected included:

- FFO to interest cover – this represents the degree of security that a firm has to meet its interest payments[671]

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668 The AER notes that the normality of the distribution is driven by how the sample is constructed (e.g. balanced sample versus unbalanced, types of businesses in the sample, and single versus multiple years) ; JIA, *Submission in response*, op. cit., September 2008, p. 141.

669 ACG, op. cit.,, p. 20.

670 This approach could be used to simulate credit rating decisions of any agency. However, the ACG used this approach to simulate a Standard and Poor's credit rating decision.

671 Funds from operations (FFO) for the regulatory benchmark (i.e. TransGrid decision) is calculated using the forecast cash flows derived from the regulatory decision. In particular, this value is obtained by calculating the sum of the building blocks used to obtain the regulated business' regulated revenues and subtracting the sum of the operating expense, tax expense and the interest expense.

- FFO to total debt – this represents a cash equivalent measure of gearing which is the cash flow available after paying operating expenses and taxes
- total debt to total capital, and
- net cash flows to capital expenditure.[672]

Table 9.2 replicates the table provided by the ACG:

**Table 9.2: Benchmark electricity transmission business: comparison of Standard and Poor's credit rating metrics**

| Company | Rating | FFO/Int | FFO/TD | TD/TC | NCF/Capex |
|---|---|---|---|---|---|
| SPI PowerNet | A+ | 2.5 | 9.4% | 74.0% | 129.8% |
| **TNSP benchmark[(a)]** | **N.R.** | **2.3x** | **9.3%** | **60.0%** | **59.4%** |
| ElectraNet | BBB+ | 2.3 | 9.8% | 70.7% | 57.7% |
| GasNet | BBB | 1.9 | 5.7% | 75.8% | 30.5% |
| Envestra | BBB | 1.5 | 3.8% | 83.9% | (3.6)% |

Source: ACG[673]
(a) The ACG assumed the benchmark business is represented by the latest regulatory decision (at the time this business was TransGrid for 2004-05).

The AER has a number of concerns with this approach related to the derivation of the benchmark credit rating, including the estimation of net cash flows. First, the benchmark used by the 'best comparators' approach uses revenues from a regulatory decision (in this case forecast revenues for TransGrid in 2004-2005) which may be different to the revenues applied by Standard and Poor's in its credit rating metrics (cash flow measures).[674] This can be demonstrated by examining TransGrid's actual credit rating measures as measured by Standard and Poor's for the 2004/2005 financial year, where:

- FFO to interest cover was 3.2 times (compared to 2.3 times for 2004-05 in the regulatory decision)
- FFO to debt was 15.1 per cent (compared to 9.3 per cent for 2004-05 in the regulatory decision)

672 Net cash flows are calculated using the dividend yield approach (with an assumed dividend yield of 6.5 per cent). To determine the benchmark net cash flows the dividend yield is applied to Transgrid regulated asset base (RAB). This creates an estimated amount of dividends that are paid out by the regulated benchmark business which is then subtracted from the FFO to estimate net cash flows.

673 ACG, op. cit., p. 23.

674 Regulatory decisions do not set down revenues/cash flows for negotiated, excluded, unregulated and, in some cases alternative control services (i.e. schedule of fixed prices which are not based upon building blocks). Standard and Poor's is likely to include these revenues/cash flows.

- total debt to total capital was 44.9 per cent (compared to 60 per cent for 2004-05 in the regulatory decision), and

- net cash flows to capital expenditure was 117.2 per cent (compared to 59.4 per cent for 2004-05 in the regulatory decision).[675]

Accordingly, the regulatory decision (benchmark) credit rating metric outcomes (cash flow measures) and the Standard and Poor's credit rating metric measure outcomes for the comparator businesses are not comparable. The AER considers that it would be inappropriate to make ad hoc adjustments to the credit rating metrics that Standard and Poor's calculates for the purposes of maintaining consistency as this would result in an outcome that further abstracts away from the credit rating process.

Second, using a benchmark efficient business that is based upon credit rating metrics estimated using cash flows measures from regulatory decisions for a specific year (e.g. 2004-2005 for TransGrid) is problematic. When Standard and Poor's examines credit rating, the credit rating metrics that are recorded in the report cards are based upon annual reports. If these credit rating metrics were stable from year to year, the approach taken by the ACG may be acceptable. However, the credit rating metrics in both the forecast annual amounts (for the regulatory decision) and the actual credit rating metrics (from the industry report cards) change significantly from year-to-year. Table 9.3 indicates the credit rating metrics obtained from the Standard and Poor's report card in December 2007:

**Table 9.3: Benchmark electricity transmission business: comparison of Standard and Poor's credit rating metrics**

| Company | Rating | FFO/Int | FFO/TD | TD/TC | NCF/Capex |
|---|---|---|---|---|---|
| SPI PowerNet | A | 2.5 | 10.0% | 59.2% | 75.7% |
| **TNSP benchmark[(a)]** | **N.R.** | **2.5x** | **10.14%** | **60.0%** | **54.2%** |
| ElectraNet | BBB+ | 2.1 | 8.6% | 73.4% | 35.0% |
| GasNet | BBB | 1.8 | 5.3% | 77.2% | 14.8% |
| Envestra | BBB- | 1.6 | 4.1% | 86.4% | 2.5% |

Source: ACCC[676], Standard and Poor's[677],
(a) 2006-07 forecast values for the TransGrid decision were used.

The credit rating metrics and latest regulatory decision (i.e. TNSP benchmark) in table 9.3 relate to period from 30 June 2006 to 30 June 2007. The Powerlink decision

[675] Standard and Poor's, *Industry Report Card: Australian government-owned electricity and gas utilities*, Electronic version from RatingsDirect, Accessed on: 3 April 2006.

[676] ACCC, *NSW and ACT Transmission Network Revenue Cap – Transgrid – 2004-05 to 2008-09*, pp. 17-21; Final Decision, 27 April 2005, pp. 17-21 and 179.

[677] Standard and Poor's, *Industry Report Card: Rain eases pressure, but Australian Utilities not out of the woods yet*, 3 December 2007, pp. 13-14.

does not have forecasts for this period and therefore the TransGrid decision is still the most recent decision. In this example, SPI PowerNet has the same FFO to interest ratio, the closest match to the FFO to debt percentage, and a similar level of gearing. ElectraNet's net cash flows to capital expenditure ratio are slightly closer than SPI PowerNet's. Given that the majority of credit rating metrics for SPI PowerNet are closer than ElectraNet's metrics, a benchmark credit rating of A rather than BBB+ would have applied if the credit rating had been determined on the basis of this approach in 2007.

Third, regulatory decisions have a credit rating built into the decision. The credit rating itself implies a debt risk premium which impacts on a business' cash flows and interest payments. For example, if the regulatory decision incorporated a specific credit rating, the interest expense related to the cost of debt will include a forecast of the DRP based upon the same credit rating. This interest expense drives the value of the FFO to interest coverage ratio, as a change in the credit rating, *ceteris paribus*, will change the interest expense and subsequently the proportion of the interest expense and FFO for the businesses cash flows.[678] Therefore, a high credit rating will lower the interest expense and increase the FFO to interest cover ratio and vice versa. Accordingly, it is likely that sample businesses which best represent the benchmark are likely to have the same or similar credit rating (creating significant circularity issues).

Fourth, given that the last measure of this table relies upon estimating net cash flows based upon a dividend yield applied to the RAB, this benchmark may be unreliable. The AER has recently raised concerns over using the dividend yield approach to estimate net cash flows in assessing equity raising costs. These concerns are:

- the ACG obtains a dividend yield benchmark based upon market capitalisation but then proceeds to apply the yield to non-market based value (the RAB)

- the ACG approach uses economic/regulatory depreciation to estimate its net profits rather than the straight line depreciation item in the post-tax revenue model and

- the dividend yield is applied to the RAB rather than the equity component of the RAB.[679]

Using a dividend yield approach may lead up to dividend payout ratios of over 200 per cent depending on which parameters are used which is significantly higher than the industry average.

Given, the number of deficiencies of this approach the AER considers that the best comparators approach is unlikely to inform the AER on the appropriate benchmark efficient credit rating.

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[678] FFO to interest coverage has been used for illustrative purposes. Interest expenses will also have a similar impact on most cash flow credit rating metrics (i.e. net cash flows and FFO to debt) but not upon profit or non-cash flow credit rating metrics such as gearing.

[679] AER, *Issues Paper*, op. cit., August 2008, pp. 111-113.

#### 9.5.1.3 AER's conclusion

The AER considers that examining median credit ratings of sample businesses is the most appropriate approach to determine a benchmark efficient credit rating. The AER disagrees with the JIA submission that a limitation of using a median credit rating is that the sum of the businesses may not equate to the benchmark credit rating. The AER considers the median credit rating is not examining the sum of businesses but rather the median decision applied to the representative businesses in the sample which incorporates Standard and Poor's assessment of business and financial risk. Furthermore, the AER notes that other benchmarks such as the equity beta and level of gearing are usually formed on the basis of combining a number of businesses in order to obtain either an average or portfolio benchmark. The AER acknowledges the JIA's criticism of credit ratings being discrete variables [680] (which may have a non-normal distribution), making it difficult to form conclusive inferences about the benchmark credit rating from either a simple average or a regression approach. On this basis the AER considers that a simple average of credit ratings and estimates from regression analysis should only be used as a cross check on the median credit rating values. In addition, in applying regression analysis the presence of a non-normal distribution makes inferences on confidence intervals inappropriate. Accordingly, the AER only uses the point estimates from regressions as a cross check on median credit rating values.

Based on the number of deficiencies of the 'best comparators' approach (e.g. the inherent difficulties associated with deriving relevant credit rating benchmark) it is unlikely that it could be used as a method to inform the AER on the appropriate benchmark efficient credit rating.

### 9.5.2 Selection of businesses used to derive an industry benchmark

As discussed in the AER Issues Paper, 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.[681] The AER observes that regulators have selected a group of comparator businesses to determine the benchmark credit rating for electricity networks rather than adopting a market-wide benchmark. The AER considers that when selecting the businesses to be used for informing the AER's decision on the efficient electricity distribution and transmission benchmark credit rating there are a number of considerations, these include:

- the extent to which the sample businesses are expected to reflect the benchmark efficient business, and
- empirical issues such as statistical robustness and selection bias.

The AER notes that ownership has been previously raised as a significant issue when determining businesses used to obtain a benchmark credit rating.[682] In particular, Lally has previously noted that publicly owned businesses appear to have higher

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680 JIA, *Submission in response*, op. cit., September 2008, p. 141.

681 AER, *Issues Paper*, op. cit., August 2008, p. 15.

682 ACG, op. cit., May 2006, pp. 10 and 20; and Lally, op. cit., 13 March 2006, pp. 4-6.

credit ratings than otherwise identical businesses that are privately owned.[683] Lally considers that publicly owned businesses have a lower risk of default because their owners are more likely to rescue the entity in the event of financial difficulties.[684] The ACG disagrees with this view as it considers that not only the effect of government ownership differs across businesses, that a parent company of a privately owned entity may also have a positive or negative effect (supportive or unsupportive parent) on the credit rating of a business.[685] It notes that a supportive parent company is likely to increase the credit rating while a parent company that takes large distributions from the business is likely to lower the credit rating.[686]

#### 9.5.2.1 Submissions in response to issues paper

The MEU argue that ownership and credit rating are not closely related as a credit rating is not an assessment of the risk of a loan but a rating of the credit quality or the potential that the loan will be repaid.[687]

The JIA submit that transmission and distribution, gas and electricity businesses, excluding those companies with characteristics not similar to a benchmark efficient network service provider are appropriate comparators to estimate the benchmark credit rating.[688]

The JIA argue that there is a degree of arbitrariness to the distinction between electricity transmission and distribution businesses particularly when considering infrastructure that operates between or near 66kV and 220kV. They note that while some aspects of the regulatory regime can differ at the asset level it makes no sense to apply inconsistent benchmarks for corporate wide factors such as credit ratings.[689]

The JIA also note that the ACG consider that the financial characteristics of regulated gas businesses are unlikely to differ substantially to regulated electricity businesses, and the benefits from pooling information to increase the number of comparators would likely outweigh any concerns with inappropriate comparators.[690] That said, the JIA consider that regulated gas businesses are a reasonable but not perfect comparator to use for the purposes of reviewing the evidence for the benchmark credit rating. Accordingly, the JIA submit that consideration should be given to the view that gas infrastructure is sometimes perceived as being riskier than electricity.[691] The JIA note this view has been supported in previous regulatory decisions where equity betas have been set at greater than 1.0 (the Economic Regulation Authority (ERA) with Goldfields Gas pipelines in WA and the Queensland Competition Authority with

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683 Lally, op. cit., 13 March 2006, p. 3.

684 ibid., p. 4.

685 ACG, op. cit., May 2006, p. 20.

686 ibid.

687 MEU*, Submission in response,* op. cit., September 2008, p. 56.

688 JIA, *Submission in response*, op. cit., September 2008, p. 132.

689 ibid., p. 138.

690 ibid., p. 139.

691 ibid., pp. 138-139.

Allgas)and credit ratings below BBB+ have been used (the ACCC with the Roma to Brisbane Pipeline).[692]

The JIA argue that the following characteristics are not consistent with the benchmark efficient network service provider assumption:

- a financially supportive owner (i.e. government or parent company)
- significant non-regulated activities and
- significant restructuring, merger or growth.[693]

Notwithstanding, JIA's views of a financially supportive government owner, the JIA note that government owned businesses have a standalone credit rating that reflects their capital structure and business cash flows. This provides guidance for the business of its underlying business credit rating, and is used by State Governments to impose competitive neutrality fees in accordance with national competition policy.[694]

#### 9.5.2.2 Issues and AER's considerations

The AER agrees that a benchmark efficient business would be a 'pure play' electricity network (transmission or distribution) business. This is due to electricity network owners facing similar financial and business risk due to similar market conditions (e.g., customer behaviour, regulatory framework). Accordingly, the AER agrees with the JIA, the MEU and previous advice from the ACG that for the purposes of examining credit ratings that the same credit rating benchmark should apply to both electricity distribution and transmission businesses.

The AER considers that there are no businesses which perfectly approximate the benchmark efficient business ((i.e. pure electricity transmission and distribution networks) that are included in the Standard and Poor's Industry Report Cards.

In selecting the sample of comparator businesses the AER agrees with the JIA submission that caution should be taken when including gas businesses into the sample, as gas businesses may have some asset specific characteristics that may impact on the credit rating of gas businesses.[695] The APIA submission notes that gas transmission businesses have physical (network design differences) and locational differences, and operate in a different market structure with different contractual arrangements and legislative requirements.[696] For the reasons given in section 4.3, the AER considers that gas networks are a reasonable but not perfect comparator to electricity network business given the similarity in the purpose of gas network to electricity network (transporting energy) as discussed in section 4.3.

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692 ibid., p. 140.

693 ibid.

694 ibid.

695 JIA, *Submission in response*, op. cit., September 2008, pp. 138-139.

696 APIA, *Submission in response*, op. cit., September 2008, pp. 4-6.

The JIA submit that only privately owned businesses should be included in the sample. However, the AER considers that an examination of government businesses should also be considered. The AER considers that it is appropriate to also examine the standalone credit ratings of government owned businesses as these credit ratings are used to apply a competitively neutral cost of debt.[697] In particular, to maintain debt neutrality with privately owned businesses, in circumstances where government owned businesses are able to borrow funds at a lower rate than privately-owned businesses, the government owned business must make adjustments to the cost of debt above the government rate of borrowing.[698] Further, the AER considers that government owned electricity businesses are more likely to be a closer comparator than gas businesses given that government owned electricity businesses are more likely to face similar business risks than gas networks.

The ACG report used to support the JIA submission criticised Associate Professor Martin Lally's treatment of ElectraNet as part government owned, noting:

ElectraNet advises that it is rated by Standard and Poor's on a stand-alone basis, which supports the treatment noted in the text. In contrast, we support Professor Lally's categorisation of the two SPI entities as part government owned given that Standard and Poor's has noted in public rating reports that it has applied a higher rating to these entities on the basis the degree of support expected from the parent.[699]

This indicates that Standard and Poor's rates government owned businesses on a stand alone basis (i.e. not on the basis of its 51 per cent government ownership). As the JIA note this also demonstrates that caution should be given to businesses that have a financially supportive parent.[700]

Table 9.4 demonstrates the impact on the median credit rating by using different samples of comparator businesses.

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697 JIA, *Submission in response*, op. cit., September 2008, p. 140.

698 Department of Finance and Administration, *Australian Government Competitive Neutrality Guidelines for Managers,* Financial Management Guidance No. 9, February 2004, pp. 21-24.

699 ACG, op. cit., May 2006, p. v.

700 JIA, *Submission in response*, op. cit., September 2008, p. 140.

**Table 9.4: Comparison of different samples (2002 - 2008)[701]**

| Measure | Energy Networks | Government Energy Networks | Private Energy Networks | Private Gas Networks | Private Electricity Networks |
|---|---|---|---|---|---|
| Median Credit Rating (Excluding hybrids) | A- | AA | BBB | BBB | A- |
| Median Credit Rating (Hybrid businesses) | A- | AA | BBB+ | BBB | A- |
| Number of businesses (Excluding hybrids) | 7-10 | 1-4 | 5-10 | 1-4 | 3-5 |
| Number of businesses (Hybrid businesses) | 11-15 | 3-6 | 7-12 | 4-6 | 6-8 |
| Government networks (%) | 31 | 81 | 10 | 5 | 14 |
| Private electricity (%) | 41 | 15 | 54 | 14 | 77 |
| Private gas (%) | 28 | 5 | 36 | 76 | 10 |
| Electricity (%) | 68 | 83 | 61 | 19 | 87 |

Source: Medians obtained using Standard and Poor's industry report cards (2002 - 2008)

Table 9.4 demonstrates the inclusion of gas businesses in the sample of comparator businesses decreases the median credit rating from A- to BBB or BBB+ (i.e. private energy networks) and the inclusion of government networks in the sample then increases the median to A-. Further, the percentage of private gas (28 per cent) and government owned (31 per cent) businesses is similar that in the in energy networks sample and their impact on the credit rating in the energy business sample offsets each other.

In examining the median credit ratings from each sample of businesses, what is of more importance is the number of businesses that are above or below the median credit rating value for each sample. In contrast, the simple average (mean) value will be affected by the distance of the credit rating between the average of the group of businesses being added to the sample credit rating average. For example, if the benchmark credit rating is BBB+-, the addition of government businesses might not be offset by the gas businesses as the government businesses' credit rating (A- to AA) is a greater distance away from BBB+ than that of gas businesses (A- to BBB). Accordingly as discussed in section 9.5.1, the AER will only be relying on average (mean)credit ratings as a cross check rather than informing the credit rating for the benchmark efficient service provider.

[701] Percentages expressed as percentage of total businesses for each sample. Where businesses have electricity and gas activities, and/or, State government and private ownership, a value of 0.5 has been used in the 'hybrid businesses'. There are no private and government owned businesses, and/or gas and electricity in the 'excluding hybrid' samples.

#### 9.5.2.3 AER's conclusion

The AER agrees with the JIA, the MEU and previous advice from the ACG that for the purposes of examining credit ratings that both transmission and distribution businesses should be included in the sample and that the same credit rating benchmark apply to both electricity distribution and transmission businesses.

The AER has broadened the sample to include both gas networks and government owned networks. Whilst the JIA support the inclusion of gas businesses in the sample, the JIA do not support the inclusion of government businesses in the sample. The AER recognises that some caution should be exercised by including these networks into the sample as these businesses may have characteristics which are different from the benchmark efficient business (e.g. gas businesses may have sufficiently different business and financial risks to electricity businesses and government businesses could be considered to have a financially supportive parent). That said, the AER observes:

- the ACG has also considered that a financially supportive parent impact credit ratings (both private and government owned businesses)
- the JIA acknowledge that government owned businesses are treated on a standalone basis by Standard and Poor's in determining credit ratings, and
- the impact on credit ratings of including gas businesses and government businesses will offset each other relative to an median credit rating derived from the private electricity sample.

Accordingly, the AER considers that both government and gas businesses are reasonable but not perfect comparators for the reasons given in section 9.5.2.2. Furthermore, when considering the inherent offsetting biases in these businesses and the need for the sample to be large enough to form a reliable benchmark, the AER considers the biases are unlikely to have a significant impact on the overall outcome.

### 9.5.3 Credit rating metrics used to evaluate credit rating

In order to ensure that the analysis of the benchmark credit rating is reasonable, credit rating metrics have been used as variables to estimate a benchmark credit rating. In the past this has involved examining the level of gearing in conjunction with the credit rating. However, the ACG noted that Standard and Poor's considers a number of different factors when setting a credit rating. The factors that Standard and Poor's considers either relate to a business's exposure to business or financial risk. Business risk relates to a number of qualitative factors (e.g. management behaviour) and the competitive position of the business. Financial risk relates to a business's financial policies and a number of different accounting measures (e.g. cash flow measures and the level of gearing).

#### 9.5.3.1 Submissions in response to issues paper

The MEU consider that the AER should not concern itself with other credit rating metrics and focus on actual credit ratings.[702]

The JIA submit that credit ratings are influenced by an assessment of a business' ability to repay debt, being principal and interest in full and on time. This requires an assessment of a company's business and financial risk which provides a measure of both its capacity to pay and willingness to pay. [703] Among other things these factors include the level of debt, the cash generated by the provision of services, the stability of revenue, and also non-quantitative factors such as regulatory stability, support from related companies, and the management of the business.[704]

The JIA argue in determining a benchmark credit rating, it is therefore appropriate to consider:

- the credit ratings for comparator businesses, which would include transmission and distribution businesses in both the electricity and gas industries
- relevant financial ratios such as interest cover, funds from operations to total debt, free operating cash flow to total debt, and the ratio of cash flow to capital expenditure, and
- business or industry specific factors that might influence observed comparator credit ratings. Some of these factors are qualitative, such as the managerial ability within the business.[705]

The JIA consider that while gearing gives an indication of the potential financial risks to a business, it is only one measure and should not be used in isolation to provide a reliable indicator of creditworthiness. It may be a less useful credit metric when considered against other measures because it is heavily influenced by the methodology used to estimate the asset value.[706]

#### 9.5.3.2 Issues and AER's considerations

In the past, Lally only used the level of gearing as the only credit rating metric in his regression analysis. The AER acknowledges the JIA submission which notes the ACG advice which applied a number of different credit rating metrics to its analysis. The AER recognises gearing is an indirect measure of financial risk and has therefore incorporated other credit rating metrics in its regression analysis consistent with the ACG advice. These include:

- credit ratings for comparator businesses
- gearing

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[702] MEU, *Submission in response*, op. cit., September 2008, pp. 57-58.

[703] ibid., p. 134.

[704] ibid.

[705] ibid., p. 137.

[706] ibid., p. 145.

- interest cover
- funds from operations to total debt
- free operating cash flow to total debt and
- the ratio of cash flow to capital expenditure.

The AER agrees with the JIA that business or industry specific factors might also influence comparator ratings.[707] Although the AER considers it difficult to account for every qualitative factor which may impact on business risk, it has attempted to account for the impact of qualitative factors in the regression analysis by using the generalised least squares approach. This approach assumes that the businesses (cross sections) in the sample are not identical (i.e. businesses have qualitative differences) and applies an iterative process to assign different weights (based upon differences in the errors across businesses) to each of the businesses.

#### 9.5.3.3 AER's conclusion

The AER will be considering the following financial measurements in its regression analysis:

- credit ratings for comparator businesses, and
- credit rating metrics such as gearing, interest cover, funds from operations to total debt, free operating cash flow to total debt, and the ratio of cash flow to capital expenditure.

The AER has incorporated the expected impact of selected qualitative factors in its regression analysis to examine impacts of qualitative factors on the overall benchmark credit rating.

## 9.6 AER's analysis

### 9.6.1 Credit rating sample issues

The AER has removed subsidiary businesses from the energy business sample when the credit rating for the parent company is already recorded. The AER considers that including subsidiary businesses would result in an outcome that biases the estimated credit rating towards businesses with a large number of subsidiaries. The businesses that have been excluded from the sample for this reason are Envestra Victoria Pty Ltd, SP AusNet, and SPI Australia. Alinta and AGL have been removed from sample due to having significant retail activities and/or being involved in mergers and acquisition activities throughout the period which are likely to impact on its financial position and credit rating. The following businesses have been included as the AER considers that these businesses are sufficiently close comparators to the benchmark efficient business:

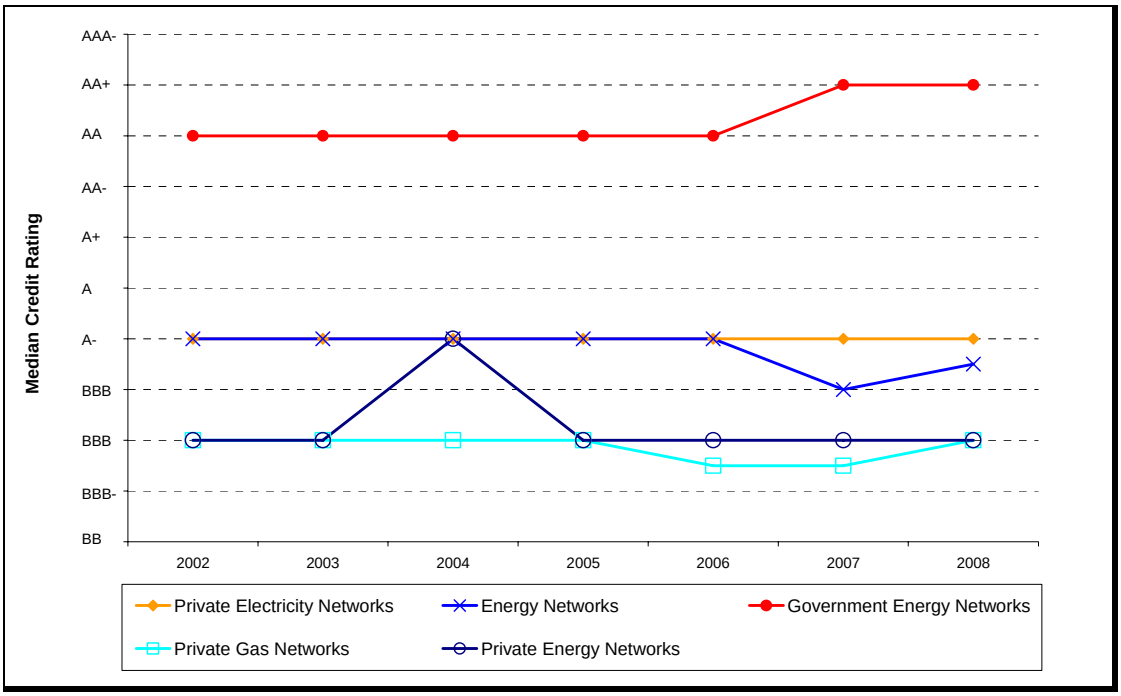
[707] JIA, *Submission in response*, op. cit., September 2008, p. 137.

- Citipower Trust
- Country Energy
- Dampier Bunbury Natural Gas Pipeline Trust
- Diversified Utility and Energy Trusts
- ElectraNet Pty Ltd
- Energy Australia
- Energy Partnership (Gas) Pty Ltd (EPG)
- Envestra Ltd
- Ergon Energy Corporation
- ETSA Utilities
- GasNet Australia (Operations) Pty Ltd
- Integral Energy
- Powercor Australia
- Rowville Transmission Facility Pty Ltd
- SPI PowerNet Pty Ltd, and
- United Energy.

### 9.6.2 Median credit rating

As a first step, the AER has examined credit rating on annual basis. Figure 9.1 demonstrates the median credit rating using the different samples discussed in section 9.5.2.

**Figure 9.1: Annual median credit rating (2002 - 2008)**[708]

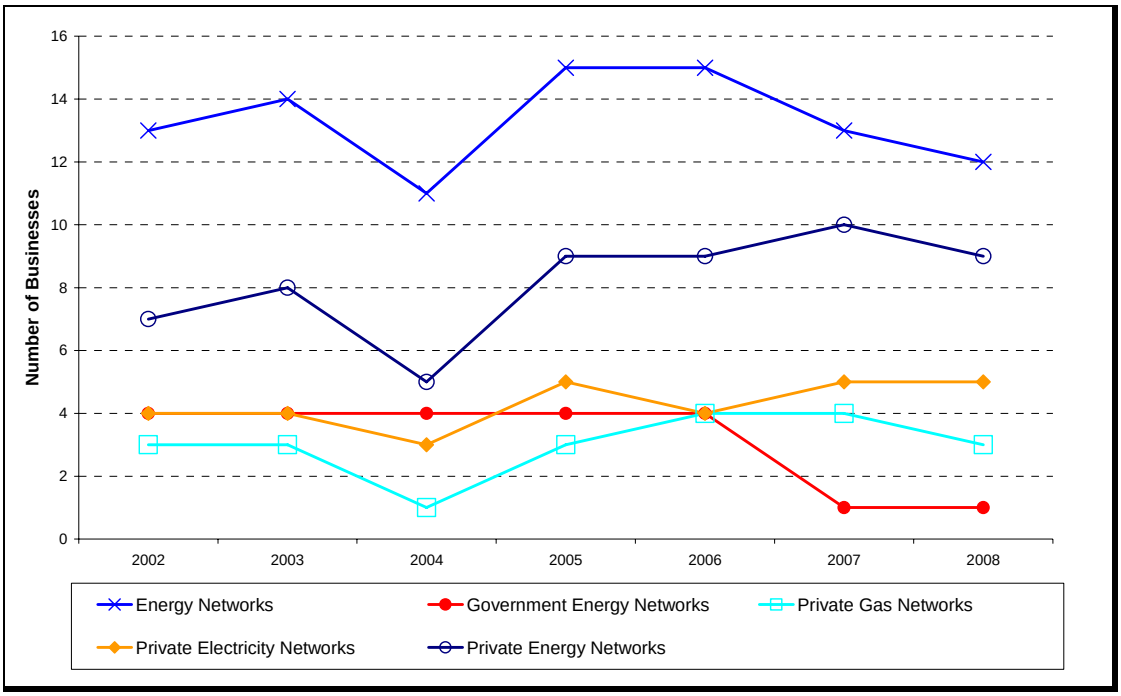



Source: Medians obtained using Standard and Poor's industry report cards (2002 - 2008)

In general, the median credit ratings across samples have been relatively stable. As discussed in section 9.5.1 median credit ratings are driven by the number of businesses above and below the median credit rating value and figures 9.2 and 9.3 demonstrate it is the number businesses in the sample affecting the change in the credit rating rather than the credit ratings of individual businesses changing.

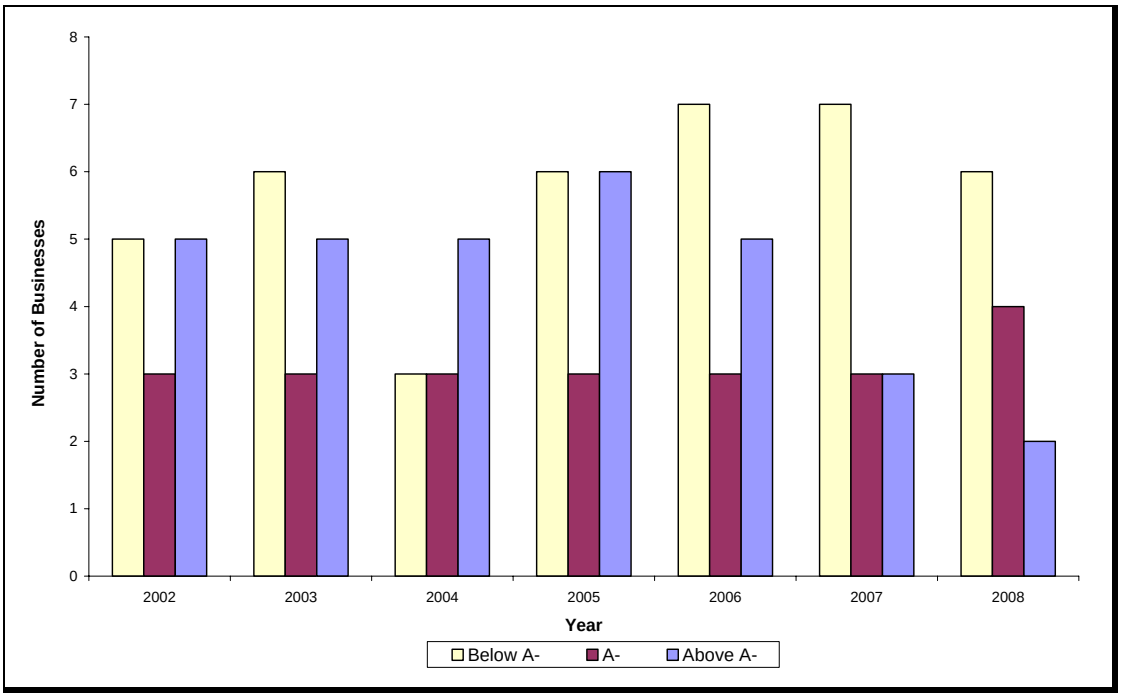
[708] ElectraNet and SPI PowerNet are not included in either the private electricity or government energy networks sample. However these businesses would have offsetting effects in the median and are unlikely to change the analysis.

**Figure 9.2: Annual median credit rating (2002 - 2008) – Number of businesses[709]**




Source: Medians obtained using Standard and Poor's industry report cards (2002 - 2008)

**Figure 9.3: Energy business (2002 - 2008) – Below, equal to or above A-**




Source: Medians obtained using Standard and Poor's industry report cards (2002 - 2008)

[709] ElectraNet and SPI PowerNet are not included in either the private electricity or government energy networks sample. However these businesses would have offsetting effects in the median and are unlikely to change the analysis.

Figure 9.3 indicates that the number of government owned businesses declined in 2007 and 2008 while the number of private energy businesses remained relatively stable. Figure 9.4 reflects this reduction in the number of government businesses in the sample as the number of businesses with a credit rating of above A- declined (which are generally government owned businesses). Given the sensitivity of median credit ratings to the number and types of businesses in the sample the AER considers that using medians across a number of years (e.g. approximately 5 years) is more appropriate rather than the latest available year. Further, using a number of years is consistent with the approach the AER has taken with deriving other industry specific parameters such as the equity beta and level of gearing.

Accordingly, the AER has examined whether selecting different sampling periods is likely to affect the overall median credit rating. Given that the Standard and Poor's Industry Report Cards do not provide credit rating metrics for all businesses in the sample for 2007 and 2008 (as some businesses report as at 31 December 2007 and the most recent report card is from May 2008), 2006 has been used as an end point in a number of the regressions. Consistent with the level of gearing the AER has examined medians using a period consistent with the equity beta (2002 to 2008, in table 9.5) and has included a median for all the years examined (in figure 9.2) for completeness.

**Table 9.5: Comparison of different samples (2002 - 2008)**

| Measure | Energy Networks | Government Energy Networks[(a)] | Private Energy Networks [(b)] | Private Gas Networks [(b)] | Private Electricity Networks |
|---|---|---|---|---|---|
| Median Credit Rating (2002 – 2008) | A- | AA | BBB+ | BBB | A- |
| Median Credit Rating (2002 – 2007) | A- | AA | BBB+ | BBB | A- |
| Median Credit Rating (2002 – 2006) | A- | AA | BBB+ | BBB | A- |
| Median Credit Rating (2003 – 2007) | A- | AA | BBB+ | BBB | A- |
| Median Credit Rating (2004 – 2008) | A- | AA | BBB+ | BBB | A- |

Source: Medians obtained using Standard and Poor's industry report cards (2002 - 2008)
(a) Includes SP AusNet and ElectraNet
(b) Includes SP AusNet and DUET

The AER observes that irrespective of the period selected the median credit rating across all the samples has remained constant (e.g. for both the private electricity sample and the energy businesses sample is A-).

### 9.6.3 Credit rating metrics issues

***Credit rating values***

In order to calculate average credit ratings and conduct regressions, values have been assigned to the different credit ratings. These values are as follows:

**Table 9.6: Values assigned to credit ratings**

| Credit Rating | Value | Credit Rating | Value | Credit Rating | Value |
|---|---|---|---|---|---|
| *BBB-* | 1 | *A* | 5 | *AA+* | *9* |
| *BBB* | 2 | *A+* | *6* | *AAA-* | *10* |
| *BBB+* | 3 | *AA-* | *7* | *AAA* | *11* |
| *A-* | 4 | *AA* | *8* | *AAA+* | *12* |

***Credit rating metrics and/or financial benchmarks***

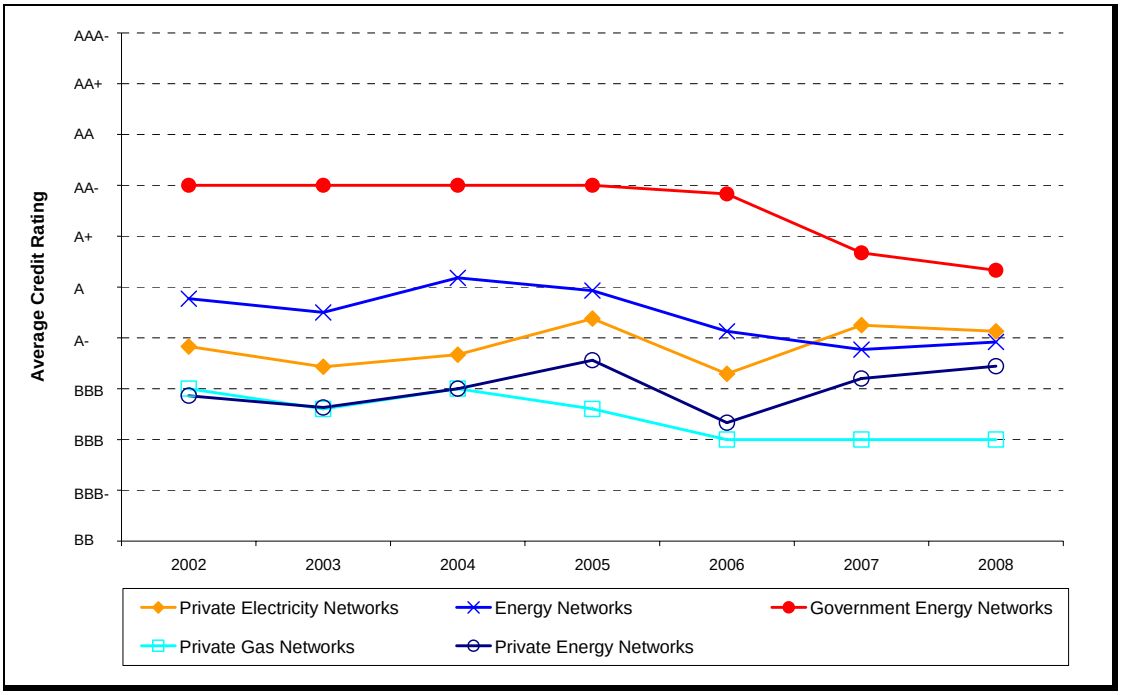
Consistent with the approaches taken for the regression analysis conducted by Associate Professor Lally and the ACG, the AER has used the financial ratios recorded in the Standard and Poor's Industry Report Cards. To calculate the benchmarks for the other cash flow measures (such as FFO to debt, FFO to interest and net cash flows to debt) the AER has calculated benchmarks using utilities businesses. The AER considers it is inappropriate to apply benchmarks based upon the most recent regulatory decision for the reasons given in sections 4.3 and 9.5.2. The AER considers that taking an average from utilities is more likely to be appropriate than the ACG's benchmarks as the average credit rating metrics from utilities businesses are a reasonable but not perfect benchmark when compared to other approaches.

### 9.6.4 Cross checks of median credit rating

#### 9.6.4.1 Simple average credit ratings

For the purposes of completeness the AER has replicated the analysis in Figure 9.4, applied to median credit value ratings examining the annual average credit ratings from 2002 to 2008.

**Figure 9.4: Annual average credit rating (2002 - 2008)** [710]




Source: Averages obtained using Standard and Poor's industry report cards (2002 - 2008)

Figure 9.4 demonstrates that the annual medians provide a lower credit rating estimate than the annual simple averages. In addition, consistent with the annual median values the simple average credit rating values have been relatively stable over time whereas the annual simple averages change from year to year due to changes in the composition of businesses in each sample. The AER considers that this confirms that pooling years is more likely to provide a more reliable benchmark of the credit rating.

[710] ElectraNet and SPI PowerNet are included in either the private electricity or government energy networks sample as averages are more conservative with their inclusion.

**Table 9.7: Comparison of different samples (2002 - 2008)** [711]

| Measure | Energy Networks | Government Energy Networks[(a)] | Private Energy Networks [(b)] | Private Gas Networks [(b)] | Private Electricity Networks |
|---|---|---|---|---|---|
| Average Credit Rating (2002 – 2008) | A-/A (4.45) | A+/AA- (6.72) | BBB+/A- (3.25) | BBB+/A- (3.02) | A-/A (4.30) |
| Average Credit Rating (2002 – 2007) | A-/A (4.53) | A+/AA- (6.85) | BBB+/A- (3.22) | BBB/BBB+ (2.94) | A-/A (4.16) |
| Average Credit Rating (2002 – 2006) | A-/A (4.68) | A+/AA- (6.97) | BBB+/A- (3.19) | BBB/BBB+ (2.87) | BBB+/A (3.95) |
| Average Credit Rating (2003 – 2007) | A-/A (4.49) | A+/AA- (6.81) | BBB+/A- (3.22) | BBB/BBB+ (2.95) | A-/A (4.29) |
| Average Credit Rating (2004 – 2008) | A-/A (4.38) | A+/AA- (6.58) | BBB+/A- (3.31) | BBB+/A- (3.12) | A-/A (4.59) |

Source: Averages obtained using Standard and Poor's industry report cards (2002 - 2008)
(a) Includes SP AusNet and ElectraNet
(b) Includes SP AusNet and DUET

Table 9.7 provides a summary of the simple average credit rating across different samples. This indicates that the credit rating is stable for each sample across different time periods. As discussed in section 9.5.1 no inferences have been made on whether an average credit rating that covers two rating categories can be placed in a specific rating category (other than when it equals a whole number) because by doing so might be unrealistic given:

- the non-normal nature of the variable, and
- it is unclear whether there are uniform distances between the credit ratings.

Examining the (smaller) private electricity and (larger) energy network samples support the conclusion that a median value of A- is likely to be appropriate as the averages of these samples provide average credit ratings within the range of BBB+ to A- and A- to A, respectively. Accordingly, the AER considers that the average credit rating supports the view that a benchmark credit rating of A- is reasonable.

#### 9.6.4.2 Regression analysis

***Results***

Table 9.8 summarises the results from the regression analysis.

[711] ElectraNet and SPI PowerNet are included in either the private electricity or government energy networks sample as averages are more conservative with their inclusion.

**Table 9.8: Regression results (2002 - 2007)**

| Approach | Energy Networks | Government Energy Networks | Private Energy Networks | Private Electricity Networks |
|---|---|---|---|---|
| Generalised Least Squares – (Gearing) 2002 - 2006[a] | A/A+ (5.51) | AA-/AA (7.92) | BBB+/A- (3.19) | BBB+/A- (3.79) [b] |
| Generalised Least Squares (FFO/Int) 2002 -2006[a] | A+/AA- (6.26) | AA/AA+ (8.31) | BBB+/A- (3.54) | BBB+/A- (3.94) [b] |
| Pooled (Gearing) Sample 2002 - 2006[a] | A/A+ (5.58) | AA-/AA (7.93) | BBB+/A- (3.23) | BBB+/A- (3.58) [b] |
| Pooled (FFO/Int) Sample 2002 - 2006[a] | A+/AA (6.02) | AA/AA+ (8.16) | BBB+/A- (3.57) | BBB+/A- (3.96) [b] |
| Pooled (Gearing) 2002 - 2006[c] | A/A+ (5.02) | AA-/AA (7.95) | BBB+/A- (3.06) | BBB+/A- (3.32) [b] |
| Pooled (FFO/Int) 2002 - 2006[c] | A/A+ (5.49) | AA/AA+ (8.18) | BBB+/A- (3.26) | BBB+/A- (3.48) [b] |
| Pooled (Gearing)– 2002 - 2007[c] | A-/A (4.98) | AA-/AA (7.91) | BBB+/A- (3.14) | BBB+/A- (3.51) |
| Pooled (FFO/Int)– 2002 - 2007[c] | A/A+ (5.52) | AA/AA+ (8.17) | BBB+/A- (3.30) | BBB+/A- (3.63) [b] |
| Pooled (FFO/Debt) – 2002 - 2007[c] | A-/A (4.75) | AA-/AA (7.90) [b] | BBB/BBB+ (2.84) [b] | BBB+/A- (3.53) [b] |
| Pooled (NCF/Capex) – 2002 - 2007[c] | A-/A (4.36) | AA-/AA (7.87) [b] | BBB/BBB+ (2.73) [b] | BBB+/A- (3.54) [b] |

Source: Data for regressions obtained using Standard and Poor's industry report cards (2002 - 2008)
(a) Used balanced data which has the same amount of observations for each business (i.e. 5 observations per business). Businesses which do not have the same amount of observations are excluded from the sample.
(b) These results are likely to be unreliable as the regressions contain statistically insignificant variables (within a 90 per cent confidence interval).
(c) Uses unbalance data which includes all observations.

As discussed in section 9.5.1 no inferences have been made on whether an estimate can be placed in a specific rating category (other than when it equals a whole number) because by doing so might be unrealistic given:

- the non-normal nature of the variable, and
- it is unclear whether there are uniform distances between the credit ratings.

In general, the AER observes that changing estimation techniques (e.g. from generalised least squares to pooled OLS) does not affect the estimates of benchmark credit ratings. The AER observes that the majority of regressions that use private

electricity businesses as a benchmark contain statistically insignificant variables. This demonstrates that it is likely there are insufficient private electricity businesses to form a reliable estimate.

Examining results of the energy network samples supports the view that a median value of A- is likely to be appropriate as the average credit rating of these samples provide average credit ratings within the range of A- to A+. The AER has also examined the cash flow measures and find that FFO to interest and gearing provide consistently statistically reliable estimations when used independently to estimate the credit rating. In contrast, using net cash flows to capital expenditure and FFO to debt resulted in a number of statistically insignificant variables. As a further step, regressions treating ElectraNet and SPI PowerNet as privately owned business, and, DUET and Country Energy as gas businesses (value of 1 instead of 0.5) were conducted. Table 9.9 provides the results:

**Table 9.9: Regression results – No hybrid businesses (2002 - 2008)**

| Approach | Government Energy Networks | Private Energy Networks | Private Electricity Networks |
|---|---|---|---|
| Generalised Least Squares – (Gearing) 2002 - 2006[(a)] | AA/AA+ (8.07) | BBB+/A- (3.87) | BBB+/A- (4.00) |
| Generalised Least Squares (FFO/Int) 2002 -2006[(a)] | AA/AA+ (8.30) | BBB+/A- (3.97) | A-/A (4.06) |
| Pooled (Gearing) Sample 2002 - 2006[(a)] | AA/AA+ (8.17) | BBB+/A- (3.83) | BBB+/A- (3.99)[(b)] |
| Pooled (FFO/Int) Sample 2002 - 2006[(a)] | AA/AA+ (8.34) | A-/A (4.06) | A-/A (4.11)[(b)] |
| Pooled (Gearing) 2002 - 2006[(c)] | AA/AA+ (8.13) | BBB+/A- (3.41) | BBB+/A- (3.65)[(b)] |
| Pooled (FFO/Int) 2002 - 2006[(c)] | AA/AA+ (8.36) | BBB+/A- (3.63) | BBB+/A- (3.78)[(b)] |
| Pooled (Gearing)– 2002 - 2007[(c)] | AA/AA+ (8.13) | BBB+/A- (3.48) | BBB+/A- (3.81)[(b)] |
| Pooled (FFO/Int)– 2002 - 2007[(c)] | AA/AA+ (8.40) | BBB+/A- (3.66) | BBB+/A- (3.91)[(b)] |

Source: Data for regressions obtained using Standard and Poor's industry report cards (2002 - 2008)
(a) Used balanced data which has the same amount of observations for each business (i.e. 5 observations per business). Businesses which do not have the same amount of observations are excluded from the sample.
(a) These results are likely to be unreliable as the regressions contain statistically insignificant variables (within a 90 per cent confidence interval).
(c) Uses unbalance data which includes all observations.

Given the results in table 9.9 the AER considers that this provides further support that a benchmark credit rating of A- is reasonable.

## 9.7 AER's conclusion

Based upon the submissions, available data, and the considerations and conclusions made in sections 9.5 to 9.6 the AER considers the following approaches are most appropriate to analyse the credit rating for the benchmark efficient service provider:

- The AER considers that examining median credit ratings of sample businesses is the most appropriate approach to determine the credit rating of a benchmark efficient service provider. The AER disagrees with the JIA submission that a limitation of using a median credit rating is that the sum of the businesses may not equate to the benchmark credit rating (section 9.5.1).

- The AER acknowledges the JIA's criticism that credit ratings are discrete variables [712] (which may have a non-normal distribution), making it difficult to form conclusive inferences about the benchmark credit rating from either a simple average or a regression approach (section 9.5.1).

- Based on the number of deficiencies in the 'best comparators' approach (e.g. the inherent difficulties associated with deriving a relevant credit rating benchmark) it is unlikely that it could be used as a method to inform the AER on the appropriate benchmark efficient credit rating (section 9.5.1).

- The AER agrees with the JIA, the MEU and previous advice from the ACG that for the purposes of examining credit ratings, both transmission and distribution businesses should be included in the sample and that the same credit rating benchmark applies to both electricity distribution and transmission businesses (section 9.5.2).

- In relation to the sample that has been selected, the AER observes that (section 9.5.2):

    - the ACG has also considered that a financially supportive parent will impact on credit ratings (both for private and government owned businesses)

    - the JIA acknowledge that government owned businesses are treated on a standalone basis by Standard and Poor's in determining credit ratings, and

    - the impact on credit ratings of including gas businesses and government businesses will offset each other relative to a median credit rating derived from the private electricity sample.

- The AER has considered the following financial measurements in its regression analysis (section 9.5.3):

    - credit ratings for comparator businesses, and

[712] JIA, *Submission in response*, op. cit., September 2008, p. 141.

- credit rating metrics such as gearing, interest cover, funds from operations to total debt, free operating cash flow to total debt, and the ratio of cash flow to capital expenditure (as noted by the JIA).

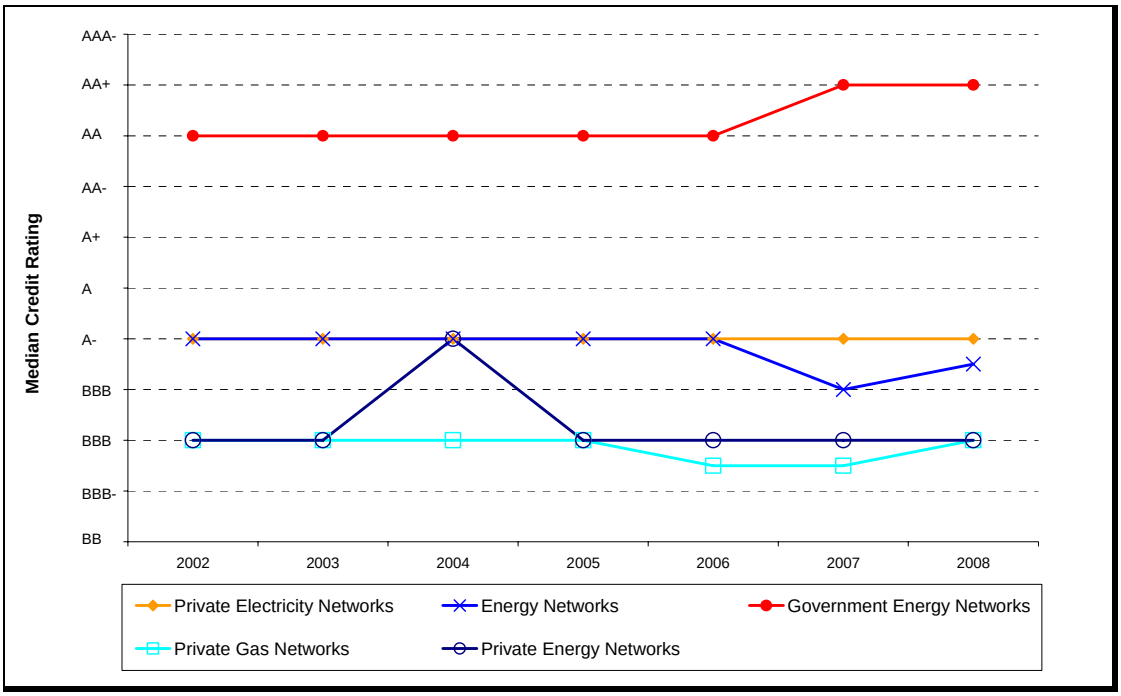
The AER has examined medians using a period consistent with the equity beta (2002 to 2008, in table 9.5 – reproduced as table 9.10) and has included a median for all the years examined (in figure 9.2 – reproduced as figure 9.5) for completeness.

**Table 9.10: Comparison of different samples (2002 - 2008)**

| Measure | Energy Networks | Government Energy Networks[(a)] | Private Energy Networks [(b)] | Private Gas Networks [(b)] | Private Electricity Networks |
|---|---|---|---|---|---|
| Median Credit Rating (2002 – 2008) | A- | AA | BBB+ | BBB | A- |
| Median Credit Rating (2002 – 2007) | A- | AA | BBB+ | BBB | A- |
| Median Credit Rating (2002 – 2006) | A- | AA | BBB+ | BBB | A- |
| Median Credit Rating (2003 – 2007) | A- | AA | BBB+ | BBB | A- |
| Median Credit Rating (2004 – 2008) | A- | AA | BBB+ | BBB | A- |

Source: Medians obtained using Standard and Poor's industry report cards (2002 - 2008)
(a) Includes SP AusNet and ElectraNet
(b) Includes SP AusNet and DUET

**Figure 9.2: Annual median credit rating (2002 - 2008) – Number of businesses[713]**




Source: Medians obtained using Standard and Poor's industry report cards (2002 - 2008)

The AER observes that irrespective of the period selected, the median credit rating across all the samples has remained constant (e.g. for both the private electricity sample and the energy businesses sample, the credit rating is A-).

Further, when examining the regression results and simple averages of credit ratings the AER observes that a credit rating of A- is at the lower end of a range of estimates representing a credit rating for a benchmark efficient service provider (A- to A+ for energy network businesses).

Based upon the submissions, available data, the AER's analysis and the considerations and conclusions made in sections 9.5.1 to 9.5.4 the AER considers that there is sufficient persuasive evidence to depart from the currently adopted from a credit rating of BBB+ for a benchmark efficient service provider to A-.

In accordance with the NER, the AER considers that a credit rating of A-:

- is supported by the most recent available and reliable empirical evidence, which the AER considers is persuasive in support of a change to the existing value
- generates a forward looking rate of return that is commensurate with prevailing conditions in the market for funds, and

[713] ElectraNet and SPI PowerNet are not included in either the private electricity or government energy networks sample. However these businesses would have offsetting effects in the median and are unlikely to change the analysis.

- generate a return on debt that reflects the current cost of borrowings for comparable debt.

On this basis the AER considers that its proposed credit rating achieves an outcome that is consistent with the National Electricity Objective.[714]

[714] NER, cls. 6A.6.2(j) and 6.5.4(e).

# 10 Assumed utilisation of imputation credits (Gamma)

## 10.1 Introduction

Under the Australian imputation tax system, domestic investors receive a credit for tax paid at the company level (an 'imputation credit')[715] that offsets part or all of their personal income tax liabilities. For eligible shareholders, imputation credits represent a benefit from the investment in addition to any cash dividend or capital gains received.[716] Standard regulatory practice in Australia is to incorporate a value for imputation credits in determining the appropriate company tax allowance (the 'corporate income tax building block') to include in the required revenues of regulated firms.[717]

The generally accepted regulatory approach to date in Australia has been to define the value of imputation credits in accordance with the Monkhouse definition.[718] Under this approach, 'gamma' ($\gamma$) is defined as a product of the 'imputation credit payout ratio' (F) and the 'utilisation rate' ($\theta$).

Gamma has a range of possible values from zero to one.

## 10.2 Regulatory requirements

### 10.2.1 National Electricity Rules

In undertaking a review of the WACC parameters, the NER sets out several matters that the AER must have regard to. Of particular relevance to the assumed utilisation of imputation credits are:

- the need for the rate of return to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds, and
- where a value cannot be determined with certainty:
  - the need to achieve an outcome that is consistent with the National Electricity Objective, and

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715 In this chapter the terms 'imputation credit' and 'franking credit' are used interchangeably.

716 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.

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

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

- the need for persuasive evidence before adopting a value that differs from the value that has previously been adopted for it.[719]

The AER's reasoning as to why these matters appear particularly relevant, while the others matters listed in the NER appear to be of lesser value, to the review of assumed utilisation of imputation credits is discussed in chapter three.

### 10.2.2 Previously adopted value

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.[720] 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:

> 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**
>
> **$\gamma$** is the assumed utilisation of imputation credits, which is deemed to be 0.5.
>
> **Distribution**
>
> **$\gamma$** is the assumed utilisation of imputation credits.

The NER (for both transmission and distribution) allow the AER to review the value of and method used to calculate 'the assumed utilisation of imputation credits' (gamma) component of the estimated cost of corporate income tax.[721]

The NER deemed the initial assumed utilisation of imputation credits for TNSPs in all jurisdictions and the DNSPs in NSW and the ACT to be 0.5.[722] For the remaining DNSPs, the NER did not deem an initial assumed utilisation of imputation credits and

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719 NER, cls. 6.5.4(e) and 6A.6.2(j).

720 NER, cls. 6A.6.4(a) and 6.5.3(a).

721 NER, cls. 6A.6.4(d) and 6.5.4(d)(7)

722 NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

the previously adopted assumed utilisation of imputation credits in these jurisdictions are those from the most recent distribution determination.

As illustrated in table 10.1, for the purposes of the NER, the previously assumed utilisation of imputation credits for TNSPs and DNSPs in all jurisdictions is 0.5.

**Table 10.1: Previously adopted value – assumed utilisation of imputation credits**

| Service provider | Source | Assumed utilisation of imputation credits |
|---|---|---|
| Transmission (all jurisdictions) | NER | 0.5 |
| Distribution (NSW) | NER | 0.5 |
| Distribution (ACT) | NER | 0.5 |
| Distribution (Tasmania) | OTTER (2007) | 0.5 |
| Distribution (Victoria) | ESC (2006) | 0.5 |
| Distribution (Queensland) | QCA (2005) | 0.5 |
| Distribution (South Australia) | ESCOSA (2005) | 0.5 |
| | | **0.5** |

Source: NER[723], OTTER[724], ESC725, QCA[726], ESCOSA[727].

The initial value of 0.5 for gamma deemed by the NER for transmission determinations reflects the position of the ACCC in its *Statement of Regulatory Principles for the regulation of electricity transmission revenues* (SRP).[728]

Table 10.2 outlines the gamma values previously adopted by jurisdictional regulators in the most recent distribution determinations for each jurisdiction. In addition, the jurisdictional regulators' separate estimates of the payout ratio and the utilisation rate are provided where applicable. The AER has included both electricity and gas distribution decisions on gamma in table 10.2, due to the (effective) equivalence of the issues across the two sectors.

723 NER, cl. 6A.6.2(b) and 6.5.2(b) of chapter 11, appendix 1.

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

725 ESC, op. cit., October 2006, p.332.

726 QCA, op. cit., April 2005, p.97.

727 ESCOSA, op. cit., April 2005, p.161.

728 ACCC, *Statement of principles for the regulation of electricity transmission revenues*, Final Decision, December 2004, p.118

**Table 10.2: Past regulatory practice – gamma in electricity and gas distribution determinations**

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

Source: ESC[729], OTTER[730], ESCOSA[731], QCA[732], IPART[733], ICRC[734].

As table 10.2 indicates, for both electricity and gas distribution, jurisdictional regulators have consistently adopted a value for gamma of around 0.5 (with a range of 0.3 to 0.5) in their most recent decisions. After analysing the empirical data available at the time, jurisdictional regulators have in many cases cited as key reasons for adopting a gamma value of 0.5:

- the complexity of the issues,
- the wide divergence of expert views, and

[729] ESC, *Gas access arrangement review 2008-2012*, Final decision – Public version, 7 March 2008, pp.499-509; ESC, op. cit., October 2006, pp.400-413.

[730] OTTER, op.cit., September 2007, pp.141-143.

[731] ESCOSA, *Proposed revisions to the access arrangement for the South Australian gas distribution system*, Final decision, June 2006, p.79; ESCOSA, op. cit., April 2005, pp.157-160.

[732] QCA, *Revised access arrangement for gas distribution networks: Allgas Energy*, Final decision, May 2006, pp.76-77; QCA, *Revised access arrangement for gas distribution networks: Envestra*, Final decision,, May 2006, pp.111-112; QCA, op. cit., April 2005, pp.121-122.

[733] IPART, *Revised access arrangement for Country Energy gas network*, Final decision, November 2005, p.66; IPART, *Revised access arrangement for AGL gas networks*, Final decision, April 2005, pp.99-100; IPART, op. cit., June 2004, p.226-227.

[734] ICRC, *Review of access arrangement for Actew AGL natural gas system in ACT, Queenbeyan and Yarrowlumla*, Final decision, October 2004, p.174-177; ICRC, op. cit., March 2004, p.70.

- the need to maintain consistency with previous decisions.

However, despite the consistency in the final value for gamma adopted by the jurisdictional regulators in past decisions, it is clear from table 10.2 that there have been widely divergent views among jurisdictional regulators on the three key variables:

- the payout ratio (ranging from 0.71 to 1.00)
- the utilisation rate (ranging from 0.50 to 1.00) and
- the range adopted for gamma, from which a point estimate is determined (lower and upper bounds of 0.30 and 1.00).

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

Table 10.3 indicates that the most recent estimates of the payout ratio (commonly referred to as 'F') quoted by Australian energy regulators have ranged between 0.39 and 1.00.

**Table 10.2: Recent estimates of the payout ratio (F)**

| Study | Method | Sample | Study Period | Payout ratio (F) |
|---|---|---|---|---|
| Lally (2003)[735] | Financial accounts | Large firms | 2002 | 1.00 |
| Hathaway & Officer (2004)[736] | Tax statistics | Market | 1988-2002 | 0.71 |
| Envestra (2006)[737] | Financial accounts | Utilities | 2000-2004 | 0.39[(a)]<br>0.82[(b)] |
| ESC (2008)[738] | Forecast revenues | Victorian gas distributors | 2008-12 | 1.00 |
| **Estimate (high-low)** | | | | **0.39 – 1.00** |

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

[735] M. Lally, 'Regulation and the cost of equity capital in Australia', *Journal of Law and Financial Management*, vol.2, no.1, November 2003, p.33

[736] N. Hathaway and B. Officer, *The Value of Imputation Tax Credits – Update 2004*, Capital Research Pty Ltd, November 2004, p.11.

[737] 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.

[738] ESC, *Gas access arrangement review 2008-2012*, Draft decision, 28 August 2007, pp.427-430.

Table 10.4 indicates that the most recent estimates of the utilisation rate (commonly referred to as 'theta') in the finance literature and in regulatory decisions have ranged between 0 and 0.81.

**Table 10.4: Recent estimates of the utilisation rate (theta)[(a)]**

| Study | Method | Study Period | Utilisation rate (theta) |
|---|---|---|---|
| Cannavan, Finn & Gray (2002)[739] | Inference from derivatives | 1994-1999 | ~0.50[(b)] (pre 45-day rule**) |
| | | | ~0.00[(c)] (post 45-day rule) |
| Hathaway & Officer (2004)[740] | Dividend drop-off | 1986-2004 | 0.50 |
| | | post-2000 | 0.60 |
| | ATO statistics | 1988-2002 | ~0.40 |
| Beggs & Skeels (2006)[741] | Dividend drop-off | 1986-2004 | 0.57 (2001-2004) |
| SFG (2007)[742] | Dividend drop-off | 1998-2006 | 0.20 - 0.40 |
| Handley & Maheswaran (2008)[743] | ATO statistics | 1988-2004 | 0.81 (2001-2004) |
| | | | 0.71 (1990-2004) |
| **Estimate (high-low)** | | | **0.00 – 0.81** |

(a) The ACG (2006) study prepared for ESCOSA has been excluded as it has not been made public.
(b) pre 45-day rule[744]
(c) post 45-day rule

It is important to note that the NER requires the AER to estimate gamma on a forward-looking basis, commensurate with prevailing market conditions (as with all other WACC parameters).[745] Due to the lack of available data this is not possible, therefore an appropriate estimate of gamma must be based upon historical data. However to satisfy the NER requirements the AER considers that an appropriate estimate of gamma must be reflective of the current imputation tax regime. This has

739 D. M. Cannavan, F. J. Finn and S. F. Gray, 'The value of dividend imputation tax credits in Australia', *Journal of Financial Economics*, vol.73, 2004, p.192.

740 N. Hathaway and B. Officer, *The Value of Imputation Tax Credits – Update 2004*, Capital Research Pty Ltd, November 2004, pp.13 and 24.

741 D. Beggs and C. L. Skeels, 'Market arbitrage of cash dividends and franking credits', *The Economic Record*, vol.82, no.258, September 2006, p.247.

742 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

743 J. C. Handley and K. Maheswaran, 'A measure of the efficacy of the Australian imputation tax system', *The Economic Record*, vol.84, no.264, March 2008, p.90.

744 In May 1997 the Australian introduced legislative that required investors to hold shares for a period of 45 days in order to become eligible to receive the imputation credit attached to dividends. The effect of this measure was to prevent trading around the ex-dividend date solely for the purposes of obtaining the imputation credit.

745 NER, cls. 6A.6.2(j)(1) and 6.5.4(e)(1).

implications for the appropriate time period over which to derive an estimate of gamma (see section 10.5.4).

## 10.3 Summary of issues raised in issues paper

In the issues paper the AER raised the following issues on the gamma parameter:

- the methodology for estimating gamma – proposed to continue with the Monkhouse approach (i.e. payout ratio multiplied by utilisation rate)
- estimating the payout ratio – the appropriate benchmark, time period of analysis, and a discussion of off-market share buybacks
- theoretical issues with the utilisation rate (theta) – the recognition of foreign investors in the domestic capital market, the identity of the relevant investor (i.e. average / marginal investor)
- estimating theta – empirical results from dividend drop-off studies and tax statistics, and the appropriate time period for analysis, and
- consistency between gamma and the market risk premium (MRP).

## 10.4 Summary of submissions in response to issues paper

In response to the issues paper, the AER received a substantive submission on the gamma parameter from the Joint Industry Association (JIA) – endorsed by the ENA, Grid Australia and the APIA. The JIA engaged SFG[746] and NERA and Wheatley[747] separately to provide reports on the issues associated with estimating the gamma parameter. The key elements of the JIA proposal on the gamma parameter are as follows:

- The previously adopted gamma value for both electricity transmission and distribution service providers is 0.5.
- There is no empirical evidence to reject pre-2000 data in estimating both the payout ratio (F) and the utilisation rate (theta). The inclusion of pre-2000 data improves the reliability of the results.
- The most appropriate benchmark imputation credit payout ratio (F) is a market average value of 0.71, as it is unclear whether a benchmark regulated electricity utility will pay higher or lower dividends relative to the market as a whole.

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[746] SFG, *The impact of franking credits on the cost of capital of Australian firms,* A report prepared for ENA, APIA and Grid Australia*,* 16 September 2008(b).

[747] NERA, *The Valuation of Imputation Credits*, A report for ENA, Grid Australia and APIA, September 2008.

- The best estimate of theta is derived from dividend drop-off studies, which are accurate, reliable and timely. Recent estimates generated by SFG supports a theta of between 0.2 and 0.35.

- The value of imputation credits cannot be inferred directly from the fraction of credits redeemed (i.e. from tax statistics), as the face value of credits redeemed represents a gross benefit and does not include the costs of redemption.

- Empirical evidence indicates that a positive value for theta is conditional on cash dividends being valued at less than face value, which is inconsistent with the assumptions underpinning the CAPM.[748] The correct and preferable means of restoring consistency with the CAPM is to set gamma equal to zero.

- The currently adopted value for gamma of 0.5 is inconsistent with the currently adopted MRP of 6 per cent. One way to restore consistency is to round up the MRP to 7 per cent.[749]

Overall, the JIA propose a gamma in the range 0.15 to 0.25 based upon its proposed empirical estimates of F and theta. Further, the JIA submit that the final value for gamma must address the inconsistencies identified by its consultants, either by adjusting gamma (to zero) or via an adjustment to the MRP (to 7 per cent). On the two possible solutions proposed, the JIA state that:

> Either of those approaches (a gamma of 0.2 and an MRP of 7 per cent; or a gamma of zero and an MRP of 6 per cent) would be acceptable to the Joint Industry Associations.[750]

The AER received separate submissions in support of the JIA's submission on the gamma parameter from the following parties:

- the Australian Pipeline Industry Association (APIA),

- the Energy Networks Association (ENA),

- ETSA Utilities, Citipower and Powercor,

- Grid Australia,

- Integral Energy, and

- SP AusNet.

The majority of these individual submissions focused on the two consistency issues raised by the JIA.

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748 The standard CAPM assumes no differential taxation between dividends and capital gains.

749 JIA, *Submission in response*, op. cit., September 2008, pp.150-152

750 ibid, p.153.

In its submission, the MEU argue that the appropriate range for gamma is between 0.72 and 1.00, based on the analysis undertaken by the ESC in its 2008 final decision on the Victorian Gas Access Arrangement.[751] The MEU make the following specific points on the gamma parameter, primarily in relation to the recognition of foreign investors in the analysis:

- The evidence from the market indicates that the imputation tax system has not prevented investment in Australian equities by foreign investors.
- Overall it is not the existence of imputation credits that determines an investment profile, but the need to diversify in order to hold a portfolio of investments.[752]

The AER notes that it received a late submission from the JIA's consultants SFG.[753] The AER gave consideration to whether it should have regard to the submission. However given that this submission was received some seven weeks after the close of submissions on the issues paper (and just four weeks prior to the public release of this draft decision), the AER considered that there was insufficient time to fully consider the submission. As a result, it has not been taken into account in this draft decision. The AER will consider the issues raised in this additional paper from SFG at the same time as other submissions received in the course of public consultation on this draft decision.

## 10.5 Issues and AER's considerations

The following sections on specific issues are structured as follows:

- defining gamma (section 10.5.1)
- estimating the payout ratio (section 10.5.2)
- theoretical issues with theta (section 10.5.3)
- the appropriate time period for estimating theta (section 10.5.4)
- inferring theta from market prices (section 10.5.5)
- estimating theta from tax statistics (section 10.5.6), and
- consistency issues (section 10.5.7).

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751 MEU, *Submission in response*, op. cit., September 2008, p.4.

752 ibid., pp.59-61.

753 ENA, Email to the AER, 6 November 2008. The ENA attached a report: SFG, *Response to issues raised at the AER Roundtable*, Report prepared for ENA, APIA, and Grid Australia, 28 October 2008.

### 10.5.1 Defining gamma

#### 10.5.1.1 Conceptual approach

As stated in the issues paper, the generally accepted regulatory approach in Australia has been to define the value of imputation credits in accordance with the Monkhouse definition. Under this approach, 'gamma' ($\gamma$) is defined as a product of the 'imputation credit payout ratio' and the 'utilisation rate', 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 (commonly referred to as 'theta') is defined as the value of distributed imputation credits to investors as a proportion of their face value.[754]

**Submissions in response to issues paper**

The definition of gamma above can be interpreted as implicitly assuming that retained imputation credits (i.e. those credits not yet distributed) are not valued by investors. The JIA's consultants NERA and Wheatley explicitly take this view:

> Imputation credits that are not distributed have no value to shareholders.[755]

Likewise, in its report prepared for the JIA, SFG implicitly adopts an assumption that retained imputation credits are not included in the final gamma value:

> To the extent that a particular firm does not immediately distribute all franking credits that are created, the value of gamma will be lower than the estimate of theta.[756]

**Consultant's review**

In a report prepared for the AER, Associate Professor John Handley takes a different view. Based on a review of some of the key finance literature, Handley states that for valuation purposes the payout ratio should be set to one, consistent with an assumption of full distribution of free cash flows:

> This suggested alternative approach is then not only consistent with the standard WACC valuation framework (within a classical tax environment) due to Miller and Modigliana (1961), and which underlies standard valuation practice such as that formulated by McKinsey & Company, Inc. (2005) and Stewart (1991), but it is also consistent with the valuation framework which underlies Officer's (1994) set of WACC definitions appropriate to the Australian imputation tax system.[757]

Handley stresses that this assumption does not imply an actual imputation credit payout ratio of 100 per cent each period. Rather, the standard assumption for

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754 P. Monkhouse, op. cit., 1997, pp.69-88.

755 NERA, op. cit., September 2008, p.17.

756 SFG, op. cit., 16 September 2008(b), p.3.

757 J. Handley, *A note on the valuation of imputation credits*, Report prepared for the Australian Energy Regulator, Final, 12 November 2008(d), p.5.

valuation purposes is that a firm will distribute 100 per cent of its free cash flows, and therefore for consistency a 100 per cent payout of imputation credits is appropriate.

Under this approach, effectively the 'gamma' parameter is equivalent to the 'theta' parameter, and the imputation credit payout ratio (F) is not a central issue.[758]

**Issues and AER's considerations**

The AER considers the views raised by Handley on the appropriate framework within which to estimate gamma to be persuasive. Although the standard regulatory approach to estimating gamma has been based upon the Monkhouse approach, Handley has demonstrated that the current approach is inconsistent with the standard approach to valuation.

Further, the AER accepts the advice from Handley that it is theoretically correct under the Officer perpetuity WACC framework to assume full distribution of imputation credits for valuation purposes.[759]

These views raise an important issue of consistency – that between the firms' cash flows and the discount rate. Conceptually, if the value of all imputation credits created is to be recognised in the cash flows (i.e. the tax building block), consistency requires that same value be incorporated into the analysis of the discount rate (i.e. in the MRP). It is noted that the need for internal consistency between all of the WACC parameters subject to review has been raised as a key overarching issue by the JIA in its submission.[760]

In this respect, the AER notes the views from the JIA's consultants Officer and Bishop on the issue of consistency between gamma and historical estimates of the MRP. Officer and Bishop state that the appropriate measure of the MRP is one that recognises all three potential sources of an equity holder's return – dividends, capital gains, and imputation tax benefits. In terms of the component of gamma with which to explicitly 'gross-up' the MRP for imputation however, Officer and Bishop stress that it is the value of distributed imputation credits that are of particular interest:

> The imputation tax benefits are of direct interest to shareholders once they are distributed. Thus when looking at the return shareholders receive from their investment over a particular period, we are interested in capital gains, dividends and the imputation tax benefits attached to dividends.
>
> [fn] Any value to imputation tax benefits retained will be reflected in the share price through an anticipation of when they may be distributed and their value at this time.[761]

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758 The AER notes that this interpretation of the gamma parameter could be considered technically consistent with the definition contained at cls. 6A.6.4(a) and 6.5.3(a) of the NER, which defines the gamma as 'the assumed utilisation of imputation credits'.

759 R. R. Officer, 'The cost of capital under an imputation tax system', *Accounting and Finance*, Vol.34, 1994, pp.1-17.

760 JIA, *Submission in response*, op. cit., September 2008, p.25.

761 B. Officer and S. Bishop, op. cit., August 2008, p.9

The AER considers that the arguments for recognising a positive value for retained imputation credits – whether in terms of cash flows or the discount rate – are persuasive from a conceptual point of view. It is consistent with the commonly adopted free cash flow approach to valuation, and with the Officer WACC framework which forms the basis for the prescribed NER methodology.[762]

For the purposes of estimating gamma therefore, this implies a payout ratio of one.[763] It is recognised that this principle must be applied consistently across the relevant WACC parameters such that the discount rate matches the cash flows. Consistency between gamma and the MRP is discussed at section 10.5.7.

**AER conclusion**

As part of this review the AER intends to define gamma as the value of imputation credits created by the payment of corporate tax. This implies a payout ratio of one for the purposes of estimating gamma.

#### 10.5.1.2 Market practice

In the issues paper the AER noted information suggesting that the standard market practice in Australia is to exclude the value of imputation credits from rate of return analysis.[764] In its paper prepared for the JIA submission, SFG again raises the issue of market practice and its relevance in estimating the gamma parameter.[765]

The AER reiterates its view from the issues paper that the omission of imputation credits from a valuation analysis is not necessarily indicative of negligible monetary value. Rather, as Handley points out, it is possible that for practical reasons market practitioners elect to exclude the value of imputation credits from both the cash flow and discount rate analyses.[766] As the JIA's consultants NERA and Wheatley note, the value for gamma will not affect company values as long as it is included (excluded) consistently in the firm's cash flows as well as the discount rate:

> If correctly executed, the adjustments to the required return to equity and to the way in which the cash flows are measured should exactly offset one another.[767]

This is supported by Handley, who explains in the context of the Officer WACC framework that imputation credits will not affect overall firm values as long as they are consistently recognised.[768]

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762 R. R. Officer, op. cit., 1994.

763 As Handley notes, the payout ratio under this framework may be affected by time value considerations however the effect is not expected to be material such that an estimate of one is unreasonable.

764 For example, see: KPMG, *2008 Gas Access Arrangement Review – Weighted Average Cost of Capital*, Prepared for SP AusNet, March 2007.

765 SFG, op. cit., 16 September 2008(b), p.8

766 J. Handley, op. cit., 12 November 2008(d), p.16

767 NERA, op. cit., September 2008, pp.7-8

Accordingly the AER considers that recognition of a positive value for imputation credits as part of this review is entirely consistent with market practice, provided that the principle of consistency between cash flows and the discount rate is adhered to.

### 10.5.2 Estimating the payout ratio

While the AER considers that there is strong evidence to support an estimate of F of one, the payout ratio remains relevant to historical estimates of the MRP.

The most recent estimates of the imputation credit payout ratio (F) quoted by jurisdictional energy regulators have ranged between 0.39 and 1.00.

In the issues paper the AER raised the following issues regarding the payout ratio (F):

- the appropriate benchmark
- the impact of tax changes, and
- alternative methods of distribution.

These issues are discussed below, in addition to new issues raised in the course of the AER's review.

**Submissions in response to issues paper**

In response to the AER's issues paper the JIA submit that the most appropriate estimate of the imputation credit payout ratio is the market average estimate of 0.71 provided in the 2004 Hathaway and Officer paper.[769]

***The appropriate benchmark***

In the issues paper the AER identified three possible benchmarks for estimating F: a firm specific estimate; a market average; or an industry average.

The JIA engaged NERA to provide its views on the appropriate benchmark assumption to take in estimating F. NERA makes the following comments:

- The use of a firm-specific estimate is inconsistent with the principle of Australian regulatory practice that a regulated firm's cost of capital should be based on a benchmark firm.
- It is unclear whether regulated electricity network service providers (NSPs) will have a higher or lower payout ratio than the market average; therefore the preference for use of an industry average is not a straightforward proposition.

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768 J. Handley, op. cit., 12 November 2008, pp.17-20. See also: S. Gray and J. Hall, 'Relationship between franking credits and the market risk premium', *Accounting and Finance*, Vol.46, 2006, pp.405-428.

769 JIA, *Submission in response*, op. cit., September 2008, p.155.

- A sample of listed Australian regulated utilities such as that generated in 2005 by Envestra[770] is unlikely to be representative of the benchmark regulated electricity NSP (i.e. including unlisted firms), given that:
  - it includes NSPs with complex financial structures such as trusts that distribute capital as dividends, and
  - high capex growth forecasts for unlisted NSPs suggest lower payout ratios going forward.[771]

On the basis of NERA's advice, the JIA conclude that:

> In the absence of a compelling industry benchmark it is reasonable to assume that, on average, regulated electricity transmission and distribution businesses have a similar ability to distribute imputation credits as the stock market average. The most robust current estimate of the market-wide distribution rate is 0.71 as calculated by Hathaway and Officer (2004).[772]

***The impact of tax changes***

The changes to the Australian tax system in July 2000 allowed domestic investors a full cash rebate for unused imputation credits. In the issues paper the AER raised the question of whether the 2000 tax changes had resulted in an increased demand for imputation credits and therefore an increase in F for Australian firms.

In response, the JIA submit that even if there was empirical evidence supporting an increase in the value of imputation credits in the post-2000 period, this would not necessarily lead to the conclusion that F should have also increased:

> This is because the level of dividends paid by a firm, and therefore the imputation credit distribution ratio, will depend on a number of factors. One such factor is the extent to which it is appropriate for the firm to retain profits to fund future growth.[773]

This view is supported by NERA and Wheatley, which argue that the distribution of imputation credits by firms may change over time for a multitude of potential reasons.[774]

***Alternative methods of distribution***

In the issues paper the AER sought views on the ability of energy utilities to distribute imputation credits via off-market share buybacks – which effectively allow firms to 'stream' imputation credits to those investors that value them.

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770 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.

771 NERA, op.cit., September 2008, pp.17-21

772 JIA, *Submission in response*, op. cit., September 2008, op. cit., p.160.

773 ibid., p.155.

774 NERA, op. cit., September 2008, p.21

In response the JIA submit that the incentive for firms to stream imputation credits is well understood by the Australian Tax Office (ATO), and that legislative measures are currently in place to limit such practices. As a consequence, the JIA argue it would be incorrect to expect that large energy utilities will be able to stream imputation credits in the future.[775]

**Consultant's review**

As stated in section 10.5.1, Handley recommends that for valuation purposes the appropriate imputation credit payout ratio is 100 per cent. Handley is clear in explaining the implications of this assessment:

> To be clear, it is not suggested here that firms actually payout 100% of their free cash flow each period but rather, that this is the standard assumption for valuation purposes.[776]

On this basis Handley argues that the discussion concerning the imputation credit payout ratio is unnecessary in the context of estimating the gamma parameter.

**Issues and AER's considerations**

As discussed in section 10.5.1, the AER considers that the conceptual arguments for a payout ratio of one are persuasive and appropriate in the current context. Notwithstanding, the AER has considered the views presented by the JIA in its submission. At the very least the payout ratio remains of relevance to the estimation of the MRP.

The AER accepts that there are likely to be many factors influencing the imputation credit payout ratio, including (but not limited to) the July 2000 tax changes. Given that the payout ratio may be materially affected by many factors in the short to medium term (e.g. investment opportunities) a longer term sample period may be more appropriate.[777]

In its submission the JIA discuss off-market share buybacks, and in particular the extent to which it should be assumed that a benchmark utility will engage in such practices in the future. It is clear that Australian companies do undertake off-market share buybacks from time to time, with the release of imputation credits one of the key drivers for such practices.[778] Therefore it could be argued that utility firms are in the same position. However it is acknowledged that currently there is some uncertainty surrounding the legislation on these issues.[779]

In the issues paper the AER stated that the industry average approach to estimating the payout ratio may have some advantages over a market average:

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[775] JIA, *Submission in response*, op. cit., September 2008, p.156.

[776] J, Handley, op. cit., 12 November 2008(d), p.5.

[777] This contrasts with theta, where the conceptual arguments for a structural break as a result of the July 2000 tax changes appear to be much stronger (see section 10.5.4).

[778] Board of Taxation, , *Review of the taxation treatment of off-market share* buybacks, pp.7-8. The AER notes that the final report from the Board of Taxation has not yet been publicly released.

[779] To the extent that off-market share buybacks continue to occur, the arguments for the recognition of a free cash flow framework are further strengthened.

> 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.[780]

Despite acknowledging that the payout ratio is indeed likely to be a firm / industry specific parameter, in its submission the JIA raise some practical issues with estimating an industry average payout ratio. In particular, the AER notes the views from the JIA that an appropriate industry sample group:

- should not include any firms that have complex financial structures that allow them to make non-dividend distributions, and
- should include firms that have a similar expected capital growth rate as that of Australian electricity NSPs.[781]

At a high level, the AER considers that a benchmark industry average should include as wide a sample of relevant firms as possible so as to generate a representative benchmark. For the payout ratio, such a sample should include both listed and unlisted firms. Notwithstanding, the AER accepts that the prevalence of complex financial structures (e.g. trusts) among the privately owned firms in the energy utility sector may complicate the calculation of a payout ratio based on listed firms.

As stated above, there are reasons to expect that an industry average payout ratio will differ from the market average. However, the AER accepts that it is not clear whether the industry average payout ratio will be higher or lower than the market average.

**AER's conclusion**

In terms of estimating the 'gamma' parameter, as discussed in section 10.5.1 the AER considers Handley's advice regarding the distribution of free cash flows to be persuasive, as it accords with the standard approach to valuation.[782] Accordingly, the AER will adopt a payout ratio of 1.0 in the assessment of gamma. As pointed out by Handley, this does not imply an expectation that all credits will be paid out in each period, but rather that the standard assumption for valuation purposes full distribution of free cash flows, therefore for consistency a 100 per cent payout of imputation credits is appropriate.

As an aside the AER accepts that the market average payout ratio of 0.71 generated by Hathaway and Officer is a reasonable empirical estimate of the annual payout ratio, given the absence of any compelling data based on an industry average. For the purposes of this review, this assessment has implications for the MRP only. Importantly, the AER considers that the market average payout ratio of 0.71 is not inconsistent with the results from the 'imputation credit yield' estimation used in calculating a 'grossed-up' historical MRP (see section 7.5.2.5).

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780 AER, *Issues Paper*, op. cit., August 2008, p.78.

781 JIA, *Submission in response*, op. cit., September 2008, p.171.

782 J. Handley, op. cit., 12 November 2008(d), pp.4-5

### 10.5.3 Theoretical issues with theta

In the issues paper the AER raised a number of theoretical issues that have been prominent in the previous regulatory debate on the value of imputation credits ('theta'), including:

- the recognition of foreign investors in the domestic capital market, and
- the identity of the relevant investor (i.e. average / marginal).

The AER proposed to adopt a market definition assumption of a domestic capital market with foreign investors recognised. Further, it was proposed that the most appropriate value of imputation credits is that based on a weighted average valuation of all investors in the market, but that none of the existing empirical estimates were necessarily inconsistent with this assumption.

**Submissions in response to issues paper**

As noted in section 4.2 (multi-parameter considerations), the JIA acknowledge that the use of domestic data in estimating WACC parameters implicitly recognises the presence of both domestic and foreign investors. Implicitly therefore, the JIA accept the AER's proposed approach to adopt a domestic form of the CAPM with foreign investors recognised to the extent they invest in the Australian market. Further, the JIA appear to accept the implications of this market definition assumption upon the plausible outcomes for theta:

> The theoretical arguments that underpin a value for Theta of either zero or one are not sufficient to dismiss a large body of theory and empirical work presented in this submission.[783]

This view is supported by the JIA's consultants SFG, which argues that technical theoretical discussions about market definition and the identity of the relevant investor are likely to confuse the analysis.[784]

That said, based on the advice of its consultants the JIA argue that the theory supporting a theta value of zero is more consistent with the empirical data than is the theory supporting a value of one. The primary basis for this theoretical assertion is that a non-zero theta implies that foreign investors could not earn their required rate of return and would therefore exit the Australian capital market. According to the JIA's consultants, the presence of foreign investors in the Australian market provides a conceptual basis for recognising a negligible (i.e. close to zero) value for theta.

The JIA submit that a focus on the valuation of the average or marginal investor can be misleading, as all investors will generally be marginal investors. In support of this the JIA refer to a report by its consultants NERA and Wheatley, which states that:

> All investors, though, will wish to diversify and so all investors will typically hold some position in each stock. It follows that *all* investors will be marginal investors, consequently one cannot identify an individual as the marginal

783 JIA, *Submission in response*, op. cit., September 2008, pp.28, 174.

784 SFG, op. cit., 16 September 2008(b), p.5.

> investor for the purposes of determining the value of distributed franking credits.[785]

In turn, NERA and Wheatley state that the value of imputation credits will be determined via a weighted average of all marginal investors in the market:

> It is important to note that the value of franking credits that a firm issues will be determined by a representative of *all* investors…[786]

NERA and Wheatley define the weights to be applied to individuals in forming a view on the valuation of the 'representative investor' according to the wealth of each individual investor in the market. Assuming that equity markets are integrated, as Australia holds a small portion of the world's wealth, domestic Australian investors will be granted very little weight and thus the representative investor will most closely resemble a foreign investor. On this basis NERA and Wheatley suggest that:

> Since foreign investors are limited in their ability to use franking credits and a representative investor is likely to most closely resemble a foreign investor, it is likely that franking credits will have little value.[787]

Following from this theoretical discussion, NERA and Wheatley postulate that an important empirical indicator of the impact of franking credits on equity returns in Australia is the extent to which the domestic capital market is integrated with global capital markets. They state that:

> One of the barriers that foreign investors who wish to invest in Australia face is an imputation tax system that discriminates between domestic residents and foreign residents… Despite the existence of a discriminatory imputation tax system, the Australian Bureau of Statistics (ABS) (2008) estimates that non-residents held 29 per cent of the total value of equity on issue by Australian enterprise groups as of 30 June 2007.[788]

NERA and Wheatley suggest that the presence of foreign investors in the Australian capital market supports the notion that franking credits have little value, as if they had a high value, foreign investors would not be able to earn their required return.

Conversely, the underlying notion that a positive theta value would discourage foreign investment in Australia is rejected by the MEU in its submission to the issues paper:

> …many investors do buy into Australian equities in the full knowledge that they will receive a lower benefit than Australian residents due to the existence of imputation credits of imputation credits that they cannot use. This has not prevented investment in Australian equities.

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785 NERA, op.cit., September 2008, p.11.

786 ibid., p.12.

787 ibid., p.13.

788 ibid., p.14.

> Overall, it is not the existence of imputation credits that determines an investment profile, but the need to diversify in order to hold a portfolio of investments that meets the return criteria determined.[789]

In its report prepared for the JIA, SFG presents a similar counterfactual argument to that presented by NERA and Wheatley:

> …setting gamma above zero requires an assumption that foreign investors have been willing to accept a reduction in their expected rate of return. In my view, foreign investors are unlikely to behave in this way – they will be price sensitive and find substitute investments in other markets if expected returns on Australian investments are suddenly reduced.[790]

To examine the 'price sensitivity' of foreign investors SFG refers to a forthcoming study which explores the extent to which Australia expands the risk-return frontier available to foreign investors.[791] Based on this analysis SFG suggests that there are no unique benefits available to foreign investors from investing in Australia, and that these investors are likely to exit the Australian market if prices rise due to imputation credits (that they cannot access). SFG concludes from this analysis that imputation credits must have little value.

**Consultant's review**

Handley argues that, contrary to the statements from SFG, theoretical issues such as the definition of the market and the identity of the relevant investor are essential in the current context. Handley states that arguably the most critical choice to make when using the CAPM is in defining the market:

> Once you choose the market, you define the set of assets that are relevant for pricing purposes and you define the set of investors that are relevant for pricing purposes. Non market assets, including assets held by any of the investors in other markets are outside the model and therefore play no role.[792]

Consistent with the views presented by NERA and Wheatley, Handley states that under a CAPM equilibrium framework all investors are collectively 'the marginal investor' since all investors collectively determine the prices of all assets. Under this framework, the equilibrium value of an asset is determined via a complex weighted average of the levels of risk aversion of all investors in the market. Similarly, the equilibrium value of imputation credits represents a complex weighted average of the values of credits and risk aversion of all investors in the market.

On these two key theoretical issues, Handley concludes:

> For clarity, it is not suggested that the identity of the marginal investor should be assumed nor that the existence of foreign investors should be assumed away. Rather, by choosing a domestic market portfolio, the equilibrium value

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789 MEU, *Submission in response,* op. cit., September 2008, p.60.

790 SFG, op. cit., 16 September 2008(b), p.52.

791 The study referred to is: D. Costello, S. Gray, J. Hall, and McCrystal, *The unique diversification benefits of investing in Australia*, forthcoming in JASSA, the Journal of the Finsia professional body.

792 J. Handley, op. cit., 12 November 2008(d), p.6.

> of gamma is by definition equal to a weighted average over all investors in the domestic market, including foreign investors but only to the extent that they invest domestically.[793]

Handley critiques the statements made by NERA and Wheatley concerning what the presence of foreign investors in the Australian market can reveal about the value of imputation credits. As Handley points out, the conclusion of a zero theta value rests on the assumption that equity markets are fully integrated – that the relevant market portfolio for pricing purposes is an international benchmark. However this conclusion does not hold if the relevant market portfolio is a domestic benchmark:

> So whilst it is true that the aggregate wealth of domestic investors compared to the aggregate wealth of foreign investors is small on a global scale, the choice of a domestic market portfolio means that the weighting should be based only on the wealth invested in the domestic market portfolio…[794]

Further, Handley states that if equity markets are assumed to be fully integrated an international CAPM must be used for pricing purposes, which has implications for other WACC parameters.[795]

**Issues and AER's considerations**

The AER notes the views from SFG that if one empirically estimates theta from market data (e.g. from dividend drop-off analysis) there is no need to enter a theoretical debate about the identity of the marginal investor or market definition. This is in contrast to the views from Handley that the conceptual basis upon which the analysis of WACC parameters rests is an essential starting point, particularly in relation to the gamma parameter.

As stated in the issues paper, the AER considers that these theoretical issues cannot be sidelined in the analysis of the empirical evidence examining the value of imputation credits. It is important to understand the conceptual basis for alternative empirical estimates of theta (e.g. from dividend drop-off studies and tax statistics) in forming a view on how much weight to assign to the various methods available. This issue was discussed at some length at the AER's October 2008 expert's group round-table discussion on the WACC parameters.[796]

At a high level, the AER notes that the theoretical debate on theta appears to have shifted from that which has characterised previous regulatory decisions in the energy sector. A number of common positions appear to have emerged, including:

- Market definition – domestic capital market with foreign investors recognised implicitly in the use of domestic market data. This proposal effectively rules out the two theoretical extreme positions for a theta value of one (i.e. assuming full segmentation of the domestic capital market) and zero (i.e. assuming full integration in a perfect global capital market).

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793 ibid., p.7.

794 ibid., p.21.

795 For example, in the estimation of the risk free rate, the MRP, and the equity beta.

796 AER, *Australian Energy Regulator review of WACC parameters for electricity transmission and distribution*, Transcript of proceedings, Melbourne, 10 October 2008.

- Average / marginal investor – all investors are marginal investors, therefore the task is to determine the valuation of the 'representative investor', which is the weighted average valuation of all investors in the market.

On the first position, it is noted that the JIA and its consultants support the use of domestic market data to estimate the WACC parameters (explicitly recognising the presence of foreign investors). However there appears to be a difference of opinion on what the presence of foreign investors can reveal about the value of imputation credits in the Australian economy.

Specifically, the question becomes what weights should be assigned to each investor or group of investors in coming to a view on the appropriate weighted average value of imputation credits in the market as defined. There appear to be two possible approaches:

1. weight Australian [foreign] investors according to the proportion of global wealth held by Australian [foreign] investors, or

2. weight Australian [foreign] investors according to the proportion of Australian assets held by Australian [foreign] investors.

The first of these approaches is that suggested by the JIA and its consultants. By allowing *foreign assets and investors* into the model and assuming perfect global capital markets (i.e. no 'home country bias'), the weighting applied to Australian investors is negligible. As a consequence, under this scenario theta is negligible. As Handley points out, this approach effectively assumes fully integrated capital markets, and that the relevant market portfolio for pricing purposes is an international benchmark.

The second of these approaches is that suggested by Handley, and accords with the market definition proposed in the issues paper.[797] By allowing *only foreign investors* into the model and basing the weights upon observed holdings of Australian assets, the weighting applied to Australian investors is commensurate with their ownership of Australian equities. Similarly, the weighting applied to foreign investors is commensurate with their ownership of Australian equities. As a consequence, theta can be thought of as the proportion of Australian equities held by Australian investors (who fully value credits).

The AER considers the second approach above recognises the influence of foreign investors on domestic market data, and ensures consistency with the other WACC parameters. The assumptions from both SFG and NERA and Wheatley on the effects of allowing foreign investors into 'the market' present only one theoretical extreme. In particular, both consultants ignore the impacts of 'home country bias' in their analysis and assume perfect capital markets.[798] Further, in its submission the JIA

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[797] The AER notes that this position has been implicitly accepted by the JIA in its submission, in that it advocates the use of domestic market data to estimate the various WACC parameters subject to review.

[798] For a recent discussion of 'home country bias', see: J. C. Hatchondo, 'Asymmetric information and the lack of portfolio diversification', *International Economic Review*, Vol.49, No.4, November

support the use of a domestic market portfolio for pricing purposes, therefore the full integration scenario – necessitating the use of an international CAPM – will not be considered further.

This conceptual basis was put forward by Professor Kevin Davis in an early paper prepared for the ACCC:

> …it is worth noting that γ is an "average" utilization factor. For any single Australian tax paying investor who does not finish the fiscal year with unused tax credits, γ=1. For foreign investors and non-taxable entities, γ=0. Hence, in principle, the average γ should approximate the proportion of total investment held by Australian taxpaying investors in the equity market.[799]

It is noted that the views of Davis (among others) were influential in forming the conceptual basis for the ACCC's previously adopted value of 0.5 for gamma.[800]

As stated above, the presence of foreign investors in the Australian market is not disputed. The point of difference appears to be what the presence of foreign investors can reveal about the value of imputation credits. One argument put forward by the JIA's consultants is that the presence of foreign investors in the Australian market requires that imputation credits have negligible value, as if they had a high value foreign investors would not be able to earn their required return. The alternative view is that foreign investors may continue to hold Australian assets even though they cannot access the benefits of imputation credits, due to (for example) diversification benefits.[801]

On this point the AER notes the analysis provided by SFG regarding the extent to which the Australian capital market expands the risk-return frontier available to foreign investors (see figure 10.1).

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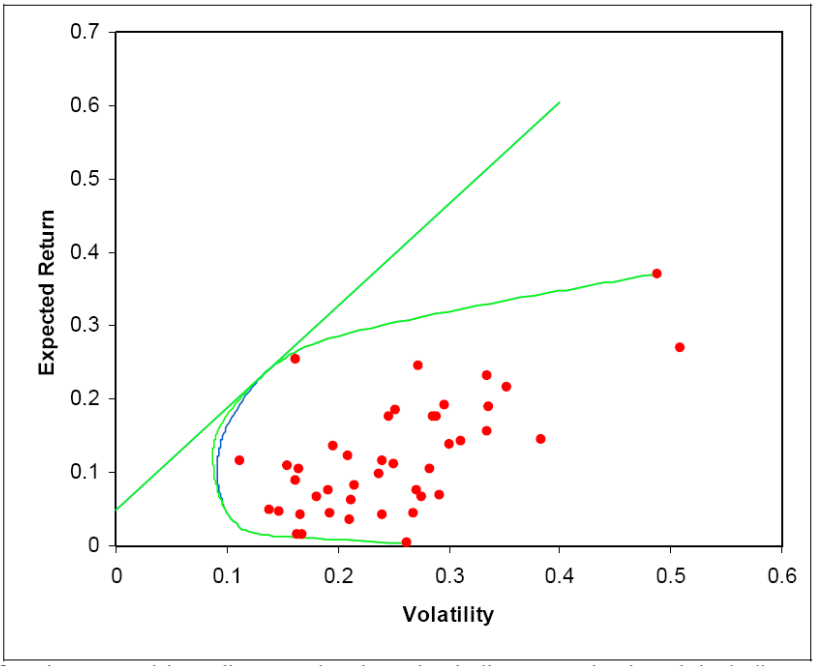
2008, pp.1297-1330. The authors conclude: "There is pervasive evidence that individuals invest primarily in local stocks and thus hold poorly diversified portfolios."

799 K. Davis, *The weighted average cost of capital for the gas industry*, Report prepared for: Australian Competition and Consumer Commission and Office of the Regulator General, University of Melbourne, March 1998, p.5.

800 ACCC, *Access Arrangement by Transmission Pipelines Australia Pty Ltd and Transmission Pipelines Australia (Assets) Pty Ltd for the Principal Transmission System; Access Arrangement by Transmission Pipelines Australia Pty Ltd and Transmission Pipelines Australia (Assets) Pty Ltd for the Western Transmission System; Access Arrangement by Victorian Energy Networks Corporation for the Principal Transmission System*, Final Decision, 6 October 1998, p.54.

801 The AER notes that the issue of the diversification benefits available to foreign investors committing capital in the Australian market was discussed in the context of the ESC's 2008 gas distribution decision.

**Figure 10.1: Risk-return efficient frontier with and without Australia**




The efficient frontier comprising all 43 national equity indices examined and including Australia is presented in green. The efficient frontier excluding the Australian index is presented in blue. Data points appearing below the efficient frontier represent individual index returns.
Source: Costello, Gray, Hall and McCrystal (2008), Figure 1, p. 5.

Source: SFG[802]

Based on this analysis SFG suggests that there are no unique benefits available to foreign investors from investing in Australia, and therefore that these investors are likely to exit the Australian market if prices rise due to imputation credits (that they cannot access). The AER notes two major points regarding this counterfactual scenario presented by SFG.

First, SFG's own analysis indicates that the Australian capital market *does* in fact provide unique diversification benefits to foreign investors. That is, according to figure 10.1, the inclusion of Australia in a global portfolio shifts the efficiency frontier in the north westerly direction. This implies that foreign investors will include Australian equities in their global portfolio for diversification reasons.

Secondly, the majority (around 90 per cent) of equity indices plotted in figure 10.1 do not sit on the efficiency frontier. This casts doubt on the representativeness of the frontier in describing efficient risk-return tradeoffs, and suggests a lack of international diversification is inefficient. Plotting entire equity indices to generate an efficiency frontier may be inconsistent with the CAPM, as it may not take account of the infinite amount of portfolios that can be derived from the individual assets and firms within these markets.

There are many reasons to suggest that the simple CAPM risk-return framework is insufficient to explain patterns of investment across borders (e.g. heterogeneous

[802] SFG, op. cit., 16 September 2008(b), p.52.

expectations, imperfect information, non-zero transactions costs, etc). This point is made by Handley, with reference to some of the finance literature.[803]

On this basis the AER considers that a positive value for imputation credits is not inconsistent with the presence of foreign investors in the Australian capital market.

**AER's conclusion**

The AER will adopt a conceptual framework that defines 'the market' as the domestic Australian capital market with foreign investors recognised to the extent they invest in that market. In turn, the value of imputation credits is best considered a weighted average valuation of all investors (both domestic and foreign investors) in the defined market. The AER considers that this conceptual framework recognises the realities implicit in domestic market data and ensures consistency with the other WACC parameters. It also accords with the upfront position established in the issues paper, the appropriate approach to estimating WACC parameters endorsed by the JIA, and the views expressed by Handley.

Importantly, this theoretical position does not preclude the consideration of any of the available empirical methodologies to estimate theta (i.e. dividend drop-off or tax statistics).

### 10.5.4 The appropriate time period for estimating theta

In the issues paper the AER raised the question of whether it is more appropriate to rely on post-2000 data to estimate theta given the tax changes in July 2000 which allowed resident investors (including superannuation funds) a cash rebate for unused imputation credits.

**Submissions in response to issues paper**

The JIA submit that:

> There is no evidence to reject pre-2000 data. Therefore, empirical estimates of Theta should be based on a long term data set to minimise estimation errors.[804]

This view is based on the advice of the JIA's consultant SFG, which examined the results of three recent dividend drop-off studies to look for evidence of a structural break in 2000. As a general principle, SFG states that a longer data set with more observations will produce more precise and statistically reliable results. SFG argues

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[803] J. Handley, op. cit., 12 November(d), p.21. The paper referenced is G. A. Karolyi and R. Stulz, *Are financial assets priced locally or globally?* Handbook of Economics and Finance, 2003. Specifically, from p.1014: "Models that rely on perfect financial markets do not explain important stylized facts in international finance, such as the home country bias and the volatility of capital flows." See also: J. C. Hatchondo, op. cit., November 2008.

[804] JIA, *Submission in response*, op. cit., September 2008, p.164.

that a larger sample is particularly important in the context of dividend drop-off analysis, given that the data are known to be 'noisy'.[805]

On the three dividend drop-off studies analysed, SFG makes the following comments:

- in the 2004 Hathaway and Officer study, the estimated value of theta reduced for two and a half years post 2000, and by the end of the sample period it was no higher than at the time the rebate was introduced
- in the 2006 ACG study, the estimates of theta were insignificantly different from zero both before and after the July 2000 tax changes, and
- in the 2006 Beggs and Skeels study, the observed increase in theta post July 2000 was more driven by the decrease in the value of the cash dividend from an economically implausible high.

In addition, SFG's 2008 dividend drop-off study as contained in its report prepared for the JIA tested for a structural break between the periods 1998-1999 and 2001-2006, and found that theta was insignificantly different over the two periods.[806]

On the basis of these observations, SFG concludes that there is strong evidence that the July 2000 tax changes did not cause a significant increase in theta, therefore data from pre and post 2000 should be included in the analysis so as to improve the reliability of the results.[807]

**Consultant's review**

As part of this review Handley did not explicitly examine the empirical evidence for a structural break as a result of the July 2000 tax changes. However in noting that SFG's 2008 results for theta in the period 2001-2006 are higher than that for the full sample period 1998-2006, Handley comments that:

> Arguably the period since 2001 is most relevant since this corresponds to the date from which certain resident investors became entitled to a cash refund of excess franking credits…[808]

**Issues and AER's considerations**

The AER acknowledges that there have been many changes to the taxes that investors face at the personal level, including those to the imputation system, which may have affected the required returns on equity and debt.[809] However given that we are estimating the value of imputation credits (abstracting from other personal taxes), changes to the imputation tax system are of most relevance in the current context.

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805 SFG, op. cit., 16 September 2008(b), pp.15-16. The term 'noise' refers to factors completely unrelated to the dividend that can drive the results of drop-off analysis, such that the effect of the dividend in isolation is difficult to measure.

806 ibid., pp.54-63. SFG examined 'p-values' and concluded that an observed p-value > 0.05 indicates that the pre and post 2000 credit drop-off values are insignificantly different from each other.

807 ibid., pp.17-20.

808 J. Handley, op. cit, 12 November 2008(d), p.13.

809 This point was made by NERA and Wheatley [NERA, op. cit., September 2008, p.10].

In contrast to the payout ratio (see section 10.5.2), there is a much clearer conceptual argument that the value of imputation credits to the 'representative' investor in the Australian capital market will have increased following the July 2000 tax changes. Prior to the tax changes, the key drivers for the value of imputation credits for an individual investor were:

- residency status (i.e. domestic and foreign investors place differential valuation on imputation credits), and
- marginal tax rates (i.e. imputation credits received in excess of personal income tax liabilities were not able to be utilised).

Foreign investors were not directly affected by the July 2000 tax changes. However for domestic investors (both individuals and funds), the tax changes effectively took the impact of marginal tax rates out of the equation, as a full cash rebate was allowed for credits received in excess of income tax liabilities. For these reasons, given that theta is defined as a weighted average valuation across all investors in the Australian capital market, one would expect it to increase as a result of the 2000 tax changes.[810]

The AER considers that the results of the 2008 Handley and Mahesawaran study of tax statistics provides support to the conceptual arguments for an increase in theta following the July 2000 tax changes. The results from this study were not considered by SFG in its analysis of the case for a structural break. The authors examine the aggregate amount of imputation credits received and utilised by different groups of investors in the Australian economy. Table 10.5 illustrates some of the key findings from this study.

[810] That is, assuming that the proportion of foreign / domestic investors in the Australian capital market has remained stable over the pre and post 2000 periods.

**Table 10.5: Weighted average utilisation rate – 1990-2004**

| | Mean 1990-2000 | Mean 2001-2004 |
|---|---|---|
| Credits received ($AU, b) | | |
| Individuals | 2.8 | 5.4 |
| Funds | 1.1 | 1.8 |
| Non-residents | 1.0 | 1.9 |
| **Total** | **4.9** | **9.1** |
| Credits used ($AU, b) | | |
| Individuals | 2.6 | 5.4 |
| Funds | 0.7 | 1.8 |
| Non-residents | 0.1 | 0.1 |
| **Total** | **3.3** | **7.4** |
| Excess credits ($AU, b) | | |
| Individuals | 0.2 | 0.0 |
| Funds | 0.4 | 0.0 |
| Non-residents | 1.0 | 1.7 |
| **Total** | **1.6** | **1.7** |
| Utilisation rate (%) | | |
| Individuals | 0.92 | 1.00 |
| Funds | 0.64 | 1.00 |
| Non-residents | 0.05 | 0.07 |
| **Total** | **0.67** | **0.81** |

Source: Handley and Maheswaran[811]

In particular, table 10.5 indicates that between 1990 and 2000, on average:

- resident individuals utilised 92 per cent of imputation credits received
- resident funds utilised 64 per cent of imputation credits received, and

[811] J. C. Handley and K. Maheswaran, op. cit., 2008, table 4, p.90. Note that numbers in the table are in $Abn, except for the utilisation rates in the bottom panel.

- non-residents utilised (received value from) 5 per cent of imputation credits received.

By contrast, in the post-2000 period, consistent with an assumption of 'investor rationality', all resident investors are assumed to utilise 100 per cent of imputation credits received.[812] The utilisation rate for non-resident investors remained relatively stable at 7 per cent. The authors summarise their key results as follows:

> For 2001-2004, $A9.1bn in credits have been received each year on average of which $A7.4bn has been used leaving $A1.7bn in excess credits each year… this corresponds to an average utilisation rate of 0.67 over 1990-2000 and 0.81 over 2001-2004, with the latter period reflecting the refundability of excess imputation credits to certain resident investors since 1 July 2000.[813]

The AER considers that the results from this study are entirely consistent with the conceptual arguments for a structural break post-2000. The AER considers that the assumption of 'investor rationality' post-2000 is not unreasonable, given that it simply reflects the likelihood that the cash rebate for unused credits would be redeemed by both resident individuals and superannuation funds. Accordingly the AER considers that the results from the 2008 Handley and Maheswaran study provide further support for a structural break following the July 2000 tax changes.

To explore the specific issues raised by SFG regarding the evidence for a structural break after July 2000 the AER has considered the results from four empirical studies on theta, as follows:

- the 2006 ACG study
- the 2004 Hathaway and Officer study
- the 2006 Beggs and Skeels study, and
- the 2008 SFG study.

***The 2006 ACG study***

As stated in the issues paper, the AER does not intend to consider the results contained in the 2006 ACG dividend drop-off study prepared for ESCOSA. To the AER's knowledge the ACG study has not been made public and therefore cannot be properly scrutinised. The need for scrutiny is magnified by the admission from the ACG that there were errors in the underlying data set upon which the theta estimates were based.[814]

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812 The authors also note issues with ATO data availability in the post-2000 period.

813 J. C. Handley and K. Maheswaran, op. cit., 2008, p.91.

814 ACG, *Preliminary response to SFG report on the value of distributed imputation credits*, Report to ESCOSA, 14 September 2006.

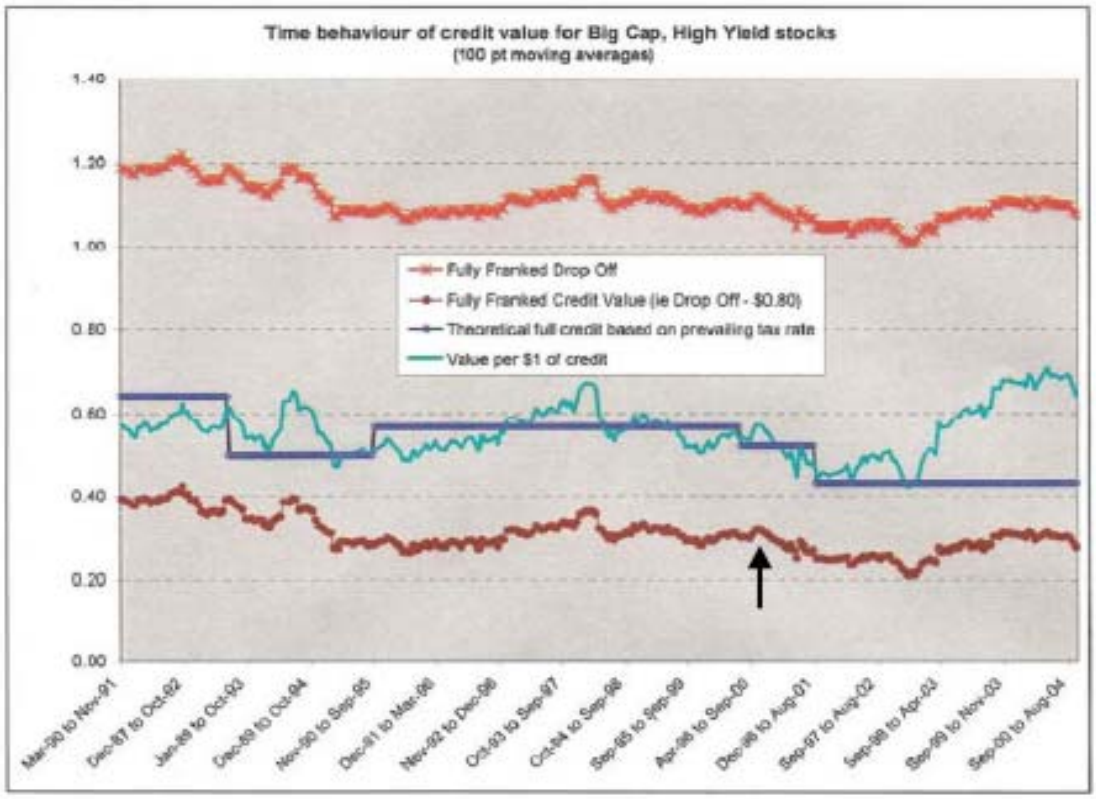
***The 2004 Hathaway and Officer study***

Based on the information presented in the 2004 Hathaway and Officer paper it is not possible to verify the statistical significance of the results. Therefore the AER considers that limited reliance can be placed upon it as part of this review.

Notwithstanding, given that the results of this dividend drop-off study have been widely quoted in previous regulatory decisions, the AER has considered the case put forward by SFG regarding a structural break.

SFG presents figure 10.2 from the Hathaway and Officer study, which illustrates the value of imputation credits over the period March 1990 to August 2004 (based on a rolling average).

**Figure 10.2: Hathaway and Officer (2004) – time behaviour of credit value**




Source: SFG[815]

SFG focuses on the lower line in figure 10.2 above (labelled 'Fully Franked Credit Value'), which measures the value of the imputation credit (i.e. the franking credit drop-off, in dollar terms), conditional on $1.00 of cash dividends being valued at $0.80. SFG states that after the tax changes in July 2000 were introduced (depicted by the arrow) the value of a franking credit actually decreased for the following two years. On this basis SFG concludes that there is no evidence to suggest an increase in theta coinciding with the tax changes in July 2000.

[815] SFG, op. cit., 16 September 2008(b), figure B.1, p.44, taken from: N. Hathaway and R. R. Officer, op. cit., November 2004, p.24.

The AER considers it is inappropriate to focus on the lower line in figure 10.2, as it does not measure theta. The series relied upon by SFG provides only the absolute dollar value of a franking credit, which is misleading in terms of estimating theta as it does not take account the impact of changes in the prevailing tax rate. As the flat series titled 'Theoretical full credit based on prevailing tax rate' in figure 10.2 indicates, there were numerous changes in the company tax rate over the sample period.

The appropriate focus in figure 10.2 should be on the middle line (labelled 'Value per $1 of credit'), which measures theta directly – as the value of an imputation credit relative to its face value (i.e. the franking credit drop-off ratio). This series indicates that theta remained relatively stable between 0.45 and 0.50 over the first two and a half years following the July 2000 tax changes, and then increased quite dramatically to a level exceeding 0.60 in the two years thereafter. In their paper, Hathaway and Officer appropriately focus on this series in their discussion, and make the following observation:

> The ratio of the actual credit drop to the theoretical drop varied around 50% of the face value but in recent years has shown an increase to above 60% of face value… These changes have been too recent to enable any detailed analysis.[816]

In sum, even if the reliability of the results from the 2004 Hathaway and Officer study could be verified, the AER considers them to be inconclusive in terms of a structural break following the July 2000 tax changes. While there is evidence from this study that theta increased in the post 2000 period, the case for a structural break is unclear given that the estimates of theta remained stable immediately following the tax changes.

***The 2006 Beggs and Skeels study***

The AER considers that the results of the 2006 Beggs and Skeels dividend drop-off study provide a strong case for a structural break after July 2000. Importantly, this published study has been subject to peer review, and contains detailed econometric analysis of all of the key results.

Beggs and Skeels estimate that theta increased from 0.128 to 0.572 as a result of the July 2000 tax changes, and the result is estimated to be statistically significant. The authors conclude:

> …it appears that this tax change had a permanent impact on the value of franking credits. This result is confirmed by a test for structural breaks whereby the interval 1998-2000 is compared to 2001-2004. The test shows that the franking credit drop-off ratio was significantly higher in 2001-2004.[817]

SFG points out that this result from the 2006 Beggs and Skeels study must be read in conjunction with the result that the value of cash dividends decreased from $1.168 to $0.80 over the same period. SFG argues that:

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[816] N. Hathaway and R. R. Officer, op. cit., November 2004, p.24.

[817] D. Beggs and C. L. Skeels, op. cit., 2006, p.248.

> …the result here is not so much one of an increase in the value of franking credits, but one of a massive decrease in the estimated value of cash dividends from an implausibly high level.[818]

SFG states that the value of cash dividends in the year 2000 may have been affected by estimation error resulting from noise in the data. SFG argues that if this is the case, the conclusion that theta increased over this period must also be rejected. This is supported by NERA and Wheatley, which state that concerns with the estimates from the year 2000 mean that a firm conclusion cannot be drawn on whether theta increased as a result of the tax changes.[819]

The AER agrees with SFG that these empirical results must be considered in their entirety, and therefore that the value of cash dividends should be examined in line with theta. However it is noted that the increase in theta over the period has been determined as statistically significant by the authors. In addition, as shown in table 10.6, Beggs and Skeels' separate estimates of theta for each individual year provide further support for an increase in theta in the post 2000 period, and the value of cash dividends remained relatively stable at around 0.80.

**Table 10.6: Theta and the value of cash dividends – 2000-2004**

| Year ended 30 June | Cash dividends | SE | Theta | SE |
|---|---|---|---|---|
| 2000 | 0.843 | 0.113 | 0.242 | 0.187 |
| 2001 | 0.817 | 0.131 | 0.506 | 0.233 |
| 2002 | 0.769 | 0.128 | 0.732* | 0.284 |
| 2003 | 0.728 | 0.093 | 0.678* | 0.193 |
| 2004 | 0.811 | 0.108 | 0.631* | 0.229 |

Source: Beggs and Skeels[820]
* Indicates significantly greater than zero at the 5 per cent level

The AER considers that 2006 Beggs and Skeels study sets out a series of carefully considered and highly influential views. Therefore while there are competing views, the AER is persuaded by the authors of this published study that theta indeed increased following the July 2000 tax changes.

***The 2008 SFG study***

SFG's own dividend drop-off study contained in its report to this review tested for a structural break between the periods 1998-1999 and 2001-2006, and found that in most cases theta was insignificantly different over the two periods (i.e. indicated by a p-value > 0.05). SFG does not consider the year 2000 in its analysis, given its view that the results from this year appear anomalous.

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818 SFG, op. cit., 16 September 2008(b), p.19.

819 NERA, op. cit., September 2008, p.29.

820 D. Beggs and C. L. Skeels, op. cit., 2006, table 3, p.246.

There are no diagnostics presented in the 2008 SFG study supporting the reliability of the drop-off ratios presented. Without such statistical analysis it is not possible to verify the reliability of SFG's dividend drop-off results.[821] Further, without such statistical analysis supporting the reliability of the underlying drop-off ratios, it is also not possible to form a view on the reliability of SFG's test for a structural break between these ratios over the two time periods analysed.

On this basis, the AER has placed limited weight on the results of the 2008 SFG study in determining the appropriate sample period over which to estimate theta.

**AER's conclusion**

Given the NER requires that gamma be estimated on a forward-looking basis, it is important that the data upon which it is estimated is representative of the current imputation tax regime.[822] In this respect there is a clear conceptual case to focus on data from the post-2000 period only, given the tax changes in July 2000 which allowed a full cash rebate to resident investors for unused imputation credits.

The AER considers that the JIA have not presented any compelling evidence to include pre-2000 data in the estimates of theta, nor has it established that a longer data set will improve the reliability of the final estimates. The case for a structural break as a result of the July 2000 tax changes has a sound conceptual basis, and is supported by the most reliable and verifiable empirical evidence.[823]

On this basis the AER considers there is persuasive evidence to reject pre-2000 data from consideration in estimating theta. Accordingly for the purposes of this review the AER intends to estimate theta based on post-2000 data only.

### 10.5.5 Inferring theta from market prices

In the issues paper the AER examined the most commonly cited empirical studies focusing on the value of imputation credits inferred from market prices. The studies identified included:

- the 2004 Cannavan, Finn and Gray study
- the 2004 Hathaway and Officer study

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821 The AER formally requested SFG's data and calculations as part of this review [AER, Email to ENA, 15 October 2008]. On 5 November 2008, the AER received the raw data from the ENA [ENA, Email to AER, 5 November 2008], and on 14 November 2008 the AER received more detailed information on SFG's outputs. While this further information has been taken into account, the information received does not allow the AER to verify the accuracy or reliability of SFG's results for the purposes of this draft decision.

822 NER, cls. 6A.6.2(j)(1) and 6.5.4(e)(1).

823 The AER notes that the conceptual case for a structural break in 2000 was commented on by Judge Tilmouth as part of the final ruling on Envestra's appeal of ESCOSA's 2006 final gas distribution decision. See: District Court of South Australia, *Envestra Limited v Essential Services Commission of South Australia*, 2007, para. 86, "No doubt there was some influence on the value of gamma brought about by the tax law changes coming into effect during 2000, although the precise impact remains somewhat of a mystery."

- the 2006 Beggs and Skeels study, and

- the 2007 SFG study which has been submitted as part of the JIA submission to this review.

The most recent estimates of theta inferred from market prices quoted by Australian energy regulators have ranged between zero and 0.57.

**Submissions in response to issues paper**

The JIA submit that the current empirical evidence from market prices supports a theta of between 0.2 and 0.35.[824]

These estimates are based on a dividend drop-off study undertaken by the JIA's consultants SFG, which updated a number of previous dividend drop-off studies with data through to the end of 2006.[825] SFG states that as it has used the same methodology as previous drop-off studies, with an additional two years of data in its sample (i.e. to 2006), its study is 'the most recent, up-to-date and comprehensive' study available to the AER.

One of the key features of the SFG study is that it contains a number of reduced samples which exclude certain observations considered highly influential. The overall results from the SFG study for the period 1998-2006 are summarised as follows:

- the average estimated value of a $1.00 cash dividend is $0.846 (range of $0.75 to $0.95)

- the average estimate of theta is 0.278 (range of 0.2 to 0.35), and

- the average combined value of a $1.00 fully franked dividend is $0.97.[826]

The JIA acknowledge the inherent noise in the results from dividend drop-off studies, and therefore states that a longer data set should be preferred. Further, as a cross-check on the results from these dividend drop-off studies SFG examined the results from two additional market-based studies, including:

- the 2004 Cannavan, Finn and Gray study which estimated that theta had reduced to a level close to zero after the 1997 tax amendment that effectively prevented foreign investors from 'selling' imputation credits to domestic investors,[827] and

- a 2007 study by Ickiewicz which found that there was no significant upwards movements in Australian share prices around the time of the introduction of dividend imputation in 1988.[828]

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824 JIA, Submission in response, op. cit., September 2008, p.165.

825 SFG, op. cit., 16 September 2008(b), pp.26-28. The three previous studies updated by SFG were: N. Hathaway and B. Officer, op. cit., 2004; Beggs and Skeels, op. cit., 2006; and ACG, op. cit., 2006).

826 ibid., p.28.

827 D. M. Cannavan, F. J. Finn and S. F. Gray, op. cit., 2004, pp.167-197.

NERA and Wheatley consider that the 2004 Cannavan et al result that imputation credits were effectively worthless after the introduction of the '45-day rule' provides empirical support to the theory that the representative investor most closely represents a foreign investor. Given that the 45-day rule effectively prohibited the trading of credits, NERA and Wheatley state that foreign investors no longer received any benefits from imputation credits after this time. Assuming that foreign investors most closely resemble the 'representative' investor in a fully integrated capital market, theta would be expected to fall to zero as a result of this tax change.[829]

Overall, based on its analysis of the available empirical evidence, and an assumed imputation credit payout ratio of between 0.70 and 1.0, SFG states its view that:

> …there is persuasive empirical evidence to support the use of an estimate of gamma below 0.35 and that a gamma estimate of 0.5 is no longer empirically supportable.[830]

This view is supported by the JIA in its submission.

**Consultant's review**

Handley explains the appropriate interpretation of the results from dividend drop-off studies:

> In an ideal economy characterized by no transactions costs or differential taxes, no information asymmetries, competitive price-taking and rational behaviour, the share price is expected to drop on the ex-dividend date by the amount of the dividend.[831]

Handley states that there is substantial empirical support that the results from dividend drop-off studies can be explained by the impact of differential personal taxes and the risk involved in trading around the ex-dividend date. As a result, Handley suggests that:

> …multiple interpretations of the value of franking credits are possible depending on what is assumed about differential personal taxes and risk.[832]

Handley examines the results of the three key dividend drop-off studies discussed by SFG – those from Hathaway and Officer, Beggs and Skeels, and SFG. In particular, it is noted that the two earlier studies are relatively consistent in estimating theta at around 0.5 or higher, while the 2008 SFG study presents a lower estimate of between 0.2 and 0.35. Handley also comments that:

> …there is insufficient information in Hathaway and Officer (2004) and SFG Consulting (2008) to assess the statistical significance of the estimates.[833]

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828 Ickiewicz, *Valuing dividend imputation credits in Australia: An alternative approach*, Honours thesis, University of Queensland Business School, 2007.

829 NERA and Wheatley, op. cit., September 2008, p.25.

830 SFG, op. cit., 16 September(b), p.29.

831 J. Handley, op. cit., 12 November(d), p.9.

832 ibid., pp.9-11.

833 ibid., p.13.

Handley provides a critique of SFG's assertion that theta should be set close to zero. If credits indeed have negligible value (consistent with a fully integrated capital market), we would expect to observe a similar drop-off in Australia as is observed in international markets. However the evidence from overseas (e.g. the US market, with no imputation system) is that a $1.00 cash dividend is less than fully valued. Therefore the consistent result from Australian dividend drop-off studies that a $1.00 fully franked dividend is valued at close to $1.00 clearly suggests that franking credits have a positive value (i.e. consistent with the impact of differential taxes around the ex-dividend date).[834]

**Issues and AER's considerations**

As stated in the issues paper, the AER considers that the results generated by studies that attempt to infer theta from market prices must be treated with caution. The results are subject to inherent noise and anomalies – a point that has been acknowledged by the JIA in its submission.[835] Also, as Handley points out, there are a number of assumptions required to interpret the results of such studies. However notwithstanding these concerns, the AER considers that inferential studies (in particular dividend drop-off studies) can still provide some useful information on the value of imputation credits in the Australian economy.

The AER notes the statements from SFG that its 2008 dividend drop-off study merely provides an update on the existing studies (in particular, the studies of Beggs and Skeels, Hathaway and Officer, and the ACG). On this basis SFG does not include the results of these earlier studies in its conclusion on the appropriate estimate of theta. However as noted by Handley, there are marked unexplained differences between the SFG results and the results of these earlier studies, despite the statements from SFG that it is examining data over the same time period and using the same methodology.

Table 10.7 illustrates this point, in relation to the 2006 Beggs and Skeels study. Table 10.7 excludes the results from the two studies for the post-2000 period.[836]

834 ibid., pp.13-16.

835 JIA, *Submission in response*, op. cit., September 2008, p.177.

836 The results from the two studies are not directly comparable post-2000 as the SFG (2008) study has two extra years of data.

**Table 10.7: Comparison of the results from the 2008 SFG study with the 2006 Beggs and Skeels study**

| | 1998-99 | | | 2000 | | |
|---|---|---|---|---|---|---|
| | SFG (2008) | | Beggs & Skeels (2006) | SFG (2008) | | Beggs & Skeels (2006) |
| | Average | Average (restricted)[(a)] | Estimate | Average | Average (restricted)[(a)] | Estimate |
| Cash drop-off | 0.825 | 0.805 | 0.795 | 0.445 | 0.795 | 1.168 |
| Franking credit drop-off | 0.175 | 0.300 | 0.418 | 0.885 | 0.175 | 0.128 |

Source: SFG;[837] Beggs and Skeels;[838] AER calculations
(a) These are SFG's estimates after the removal of the 'most influential 1% of observations'

As table 10.7 illustrates, there are material differences between the results of the 2008 SFG study and the 2006 Beggs and Skeels study over the same time periods. These differences have not been explained by SFG in its report.

The 2004 Hathaway and Officer study estimates theta at around 0.50 over the period 1986 to 2004, although separate estimates for individual years are not reported.[839] However figure 12 of the report indicates a theta value of between 0.40 and 0.70 over the 1998-2004 period (see figure 10.2 above), averaging around 0.50 or above. By contrast, SFG generates theta 'Estimates using Hathaway-Officer methodology' as follows:

- for the years 1998-99, theta averages 0.28 (range 0.23 – 0.34), and
- for the year 2000, theta averages 0.28 (range 0.14 – 0.42).[840]

On this basis the AER considers the differences between the results of these three dividend drop-off studies to be material. Accordingly, these three studies will be considered by the AER as separate and distinct pieces of empirical evidence.

In coming to a position on the appropriate value for theta inferred from market prices, the AER has reviewed each of the following studies:

- the 2006 ACG dividend drop-off study
- the 2004 Cannavan, Finn and Gray study of simultaneous security prices
- the 2004 Hathaway and Officer dividend drop-off study

837 SFG, op. cit., 16 September 2008(b), Appendix E, tables 3 and 4, pp.57,59. Note these are estimates from SFG's preferred samples, as highlighted in the tables.

838 D. Beggs and C. L. Skeels, op. cit., 2006, table 5, p.247.

839 N. Hathaway and B. Officer, op. cit., November 2004, p.21.

840 SFG, op. cit., 16 September 2008(b), Appendix E, tables 5 and 6, pp.60-61. Note these are estimates from SFG's preferred samples, as highlighted in the tables in its report.

- the 2007 Ickiewicz study of the impact on share prices of the introduction of the Australian dividend imputation system
- the 2006 Beggs and Skeels dividend drop-off study, and
- the 2008 SFG dividend drop-off study.

These studies are discussed in turn below.

***The 2006 ACG study***

As stated in section 10.5.4 above, the AER does not intend to consider the results of this study, as it has not been made public.

***The 2004 Cannavan, Finn and Gray study***

As stated in section 10.5.4 above, the AER considers there is persuasive evidence to reject pre-2000 data in estimating theta. As this study of simultaneous security prices only covers the period 1994-1999, it is no longer considered relevant in the context of the current imputation tax regime.

In addition, there are some unique issues associated with the interpretation of the 2004 Cannavan et al study. As noted in the issues paper this study may suffer from significant clientele effects – in that those trading in derivative securities are unlikely to value imputation credits in the same manner as the average investor in the CAPM. The JIA suggest that the potential for clientele effects to distort the estimate of theta from this study are minimal. This assertion is based on the advice of NERA and Wheatley, which argues that theta will be identical across all stocks, because:

> If theta were not identical across stocks, investors would face an incentive to shift funds from high-theta stocks to low-theta stocks to capture the additional return that would be offered by low-theta stocks.[841]

This argument is underpinned by an assumption that capital markets are perfect, such that all potential profits (i.e. from imputation credits) are arbitraged away by investors instantaneously. As noted by Handley, similar assumptions are required to interpret the results of dividend drop-off studies. It is the presence of such assumptions which necessitates caution in interpreting the results of inferential studies. For an inferential study of derivatives prices such as the 2004 Cannavan et al study these issues are potentially even more prevalent, given that traders in the securities examined are likely to be more motivated by short term factors (e.g. risk management) than an equity investor buying and selling actual stock.

It is for these reasons (i.e. different clientele) that one may expect the results of a study of simultaneous security prices to differ from those of a dividend drop-off study. Indeed this is what is observed. As Handley points out, a theta estimate of

[841] NERA and Wheatley, op. cit., September 2008, p.25.

close to zero is inconsistent with a substantial body of persuasive international evidence from dividend drop-offs.[842]

In sum, given that the 2004 Cannavan et al study covers a period prior to the current imputation tax regime, the results are not considered relevant to a forward-looking estimate of theta. In any case the results from this study appear inconsistent with other market-based evidence, possibly due to clientele effects.

***The 2004 Hathaway and Officer study***

The widely quoted 2004 Hathaway and Officer dividend drop-off study provides a single theta estimate of 0.50 over the entire period 1986 to 2004. The results also suggest that theta increased to around 0.60 in the later years of the sample period.

As noted in section 10.5.4 above the AER considers there is persuasive evidence to reject pre-2000 data in estimating theta. As much of the estimate from this study relates to the previous tax regime it is not considered as relevant in terms of generating a forward-looking theta estimate. The result from later in the period (around 0.60) appears most relevant, however the AER will not place particular weight on this estimate given that the authors themselves have cautioned against interpreting their short-term result.

In addition, based on the information presented by the authors it is not possible to verify the reliability of the results from this study.

On this basis the AER will place limited weight on the results of the 2004 Hathaway and Officer study in estimating theta as part of this review.

***The 2007 Ickiewicz study***

The results from the 2007 Ickiewicz study presented in the SFG report examine the period January 1986 to June 1987, and present two charts on the movements in equity returns over this period. SFG interprets the results as follows:

> …there is nothing in Figures 4 and 5 to suggest that Australian stock prices were driven upward by the introduction of dividend imputation.[843]

The AER intends to place limited weight upon the results of this study in informing its estimate of theta, for four primary reasons:

1. The study relates to an earlier period and is therefore less relevant – it does not provide information regarding the value of credits in the current imputation tax regime.

2. There is no conclusive evidence provided by SFG on the impact of imputation on share prices – the period covered only extends until June 1987, and does not cover the period after the introduction of imputation on 1 July 1987.

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842 J. Handley, op. cit., 12 November 2008(d), p.15.

843 SFG, op. cit., 16 September 2008(b), p.26.

3. There is other evidence that contradicts the results of this study. For example, a 2005 paper by Hancock finds that the introduction of imputation resulted in a significant once-off increase of in share prices of 21 per cent between July and September 1987.[844]

4. As noted by Handley, a theta value of close to zero is inconsistent with the substantial body of persuasive evidence concerning dividend drop-offs.

***The 2006 Beggs and Skeels study***

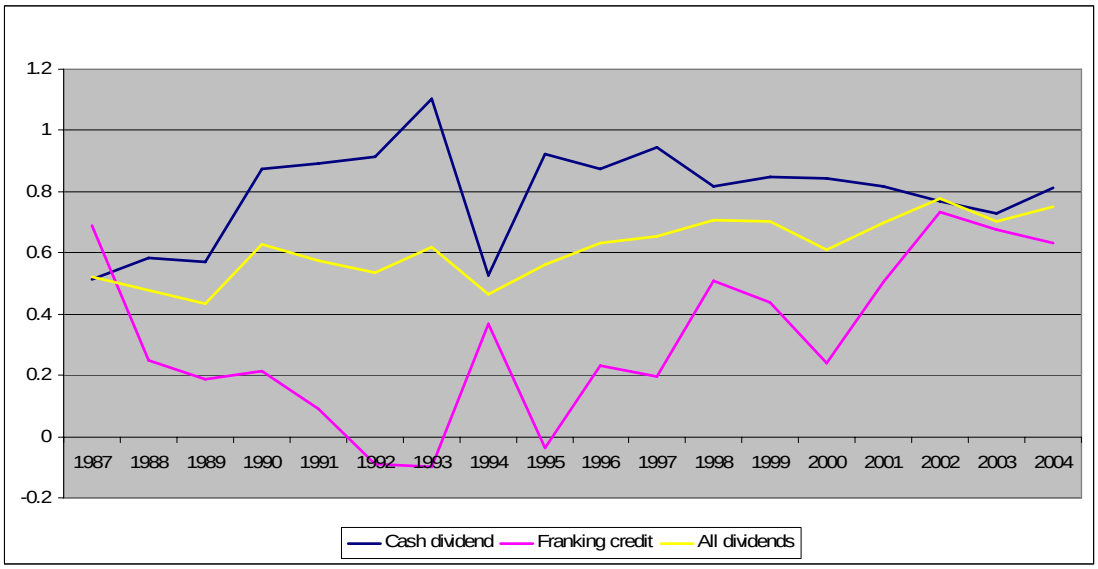
The 2006 Beggs and Skeels study is the most recent comprehensive dividend drop-off study to appear in the Australian finance literature.[845] It separately estimates the value of cash dividends and the value of imputation credits over the period 1987-2004. Further, the authors hypothesise the likely impact of various changes to the Australian taxation system over this period, and then test their hypotheses empirically. For the period post-2000 (reflecting the current imputation tax regime) the authors estimate that the value of imputation credits increased significantly, consistent with expectations of the impact from the July 2000 tax changes.

In the paper the authors perform detailed diagnostics on their results, and conclude from a number of angles that theta has increased significantly in the post-2000 period. The key theta estimate of 0.57 from the 2001-2004 period has been determined as significantly different from the theta estimate from the year 2000 (i.e. immediately prior to the recent tax changes). In addition, as table 10.5 (post-2000) above indicates, the separate annual estimates of the drop-off ratios indicate a significant increase in theta post-2000. This is illustrated in figure 10.3.

[844] J. Hancock,, *The market risk premium for Australian regulatory decisions*, South Australian Centre for Economic Studies, 2005.

[845] D. Beggs and C. L. Skeels, op. cit., 2006.

**Figure 10.3: Beggs and Skeels – drop-off ratios 1987-2004**




Source: Beggs and Skeels[846], AER calculations

Figure 10.3 above provides further support for the theta estimate of 0.57 for the 2001-2004 period. In particular, the data underpinning figure 10.3 indicates that:

- theta averaged 0.347 over the 1997-2000 period, and
- theta averaged 0.637 over the 2001-04 period.[847]

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 difficult to obtain a reliable measure of their individual values.[848] KPMG has argued that several important studies – including the 2004 Hathaway and Officer study – suffer from this problem and therefore provide less reliable estimates of theta.[849] Beggs and Skeels argue that the results of their study do not suffer from such problems:

> …where the dataset incorporates information such as unfranked and partially franked dividends, observations at different company tax rates, observations where untaxed income is distributed (such as from listed property trusts), and observations where foreign-sourced company income does not attract a tax credit, the effects of multicolinearity should be mitigated.[850]

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[846] D. Beggs and C. L. Skeels, op. cit., 2006, tables 2 and 3, pp.245-246.

[847] It is noted that not all of the annual theta estimates for the period 1997-2004 have been determined as statistically significant by the authors.

[848] This is known in econometric terms as 'multicolinearity'.

[849] KPMG, 2008 Gas Access Arrangement Review – Weighted Average Cost of Capital, Prepared for SP AusNet, March 2007, p.44.

[850] D. Beggs and C. L. Skeels, op. cit., 2006, p.243.

In sum, the AER intends to place weight on the 2001-2004 result from the 2006 Beggs and Skeels study, as it is considered:

- directly relevant to the current imputation tax regime
- verifiably reliable based on the statistical tests undertaken and presented in the paper and
- an independent and credible published study that has been through the academic refereeing process.

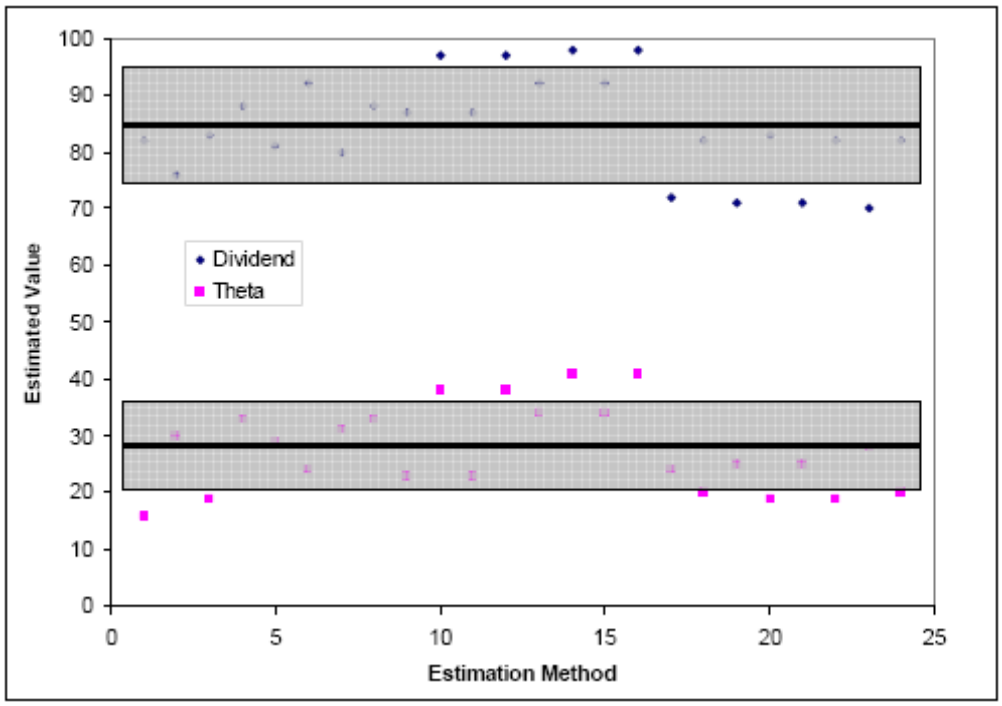
Accordingly, in coming to a view on an appropriate estimate of theta inferred from market prices, the AER intends to place significant weight on the 2001-04 theta estimate of 0.57 from this study.

***The 2008 SFG study***

The results of the SFG dividend drop-off study were provided to the ESC for consideration as part of the 2008 Victorian gas distribution decision.

In its report prepared for the JIA, SFG plots its key results over the period 1998-2006 as in figure 10.4.

**Figure 10.4: SFG estimates of the value of cash dividends and theta 1998-2006**




Source: SFG[851]

Based on figure 10.4, SFG concludes that theta ranged between 0.2 and 0.35 over the 1998-2004 period.

[851] SFG, op. cit., 16 September(b), figure 6, p.28.

As noted by Handley, based on the information included in the SFG report it is difficult to reconcile this estimate with previous dividend drop-off studies. The ESC commented in this regard:

> In reviewing the empirical results of SFG, the Commission has noted that the value derived for theta as reported are quite different, despite the fact that each of the research papers as cited has utilised the same underlying data set, and methodologically has applied a regression equation of substantially the same form. There is no commentary associated with the divergent results provided by SFG… [852]

Unlike the 2006 Beggs and Skeels study, the 2008 SFG dividend drop-off study does not provide statistical analysis examining the reliability of the estimates. There is no apparent reason why this vital information has been omitted from the report submitted to the AER.[853] Indeed, the AER notes that the need to have regard to the 'statistical precision and the reliability of the empirical estimates' was listed as one of the key criteria for assessing the weight to place on various empirical estimates by Professor Stephen Gray (of SFG) at the AER's recent WACC roundtable discussion.[854]

Given the inherent noise in the results from dividend drop-off studies, the AER considers it critical that the statistical significance of the estimates is examined. In the absence of such statistical tests the reliability of SFG's dividend drop-off results cannot be verified, and therefore the results cannot be relied upon for the purposes of estimating theta.

Accordingly the AER will not place any weight upon the 2008 SFG dividend drop-off study in estimating theta for the purposes of this draft decision.

**AER's conclusion**

Based on the empirical evidence available, the AER considers that the 2006 Beggs and Skeels study provides the most comprehensive, reliable and robust estimate of theta inferred from market prices in the post-2000 period. Accordingly the AER has placed significant weight on the 2001-2004 estimate of theta from this study, of 0.57.

Despite the advantage of providing more up-to-date estimates (i.e. to 2006), the reliability of the estimates provided by SFG in its 2008 dividend drop-off study cannot be verified. Therefore the results have not been considered further at this stage.

It is also noted that this result from the 2006 Beggs and Skeels study is not inconsistent with the commonly quoted theta estimate of 0.5 – 0.6 from the 2004

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[852] ESC, op. cit., 2008, p.503.

[853] The AER formally requested SFG's data and calculations as part of this review [AER, Email to ENA, 15 October 2008]. On 5 November 2008, the AER received the raw data from the ENA [ENA, Email to AER, 5 November 2008], and on 14 November 2008 the AER received more detailed information on SFG's outputs. While this further information has been taken into account, the information received does not allow the AER to verify the accuracy or reliability of SFG's results for the purposes of this draft decision.

[854] AER, *Australian Energy Regulator review of WACC parameters for electricity transmission and distribution*, Transcript of proceedings, Melbourne, 10 October 2008, pp.3-4

Hathaway and Officer study. However the results from the 2004 Hathaway and Officer study have not been granted any weight given the lack of statistical diagnostics around the estimates and the fact that the key estimate of 0.5 from the study was generated from data that related to an earlier tax regime and is therefore less relevant.

In sum the AER considers that a reasonable estimate of theta inferred from market prices is 0.57.

### 10.5.6 Estimating theta from tax statistics

In the issues paper the AER examined the most commonly cited empirical studies focusing on the value of imputation credits to the average investor in the Australian economy. The studies identified included:

- the 2004 Hathaway and Officer study, and
- the 2008 Handley and Maheswaran study.

The most recent estimates of theta from tax statistics quoted by Australian energy regulators have ranged between 0.40 and 0.81.

**Submissions in response to issues paper**

The JIA submit that an estimate of theta based on the average redemption rate of imputation credits from tax statistics is flawed, as it does not directly measure market value. This view is supported by its consultants SFG, which states that:

> …measuring how many investors use a particular type of asset does not give us a *value* of that asset… Relevant empirical evidence requires an estimate of the market *value* to investors and redemption rates are not such an estimate.[855]

In its report SFG provides a hypothetical example of two Australian firms. One of the firms has ownership restrictions imposed upon it, in which case all imputation credits would be distributed to domestic investors who could redeem them. SFG states that if this estimate of 100 per cent redemption were then used to estimate theta (and gamma) the corresponding reduction in the cost of equity as a result of the foreign ownership restrictions could be substantial. SFG states that this result is counterintuitive:

> …the exact reverse is true – less foreign investment means a lower supply of capital and consequently an *increase* in its cost.[856]

On this basis SFG states that a redemption rate of imputation credits is not relevant in empirically estimating theta.

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[855] SFG, op. cit., 16 September 2008(b), p.5. The AER notes that this issue was discussed at length at the AER's WACC review round-table discussion.

[856] ibid., p.5.

NERA and Wheatley state that while it may seem that a utilisation rate of imputation credits should equate to a market value given that the credits can be redeemed for cash, the two measures will in general differ:

> To access the credits investors must bear risk. In particular, to access a large share of the credits distributed, Australian investors must forego the benefits that they would otherwise gain from diversifying internationally. Therefore the market value of imputation credits cannot be inferred directly from the fraction of the credits are redeemed…[857]

Consistent with the views of SFG, NERA and Wheatley consider it inappropriate to use an estimate of redemption rates as a proxy for the market value of imputation credits. Therefore they recommend that no weight be placed on the estimates provided in the 2008 Handley and Maheswaran study.

**Consultant's review**

Handley states that the use of utilisation rates in estimating theta is driven by conceptual considerations – as in equilibrium gamma represents a complex weighted average valuation of imputation credits across all investors in the market. On this basis Handley considers that utilisation rates from tax statistics can indeed provide a measure of the 'value' of imputation credits:

> Depending on tax status and domicile, franking credits are used by investors to reduce their personal taxes. It is this reduction in personal taxes, if any, which is the ultimate source of value to an investor.[858]

According to Handley, the suggestion from NERA and Wheatley regarding the costs associated with accessing imputation credits (i.e. lost diversification benefits) is not relevant in the context of a domestic market portfolio:

> Non market assets, including assets held by any of the investors in other markets are outside the model and therefore play no role in the pricing of domestic assets…[859]

Given these conceptual considerations, Handley considers that the results from the 2008 Handley and Maheswaran study of tax statistics are relevant to the estimation of theta in the current context. Specifically, Handley considers that the average utilisation rate of imputation credits across all investors (resident and non-resident) of 70 to 80 per cent is the relevant result. It is noted that:

> …the estimate of (around) 70% is based on pre-2001 data and so includes no allowance for cash refunds of excess franking credits, whereas the estimate of (around) 80% assumes the cash refund provisions, introduced in 2001, have taken full effect.[860]

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857 NERA and Wheatley, op. cit., September 2008, p.23.

858 J. Handley, op. cit., 12 November 2008(d), p.8.

859 ibid., p.21.

860 ibid., p.8.

Handley advises that the results of the 2008 Handley and Maheswaran study may be interpreted as a reasonable upper bound estimate of the value of imputation credits in the Australian capital market.

**Issues and AER's considerations**

As stated in section 10.5.3 above, theta is most appropriately defined as a weighted average valuation of all investors in the domestic capital market. Given this conceptual basis, the AER considers that the results of the 2008 Handley and Maheswaran study are directly relevant in the current context. Based on Handley's advice, redemption / utilisation rates can indeed provide a measure of the value of imputation credits, as the reduction in personal taxes brought about by the redemption of a credit is the ultimate source of value to an investor. Another way to consider this issue is to think of the Australian Tax Office (ATO) as creating a 'market' for imputation credits by offering $1 of tax deductibility (post July 2000) for each $1 of imputation credit redeemed.

The AER notes the suggestion from NERA and Wheatley that domestic investors incur the costs of a lack of diversification by receiving the value of imputation credits, and that these costs must be taken into account when interpreting a utilisation rate. As Handley notes, this is not consistent with the assumption that the relevant market portfolio for pricing purposes is a domestic market portfolio. Under this market definition assumption, only domestic assets are considered for pricing purposes – the diversification benefits available from investing in foreign assets are not relevant to the analysis.

The AER notes the hypothetical example from SFG regarding the use of redemption / utilisation rates to estimate theta, and the apparent counterintuitive result for a firm with foreign ownership restrictions imposed upon it. There are four points to note.

1. The assumption of a fully segmented domestic capital market to which the SFG example alludes is not relevant in the current context. As stated above, the AER intends to adopt an assumption of a domestic capital market recognising foreign investors to the extent they invest in the domestic capital market. This market definition has been accepted by the JIA in its submission.[861]

2. Contrary to SFG's claims, the example does not reveal anything compelling about the relevance or otherwise of redemption rates in the estimate of theta. In the example provided, any positive value for gamma, whether estimated from redemption rates or dividend drop-off studies, will lower the firm's cost of capital in accordance with Officer's derivation.[862]

3. The AER has defined theta as a weighted average of the valuation of all investors across the market – it is not a firm-specific estimate. The example provided by SFG indicates that there is a second firm in the Australian

[861] JIA, *Submission in response*, op. cit., 24 September 2008, p.28.

[862] The AER notes that the total return to equity (i.e. to shareholders) will remain unchanged with a positive value for gamma. This is discussed at Appendix C of SFG's report.

market that can raise foreign equity, in which case the estimate of theta generated from market average redemption rate would likely be lower than the 100 per cent put forward by SFG.

4. SFG's claim that corporate cost of equity would be lower as a result of foreign ownership restrictions does not take into account the likely impact of segmentation on the other WACC parameters. As stated in the issues paper, the level of domestic market integration with global capital markets is likely to impact not only the gamma parameter, but also other parameters (e.g. nominal risk free rate, MRP, equity beta). Therefore the overall effect of foreign ownership restrictions (i.e. segmentation) on the corporate cost of equity is somewhat ambiguous, which casts doubt over the conclusions to be drawn form SFG's counterfactual analysis.

In sum, the AER does not consider that SFG's hypothetical example regarding the imposition of foreign ownership restrictions provides any persuasive evidence as to the relevance or otherwise of redemption / utilisation rates to the estimation of theta.

As stated in the issues paper, there are a number of strengths inherent in the 2008 Handley and Maheswaran study, including:

- it takes into account foreign investors to the extent they invest in the Australian capital market
- the use of ATO statistics provides a robust basis from which to undertake an analysis of theta, and
- arguably it provides a more direct estimate of the value of imputation credits to investors in the Australian market relative to market-based studies that attempt to infer a value from econometric analysis.

Accordingly the AER intends to place weight upon the results of the 2008 Handley and Maheswaran study, and considers that a reasonable range of theta from this study is 0.67 to 0.81, reflecting the post-2000 period. That is, the lower bound estimate from this study is that from the pre-2000 period, and the upper bound estimate represents the maximum utilisation rate possible in the 2001-2004 period.

The AER considers the theta estimate of 0.81 from the post-2000 period is most relevant in the context of the current imputation tax regime. However this is considered an absolute upper-bound limit, given that it is partially based on an assumption:

- the proportion of imputation credits received by resident investors has been empirically estimated at 81 per cent in the 2001-04 period, however
- consistent with 'investor rationality', the authors assume that 100 per cent of these imputation credits were utilised by these investors to reduce their personal income

tax liabilities, given that the credits became fully refundable for these investors post July 2000.[863]

The AER considers that the assumption of investor rationality is reasonable in determining an upper-bound for theta in the post-2000 period, given that it simply reflects the likelihood that the cash rebate for unused credits would be redeemed by both resident individuals and superannuation funds. However given that the utilisation rate estimate of 0.81 represents the maximum possible utilisation rate given the level of foreign investment in the Australian capital market, the AER intends to exercise caution in adopting it as a point estimate for theta.

**AER's conclusion**

Overall, the AER considers the methodology provided by the 2008 Handley and Maheswaran study clearly provides a relevant and reliable estimate of theta in the post-2000 period. Based on Handley's advice, the AER considers that the results of this study provide a reasonable upper-bound estimate of theta.

Accordingly the AER considers that a reasonable range of theta estimated from tax statistics is 0.67 to 0.81 for the post-2000 period. This gives a point estimate for theta form tax statistics of 0.74.

### 10.5.7 Consistency issues

In the issues paper the AER raised two substantive issues of consistency regarding the gamma parameter:

- consistency between gamma and the MRP, and
- consistency between the value of cash dividends inferred from dividend drop-off studies and the assumptions in the CAPM.

In both cases the AER questioned stakeholders on whether a true inconsistency could be identified, and if so, the appropriate adjustment required (if any) to remedy that inconsistency.

**Submissions in response to issues paper**

***Consistency with the MRP***

Based on advice from its consultants Officer and Bishop,[864] the JIA submit that an MRP of 6 per cent was originally based on evidence that excluded any explicit consideration of the value of imputation credits.[865]

The need for consistency between gamma and the MRP is demonstrated in a report from the JIA's consultants NERA and Wheatley, which examines the derivation of the Officer WACC framework. NERA and Wheatley state that the value for gamma

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863 The authors also note issues with ATO data availability in the post-2000 period.

864 B. Officer and S. Bishop, op. cit., August 2008.

865 JIA, *Submission in response*, op. cit., September 2008, p.182.

will not affect company values as long as it is included consistently in the firm's cash flows as well as the discount rate:

> If correctly executed, the adjustments to the required return to equity and to the way in which the cash flows are measured should exactly offset one another.[866]

The JIA argue that if the currently adopted gamma value of 0.5 is maintained, the MRP must be 'grossed-up' by the same amount. Based on the historical data set analysed, Officer and Bishop recommend an adjusted MRP of 7 per cent.

***Value of the cash dividend***

Based on advice from its consultants SFG, the JIA submit that:

> Dividend drop-off studies find Theta has a positive value, however, it is conditional on the market value of dividends being less than their fair value. The regulated firm's cash flows should recognise both benefits and penalties of imputation credits and dividends.[867]

According to SFG the empirical result from dividend drop-off studies – that cash dividends are less than fully valued (around 75-80 per cent of face value) – is inconsistent with the CAPM, which assumes equal valuation of dividends and capital gains. SFG argues that it would be inconsistent to reduce the required return to recognise a positive value for theta but to disregard the offsetting effect that dividends are less than fully valued, when these two effects are part of a single estimation exercise. The implications of this inconsistency are explained by NERA and Wheatley:

> …if the AER were to include a positive benefit from distributed imputation credits, it should also include the penalty that investors face as a result of the taxes they must pay on the receipt of dividends.[868]

To resolve this inconsistency SFG recommends interpreting the empirical results in a way which is consistent with the CAPM:

> We know that there is a consistent result that the combined value of a $1.00 dividend and the attached franking credit is $1.00… The estimated value of franking credits is obtained by subtracting from this the estimated value of a $1.00 cash dividend. Under the CAPM, this $1.00 dividend must have a value of $1.00. This leaves negligible value to be ascribed to the franking credit.[869]

SFG argues that this is a theoretically correct interpretation of the dividend drop-off results (in a standard CAPM framework), and it also accords with the standard commercial market practice of ignoring imputation credits when estimating the cost of capital.

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866 NERA, op. cit., September 2008, pp.7-8.

867 JIA, *Submission in response*, op. cit., September 2008, p.168.

868 NERA, op. cit., September 2008, p.30.

869 SFG, op. cit., 16 September 2008(b), pp.21-22.

In sum, based on the advice of its consultants the JIA submit that the most appropriate and straightforward means of addressing this inconsistency is to set theta to zero (therefore excluding it from the analysis).

**Consultant's review**

Handley demonstrates that the inclusion of imputation credits in the analysis will not affect company values as long as they are consistently recognised in the cash flows as well as the discount rate.[870]

Handley advises that the presence of differential taxes and the risk involved in trading around the ex-dividend date complicates the interpretation of results from dividend drop-off studies.[871]

Handley agrees with SFG that the empirical evidence from dividend drop-off studies – that cash dividends are less than fully valued – presents an apparent inconsistency with the standard CAPM (which assumes no differential taxation). However the suggestion from SFG to set theta to zero on this basis presents a clear inconsistency with the empirical evidence:

> In particular, if franking credits have negligible value as argued – a proposition consistent with the notion that pricing in the Australian equity market is essentially determined by foreign investors – then one would expect to see on average, a dividend drop off in the Australian market similar to that observed in international markets…
>
> Instead we observe an average drop-off equal to the amount of the dividend – which is consistent with franking credits having positive value.[872]

Handley examines the empirical evidence from Australia and overseas (e.g. the US market, with no imputation system) on dividend drop-off analysis.[873] The consistent result from such studies is that a $1.00 cash dividend is less than fully valued. Therefore the result from Australian dividend drop-off studies that a $1.00 fully franked dividend is valued at close to $1.00 clearly suggests that franking credits have a positive value (i.e. consistent with the impact of differential taxes around the ex-dividend date).

It is argued that if these empirical results were to be adjusted for the impact of differential taxation (i.e. assume a full valuation of cash dividends), the value of imputation credits must be 'grossed-up' to equivalently adjust for the effects of differential tax (and assuming no changes to risk).[874]

According to Handley, the alternative to interpreting the empirical results in the manner suggested by SFG is to use a 'tax-adjusted' version of the CAPM (such as the

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870 Handley, op. cit., 12 November 2008(d), pp.17-20. See also: Gray and Hall, op. cit., 2006.

871 ibid., p.11.

872 ibid., p.15.

873 ibid., p.10.

874 ibid., p.11. This has been suggested by Professor Martin Lally, and was raised at the AER's WACC review roundtable discussion. For example, Lally suggests the 'correct' interpretation Beggs and Skeels result is theta divided by the value of the cash dividend, or: 0.57 / 0.8 = 0.72.

Brennan CAPM) which matches the empirical evidence. On this point, Handley states that:

> …at this stage there is insufficient evidence to justify replacing the standard CAPM with the Brennan CAPM, as although differential personal taxes clearly effect pricing around ex-dividend dates, "a growing body of evidence shows that within static, single period equilibrium models, there is no convincing evidence of a significant cross-sectional relation between stocks' returns and their dividend yields".[875]

## Issues and AER's considerations

***Consistency with the MRP***

The AER recognises that consistency between the gamma and the MRP is an important consideration as part of this review. As a number of experts have demonstrated, consistent recognition of the value of imputation credits across the cash flows and the discount rate is important from a theoretical point of view.

This issue is discussed in more detail at section 7.5.2.5 (MRP). In particular, the AER has explicitly considered a 'grossed-up' historical estimate of the MRP.

***The value of the cash dividend***

The AER notes the consistency issue raised by both SFG and NERA with respect to the value of the cash dividend and the assumptions in the CAPM. This issue has been raised in previous regulatory reviews,[876] and was an issue upon which the AER sought comment in the issues paper.

Both of the JIA's consultants suggest two possible approaches to resolving the inconsistency identified:

1. use an alternative version of the CAPM which allows for differential taxation of dividends and capital gains, or

2. given the empirical result that a fully franked dividend of $1.00 is valued at approximately $1.00, 'gross-up' the value of the cash dividend component to 100 per cent, thus reducing the value of the imputation credit component to zero.

SFG states that the easiest way to resolve the inconsistency is to reduce the estimate of theta to zero, therefore implicitly recognising the full value of cash dividends consistent with the CAPM (i.e. the second option above). Based on Handley's advice (and as suggested by Professor Lally), it appears that if the inconsistency were to be resolved in this way the estimate of theta would also need to be 'grossed-up' for consistency. However it remains unclear what the adjustment to the franking credit drop-off ratio would have to be (i.e. given that the impact of the risk involved with trading around the ex-dividend date would also have to be taken into account).

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875 J. Handley, op. cit., 12 November 2008(d), p.16

876 Most recently, see: ESC, op. cit., 7 March 2008, pp.499-509

In any case, based on Handley's review of the empirical evidence from Australia and overseas the AER considers that the suggestion from SFG to set theta to zero is inappropriate. Given the consistency implied by the empirical evidence, AER considers that the empirical results from dividend drop-off studies should be accepted without any theoretical adjustments imposed.

The question then becomes whether the acceptance of empirical results that imply differential taxation leads to under-compensation for regulated firms. This leads to a consideration of the first option listed above – whether it is reasonable to use an alternative version of the CAPM that explicitly recognises differential taxation on dividends and capital gains (e.g. the Brennan CAPM). On this point, the AER accepts Handley's advice that there is insufficient evidence to justify replacing the standard CAPM, and that use of the standard CAPM will not result in under-compensation.

In sum, the empirical evidence strongly suggests that differential taxation should be taken into account in interpreting dividend drop-off studies (i.e. the model which estimates the price drop-off on ex-dividend days). While this would seem to present an apparent inconsistency with the standard CAPM (which assumes no differential taxation), based on Handley's advice there is no conclusive evidence that differential taxes should be incorporated into the CAPM (i.e. the model which estimates returns).

On this basis the AER intends to allow for differential taxation in interpreting the results from dividend drop-off studies. Based on Handley's advice there is no evidence that the use of this unadjusted market data will result in incorrect compensation for regulated firms if the standard CAPM continues to be used.

**AER's conclusion**

The AER considers that consistency between WACC parameters is important as part of this review. In relation to the two consistency issues raised by the JIA and its consultants, the AER concludes as follows:

- Consistency between the gamma and the MRP is recognised as an important consideration as part of this review – this issue is explicitly considered at section 7.5.2.5 (MRP).

- The empirical result from dividend drop-off studies that cash dividends are less than fully valued may suggest that the standard CAPM cannot fully explain the reality of differential taxation. However there is no convincing evidence that the standard CAPM should be replaced to account for the realities of differential taxation. Therefore the AER will not impose a theoretical adjustment to the empirical results from dividend drop-off studies for CAPM consistency reasons, nor will the standard CAPM be replaced.

## 10.6 AER's conclusion

Based on the detailed analysis above the AER makes the following conclusions on the gamma parameter:

- The AER intends to define 'gamma' as the value of imputation credits created by the payment of corporate tax. This is consistent with the standard approach to

valuation which assumes full distribution of free cash flows, as well as the Officer WACC framework. Accordingly a payout ratio of 1.0 will be adopted in the assessment of gamma.

- The AER will adopt a conceptual framework of a domestic market of assets with foreign investors recognised to the extent they invest domestically. This conceptual framework recognises the realities implicit in domestic market data, and ensures consistency with the other WACC parameters. It also accords with the upfront position established in the issues paper, and the approach to estimating WACC parameters endorsed by the JIA. This theoretical position does not preclude any of the available empirical estimates (i.e. dividend drop-off or tax statistics).

- The AER intends to estimate theta based on post-2000 data only given the changes to imputation tax regime in July 2000.

- A reasonable estimate of theta inferred from market prices is 0.57, based on the 2006 Beggs and Skeels study. This study provides the most comprehensive, reliable and robust market-based estimate of theta in the post-2000 period. The results of the 2008 SFG study have not been given any weight given that the reliability of the results cannot be verified on the information presented by SFG.

- A reasonable estimate of theta from tax statistics in the post-2000 period is 0.74, based on the results from the 2008 Handley and Maheswaran study. This study has a sound conceptual basis and provides a direct (rather than inferred) estimate of the value of imputation credits across the Australian economy.

- The issue of consistency between the gamma and the MRP is considered important as part of this review.

- The empirical results from dividend drop-off studies do not need to be adjusted based on CAPM consistency considerations, and the standard CAPM will continue to be used for the purposes of this review.

Where a parameter cannot be determined with certainty, the NER provides that, in addition to the other relevant factors, the AER must have regard to the need for persuasive evidence before adopting a value or method that differs from the value or method that has previously been adopted for it. The AER must also have regard to the need to achieve an outcome that is consistent with the national electricity objective.[877]

On this basis, and after considering the most recent available and reliable empirical evidence, the AER considers there is persuasive evidence to depart from the previously adopted 'assumed utilisation of imputation credits' (i.e. gamma) of 0.5. Based on the evidence considered most relevant, reliable, comprehensive and theoretically appropriate, the AER considers that a reasonable estimate gamma lies in the range 0.57 and 0.74. For clarity it is noted that:

[877] NER, cls. 6.5.4(e)(4) and 6A.6.2(j)(4).

- A payout ratio of one has been adopted, consistent with a free cash flow approach to valuation and the Officer WACC framework,

- The lower bound estimate of 0.57 is based on the AER's best estimate of theta inferred from market prices, and

- The upper bound estimate of 0.74 is based upon the AER's best estimate of theta from tax statistics.

The AER notes that a range of 0.57 to 0.74 for gamma does not exactly reflect Handley's recommended range of 0.3 to 0.7.[878] The major differences between the two ranges are:

- In estimating theta the AER has focused on data from the post-2000 period only. Handley has not directly addressed the issue of a structural break and accordingly has considered results from both pre and post-2000.

- In estimating theta inferred from market prices the AER has not at this stage placed weight on the 2008 SFG study given that the reliability of the results cannot be verified. Handley has included the results from the 2008 SFG study as a lower-bound in his recommended range.

The AER notes that both of the two approaches relied upon to determine a reasonable range (i.e. market prices and tax statistics) appear consistent with the conceptual framework established for estimating gamma. That is, both of these approaches attempt to estimate theta (gamma) based on a weighted average valuation of all investors in the domestic capital market recognising the presence of foreign investors, but only to the extent that they invest domestically. On this basis it is expected that the outcomes of these two approaches should be broadly consistent, however in practice the outcomes may differ.[879] Handley considers that the estimate of theta (gamma) based on the 2008 Handley and Mahesawaran study of tax statistics should be considered an upper bound, as it:

> …represents a simple average of utilisation rates across investors rather than a (complex) weighted average and assuming the set of investors is indicative of the set of investors in the domestic market portfolio…[880]

By the same token, the results from dividend drop-off studies need to be treated with caution in when inferring a theta value, given that positive transactions costs are likely to prevent perfect arbitrage in share prices. In addition, the inherent noise in the results from dividend drop-off studies and the difficulty in separating the influence of the various components (i.e. cash dividends and imputation credits) dictate that caution should be taken in interpreting the results of these studies.

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878 J. Handley, op. cit., 12 November 2008(d), p.22.

879 It is noted that this issue was discussed at some length during the AER's WACC round-table discussion.

880 J. Handley, op. cit., 12 November 2008(d), p.8.

In their 2004 paper Hathaway and Officer attempted to reconcile the results of the two approaches:

> …redemption value should *exceed* the market-derived values because the market value must be a time discounted value of the redemption value.
>
> In addition, the redemption value is necessarily a capitalisation weighted average over all companies (tax data only show the aggregate amounts collected), both listed (big and small) and private companies. Presumably the private company derived credits are more highly valued than credits from listed companies because the latter have non-Australian taxpayers as shareholders whereas private companies would be dominated by Australian taxpaying shareholders.[881]

On these grounds the AER considers it reasonable and appropriate to adopt a range for gamma of 0.57 – 0.74.

The question of weighting the various empirical estimates to reach a point estimate for gamma then becomes relevant. In this regard, the AER considers it reasonable to apply equal weight to each of the estimation methodologies, and round to generate a point estimate. This reflects the AER's view that the results provided by each of the two methodologies are somewhat uncertain in terms of providing a point estimate, but that it is reasonable to regard them as providing bounds on a range for gamma.

Accordingly, based on the available evidence the AER proposes to adopt an 'assumed utilisation of imputation credits' (i.e. gamma) of 0.65. In accordance with the NER, the AER considers that this value:

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

On this basis the AER considers that its proposed value achieves an outcome that is consistent with the National Electricity Objective.[882]

[881] N. Hathaway and B. Officer, op. cit., November 2004, p.24.

[882] NER, cls. 6A.6.2(j) and 6.5.4(e).

# Glossary

| | |
|---|---|
| $ | dollars |
| $AU | Australian dollars |
| ACG | Allen Consulting Group |
| ACCC | Australian Competition and Consumer Commission |
| ACT | Australian Capital Territory |
| AEMC | Australian Energy Market Commission |
| AER | Australian Energy Regulator |
| AGL | Australian Gas Light |
| AGSM-RMS | Australian Graduate Management School – Risk Measurement Service |
| APA | APA Group (Australian Pipeline Trust and APT Investment Trust) |
| APIA | Australian Pipeline Industry Association |
| ATO | Australian Tax Office |
| B | billion |
| BBSW | bank bill swap rate |
| $\beta$ | Beta |
| capex | capital expenditure |
| CAPM | capital asset pricing model |
| CDS | credit default swap |
| CEG | Competition Economics Group |
| CGS | Commonwealth Government Security |
| CKI | Cheung Kong Infrastructure Holdings |
| cl. | clause |
| cls. | clauses |
| COB | close of business |

| | |
|---|---|
| CPI-X | CPI minus X |
| CPRS | Carbon Pollution Reduction Scheme |
| CSFB | Credit Suisse First Boston |
| D | value of debt |
| DNSP | distribution network service provider |
| DRP | debt risk premium |
| DGM | dividend growth model |
| DUET | Diversified Utility and Energy Trust |
| E | value of equity |
| EA | EnergyAustralia |
| ENA | Energy Networks Association |
| EPS | earnings per share |
| ESC | Essential Services Commission of Victoria |
| ESCOSA | Essential Services Commission of South Australia |
| ETNOF | Electricity Transmission Network Owners Forum |
| EUAA | Energy Users Association of Australia |
| F | imputation credit payout ratio |
| FFO | funds from operations |
| G | gearing |
| $g$ | dividend growth in perpetuity |
| Gamma | $\gamma$ – value of imputation credits |
| GDP | gross domestic product |
| HDF | Hastings Diversified Utilities Fund |
| ICRC | Independent Competition and Regulatory Commission |
| IPART | Independent Pricing and Regulatory Tribunal |
| JIA | Joint Industry Associations |
| $k_e$ | return on equity or cost of equity |

| | |
|---|---|
| LAD | least absolute deviation |
| LAV | least absolute variation |
| M | million |
| MC | market capitalisation |
| MEU | Major Energy Users Inc |
| MRP | market risk premium |
| NCF | net cash flows |
| ND | net debt |
| NEL | National Electricity Law |
| NEM | national electricity market |
| NEO | National Electricity Objective |
| NGL | National Gas Law |
| NGR | National Gas Rules |
| NSP | network service provider |
| NSW | New South Wales |
| NYSE | New York Stock Exchange |
| OLS | ordinary least squares |
| Ω | omega |
| opex | operating expenditure |
| ORG | Office of the Regulator-General |
| OTTER | Office of the Tasmanian Energy Regulator |
| P | price |
| % | per cent |
| PER | price earnings ratio |
| QCA | Queensland Competition Authority |
| QLD | Queensland |
| *R* | required return |

| | |
|---|---|
| RAB | regulatory asset base |
| RBA | Reserve Bank of Australia |
| $r_f$ | risk-free rate |
| s.e. | standard error |
| SA | South Australia |
| SFG | Strategic Finance Group Consulting |
| SPI | Singapore Power International |
| SRI | statement of regulatory intent |
| SRP | Statement of Regulatory Principles for the Regulation of Electricity Transmission Revenues |
| $T_e$ | effective tax rate |
| TD | total debt |
| TAS | Tasmania |
| term | term to maturity |
| $\theta$ | theta – imputation credit utilisation rate |
| TNSP | transmission network service provider |
| TPA | Transmission Pipeline Australia |
| the Tribunal | the Australian Competition Tribunal |
| TSLRIC | total service long run incremental cost |
| UK | United Kingdom |
| US | United States |
| V | value of debt and equity |
| VIC | Victoria |
| WACC | weighted average cost of capital |

# Appendix A: Attachments to this explanatory statement

**Attachment A**: Associate Professor John C. Handley

Comments on the CEG report: "Establishing a proxy for the risk free rate", 12 November 2008

**Attachment B**: Deloitte

Refinancing, debt markets and liquidity, 12 November 2008

**Attachment C**: Associate Professor Ólan T. Henry

Econometric advice and beta estimation, 28 November 2008

**Attachment D**: Associate Professor John C. Handley

Comments on the CEG reports: "Estimation of, and correction for, biases inherent in the Sharpe CAPM formula" and "An analysis of implied market cost of equity for Australian regulated utilities", 20 November 2008

**Attachment E**: Associate Professor John C. Handley

A note on the historical equity risk premium, 17 October 2008

**Attachment F**: Associate Professor John C. Handley

Supplement to historical equity risk premium, 27 November 2008

**Attachment G**: Associate Professor John C. Handley

A note on the valuation of imputation credits, 12 November 2008

# Appendix B: Submissions received on issues paper

On 6 August 2008, the AER released an issues paper canvassing issues relevant this review. Submissions on the issues paper closed on 17 September 2008. The AER granted a one week extension, to 24 September 2008, for the submission from the Joint Industry Associations, as well as the individual submissions from the ENA, Grid Australia and the APIA. 14 Submissions were received in total.

Submissions on the issues paper were received from:

- the Australian Pipeline Industry Association (APIA), 24 September 2008
- Cheung Kong Infrastructure Holdings (CKI), 26 September 2008
- the Energy Networks Association (ENA), 22 September 2008
- Energex. 24 September 2008
- EnergyAustralia, 24 September 2008
- Envestra, 24 September 2008
- Ergon Energy, 1 October 2008
- ETSA Utilities, Citipower and Powercor, 24 September 2008
- Grid Australia, 24 September 2008
- Integral Energy, 24 September 2008
- the Joint Industry Associations (JIA), 24 September 2008
- the Major Energy Users (MEU) in conjunction with some members of the National Consumers Roundtable on Energy, 18 September 2008
- Queensland Government, 17 September 2008
- SP AusNet, 24 September 2008

# Appendix C Credit rating level – regression analysis

In statistics there are a number of different regression approaches that can be used to analyse the relationships between different variables (from raw data). Ordinary Least Squares (OLS) regressions[883] are often used as an initial approach when examining statistical relationships. Another approach that is used when examining decision making processes is the logit approach. The ordered logit regression estimates the probability of a specific decision being made (i.e. Standard and Poor's giving a credit rating of BBB+, A-, A, etc.) assuming that the business' credit rating metrics are currently at benchmark (e.g. 60 per cent gearing, FFO to interest coverage of 4.5, etc). The benchmark credit rating would be informed by the estimated probabilities (with the highest probability credit rating decision interpreted as the benchmark).

***Sample businesses***

The same businesses that were used in the simple average and median analysis were used for the regression analysis. The AER considers that the following businesses are sufficiently close comparators to the benchmark efficient service provider:

- Citipower Trust
- Country Energy
- Dampier Bunbury Natural Gas Pipeline Trust
- Diversified Utility and Energy Trusts
- ElectraNet Pty Ltd
- Energy Australia
- Energy Partnership (Gas) Pty Ltd (EPG)
- Envestra Ltd
- Ergon Energy Corporation
- ETSA Utilities
- GasNet Australia (Operations) Pty Ltd
- Integral Energy
- Powercor Australia
- Rowville Transmission Facility Pty Ltd

[883] The OLS approach attempts to get a line of best fit by minimising the squared difference between actual observations and averages (means).

- SPI PowerNet Pty Ltd, and
- United Energy.

***OLS Regressions using cross-sectional data***

Cross-sectional data obtains observations for a single year to estimate relationships between different coefficients for the single year. Following from Lally and the ACG the AER has conducted an OLS regression, which takes the following form:

$$RAT_i = \alpha + \beta_x X_i + \beta_1 Y_y + e_i$$

where:

$RAT$ is the numerical representation of the credit rating for business $i$

$\alpha$ is the benchmark credit rating *ceteris paribus* (where dummies are set to zero and there is no deviation away from the average difference from the benchmark level)

$X_i$ represents dummy variables[884] (such as ownership type) for business $i$ and

$Y_i$ represents the difference between the actual financial measure (e.g. level of gearing) less the benchmark financial measure (for example a 60 per cent benchmark would be actual minus 60 per cent) for business $i$.

For example, a regression examining the impact of government ownership, gas businesses and gearing would take the following form:

$$RAT_i = \alpha + \beta_1 (actual\ gearing - 60) + \beta_2\, government + \beta_3\, gas + e_i$$

The OLS approach obtains estimates by minimising the sum of the squared residuals. The regression results for $\alpha$ in this equation will provide the benchmark credit rating for private electricity businesses, *ceteris paribus* (all other things being equal), when actual gearing equals 60, and 'government' and 'gas' equal zero.

The approach taken by Lally and the ACG allows for the analysis to examine different groups of sample businesses by including dummy variables. By assuming that $X$ and $Y$ equal zero the intercept in the equation ($\alpha$) can be interpreted as the benchmark credit rating level for a particular group. For example, in Lally this was a privately owned transmission business with a gearing of 60 per cent. If no dummy variables are used, the intercept will represent the benchmark credit rating for the group given the benchmarks used for each financial measure in the regression. If only gearing was used, the intercept would represent the credit rating at the benchmark level of gearing. The *a priori* (prior belief) expectations about the relationship between the variables used will depend on the nature of the variable. For example, the

[884] Dummy variables are variables which assign a value between 1 and 0 to account for a qualitative factor. For example, a government ownership dummy variable would assign a value of 1 for government owned business, a value of 0 for a privately owned business and a value 0.5 for a business that is both privately and government owned (i.e. ElectraNet).

relationship between the level of gearing and the credit rating is likely to be negative (if gearing increases the credit rating decreases), while with cash flow credit metrics the relationship is expected to be positive (if the cash flow credit metric increases the credit rating increases).

The different credit rating metrics to be used in each of the regressions will be selected using a general-to-specific approach. Where variables are removed sample one-by-one according to the probability that the coefficient in the regression is likely to be zero within a 90 per cent confidence interval.

***OLS Regressions using panel data***

Both Lally and the ACG used cross-sectional data to estimate the benchmark credit rating. If the sample number of businesses is small this creates limitations on the number of variables that can be used to analyse credit ratings as this would create a limited number of degrees of freedom. This may increase the likelihood that the estimation is not statistically different from zero. Another limitation of this approach is that the expected credit rating estimate may vary from year to year (this issue is common to all approaches that examine single years).

An approach that has been used in previous empirical studies to overcome this issue is the use of panel data. Panel data is a combination of cross-sectional and time series data. By using panel data the number of observations increases by the number of businesses multiplied by the number of points in time used. For example using five businesses with five years of quarterly data equates to 100 observations. Applying an OLS approach to panel data is known as Panel Least Squares. This approach estimates an OLS regression for each cross-section (business) and combines each estimate to give a single estimate for the panel.

One limitation of the Panel Least Squares approach is that the variance between different businesses is unlikely to be uniform over time for a number of different reasons. This creates potential problems with heteroskedasticity. In the presence of heteroskedasticity, an OLS approach will not result in a best linear unbiased estimator.

Therefore a generalised least squares (GLS) approach with cross-sectional weights will be used to address potential problems with the panel data. This uses the assumption that there are differences between the businesses that the variables in the model are not explaining (for example differences in managerial effort, weather or geography). The AER considers that it is appropriate to apply cross-sectional weights to account for business risks as noted in the JIA submission.[885]

When using this approach the equation takes the following specification:

$$RAT_{it} = \alpha + \beta_x X_{it} + \beta_y Y_{it} + e_{it}$$

where all variables are as described above and subscript t represents time (yearly, quarterly, etc).

[885] JIA, Submission in response, op. cit., September 2008, p. 141.

For example a regression examining the impact of government ownership, gas businesses and gearings would take the following form:

$$RAT_{it} = \alpha + \beta_1 (actual\ gearing - 60) + \beta_2\, government + \beta_3\, gas + e_{it}$$

The regression results for $\alpha$ in this equation will provide the benchmark credit rating for private electricity businesses, *ceteris paribus*, when actual gearing equals 60, and 'government' and 'gas' equal zero.

There are a number of problems with using a panel approach when the number of businesses outnumbers the number of periods. This approach estimates individual regressions for each of the businesses and then combines them to provide a combined estimate. Given the limited number of observations for each individual regression it becomes difficult to make inferences about the reliability and accuracy of the overall estimate in the presence of autocorrelation. It is also likely that Standard and Poor's is likely to examine previous decisions when making a decision on credit rating. Therefore, it is likely that autocorrelation (errors from the observations in past are related to observations in the future) will be present but due to the limited number of time periods an autoregressive term (applies an adjustment to the errors in estimate to account for autocorrelation) cannot be used. Therefore this approach may be used as another cross-check to demonstrate the median credit rating is appropriate.

***OLS Regressions using pooled data***

Given the limitations of panel regressions another approach that may increase the robustness of the estimation is to pool observations. Pooling observations also involves combining cross-sectional and time series data. The assumption under this approach is that each observation is an independent decision which is time invariant. In other words Standard and Poor's only examines a business' position at a given point in time independent of other businesses or previous decisions. This approach uses the OLS regression approach (as outlined above) but with a larger data set. Given that it is unlikely that Standard and Poor's makes credit rating decisions independent of each business, this approach should be used as another cross-check.

***Other data issues***

Energy network businesses using the same criteria as outlined in section 9.5.2 were used to apply the regression analysis. Therefore, no qualitative dummies (i.e. gas or government ownership) are required to estimate benchmark credit ratings for energy businesses. The most recent Industry Report Card for utilities businesses was released in May 2008 and therefore financial ratios for 2008 are unavailable. This limits the regression analysis to examining 2006 for cross-sectional data (businesses that report on 31 December 2007 are unavailable), 2002 to 2006 for the balanced regressions, and 2002 to 2007 for the unbalanced regressions.

***Ordered logit analysis***

Another approach that has been used when examining decision making processes is the logit approach. The logit approach attempts to estimate the probability (odds) of a specific outcome occurring. The most commonly used approach is a binary logit approach which estimates the probability of two different outcomes occurring. A binary logit approach is inappropriate as it is open to manipulation depending on the question being examined. For example a logit estimation can be designed to examine

the probability of credit rating decision is greater or less than a specific credit rating, or, examine the probability of two specifically defined outcomes.

The ordered logit regression estimates the probability of a specific discrete decision being made (i.e. Standard and Poor's giving a credit rating of BBB+, A-, A, etc.) assuming that the business' credit rating metrics are currently at benchmark (e.g. 60 per cent gearing). The benchmark credit rating would be informed by the estimated probabilities (with the highest probability credit rating decision being used as the benchmark). The ordered logit approach does not require the creation of two specific outcomes. The only requirement for an ordered logit regression is that each decision have a unique value, and that the values follow a specific hierarchy (i.e. low to high or vice versa).

The AER has conducted preliminary analysis to examine whether an ordered logit may be the used for the purposes of informing a benchmark credit rating. This involved estimating the probability of different outcomes for energy businesses assuming that the value of the firm being examined had credit metrics which equalled the benchmark (value of zero). The following is a summary of the results.

**Table A.1: Ordered logit results – Balanced Panel – Business with FFO interest coverage benchmark (2002 - 2007)[886]**

| Credit rating decision | Probability | Confidence interval |
|---|---|---|
| BBB- | 0.0055 | [-0.0067, 0.0178] |
| BBB | 0.0310 | [-0.0080, 0.0700] |
| BBB+ | 0.0590 | [ 0.0001, 0.1179] |
| **A-** | **0.2395** | **[ 0.1103, 0.3686]** |
| A | 0.0177 | [-0.0169, 0.0523] |
| A+ | 0.0795 | [ 0.0036, 0.1554] |
| **AA** | **0.4298** | **[ 0.2477, 0.6119]** |
| **AA+** | **0.1380** | **[ 0.0215, 0.2546]** |

[886] Where the business' actual FFO interest coverage is equal to the utilities industry's average FFO interest coverage.

**Table A.2: Ordered logit results – Balanced Panel – Business with gearing benchmark (2002 - 2007)** [887]

| Credit rating decision | Probability | Confidence interval |
|---|---|---|
| BBB- | 0.0129 | [-0.0132, 0.0390] |
| BBB | 0.0646 | [-0.0005, 0.1298] |
| **BBB+** | **0.1075** | **[ 0.0173, 0.1977]** |
| **A-** | **0.3188** | **[ 0.1825, 0.4551]** |
| A | 0.0182 | [-0.0172, 0.0535] |
| A+ | 0.0785 | [ 0.0042, 0.1528] |
| **AA** | **0.3114** | **[ 0.1762, 0.4465]** |
| AA+ | 0.0881 | [ 0.0120, 0.1641] |

**Table A.3: Ordered logit results – Balanced Panel – Business with gearing and FFO interest coverage (2002 - 2007)** [888]

| Credit rating decision | Probability | Confidence interval |
|---|---|---|
| BBB- | 0.0060 | [-0.0073, 0.0192] |
| BBB | 0.0339 | [-0.0097, 0.0775] |
| BBB+ | 0.0659 | [ 0.0034, 0.1351] |
| **A-** | **0.2554** | **[ 0.1118, 0.3989]** |
| A | 0.0179 | [-0.0170, 0.0527] |
| A+ | 0.0804 | [ 0.0039, 0.1569] |
| **AA** | **0.4137** | **[ 0.2251, 0.6023]** |
| **AA+** | **0.1269** | **[ 0.0124, 0.2415]** |

[887] Where the business' actual gearing is equal to the gearing benchmark (60 per cent).

[888] Where the business' actual FFO interest coverage is equal to the utilities industry's average FFO interest coverage, and, its actual gearing is equal to the gearing benchmark (60 per cent).

**Table A.4: Ordered logit results – Unbalanced Panel – Business with FFO interest coverage benchmark (2002 - 2007)** [889]

| Credit rating decision | Probability | Confidence interval |
|---|---|---|
| BBB- | 0.0314 | [0.0006, 0.0621] |
| **BBB** | **0.1283** | **[0.0476, 0.2089]** |
| BBB+ | 0.0669 | [ 0.0121, 0.1218] |
| **A-** | **0.2060** | **[ 0.1076, 0.3045]** |
| A | 0.0295 | [-0.0109, 0.0699] |
| A+ | 0.0649 | [ 0.0030, 0.1269] |
| **AA** | **0.3121** | **[ 0.1698, 0.4543]** |
| AA+ | 0.1252 | [ 0.0282, 0.2221] |
| AAA | 0.1380 | [ -0.0135, 0.0850] |

**Table A.5: Ordered logit results – Unbalanced Panel – Business with gearing benchmark (2002 - 2007)** [890]

| Credit rating decision | Probability | Confidence interval |
|---|---|---|
| BBB- | 0.0483 | [0.0082, 0.0883] |
| **BBB** | **0.1921** | **[ 0.0989, 0.2852]** |
| BBB+ | 0.0993 | [ 0.0230, 0.1756] |
| **A-** | **0.2456** | **[ 0.1345, 0.3567]** |
| A | 0.0277 | [-0.0103, 0.0658] |
| A+ | 0.0591 | [ 0.0025, 0.1158] |
| **AA** | **0.2296** | **[ 0.1233, 0.3360]** |
| AA+ | 0.0760 | [ 0.0160, 0.1360] |
| AAA | 0.0222 | [-0.0087, 0.0532] |

[889] Where the business' actual FFO interest coverage is equal to the utilities industry's average FFO interest coverage.

[890] Where the business' actual gearing is equal to the gearing benchmark (60 per cent).

**Table A.6: Ordered logit results – Unbalanced Panel – Business with gearing and FFO interest coverage benchmarks (2002 - 2007)** [891]

| Credit rating decision | Probability | Confidence interval |
|---|---|---|
| BBB- | 0.0358 | [0.0008, 0.0708] |
| **BBB** | **0.1557** | **[ 0.0586, 0.2529]** |
| BBB+ | 0.0867 | [ 0.0158, 0.1575] |
| **A-** | **0.2373** | **[ 0.1270, 0.3475]** |
| A | 0.0291 | [-0.0108, 0.0691] |
| A+ | 0.0636 | [ 0.0027, 0.1245] |
| **AA** | **0.2709** | **[ 0.1345, 0.4073]** |
| AA+ | 0.0943 | [ 0.0151, 0.1734] |
| AAA | 0.0266 | [-0.0110, 0.0643] |

The AER observes that the probability of Standard and Poor's awarding a credit rating of AA or A- is most likely in most circumstances. However, when the number of observations increases the same results hold but the probabilities for AA and A- decrease and the probability of a BBB+ decision increases. Therefore, the AER considers that the number of observations would need to be increased before an ordered logit approach could be considered as a reliable enough to inform the benchmark credit rating.

[891] Where the business' actual FFO interest coverage is equal to the utilities industry's average FFO interest coverage, and, its actual gearing is equal to the gearing benchmark (60 per cent).