



2008 Gas Access Arrangement Review

Weighted Average Cost of Capital

March 2007

This report contains 53 pages

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Inherent Limitations

This report has been prepared as outlined in Section 1.1 of this report. The procedures outlined in this report constitute neither an audit nor a comprehensive review of operations.

No warranty of completeness, accuracy or reliability is given in relation to the statements and representations made by, and the information and documentation provided by, SP AusNet's and Multinet's management and personnel consulted as part of the process.

KPMG have indicated within this report the sources of the information provided. We have not sought to independently verify those sources unless otherwise noted within the report.

KPMG is under no obligation in any circumstance to update this report, in either oral or written form, for events occurring after the report has been issued in final form.

The findings in this report have been formed on the above basis.

Third Party Reliance

This report is solely for the purpose set out in Section 1.1 of this report.

This report has been prepared at the request of SP AusNet and Multinet in accordance with the terms of KPMG's engagement letter dated 1 March 2007. Other than our responsibility to SP AusNet and Multinet, neither KPMG nor any member or employee of KPMG undertakes responsibility arising in any way from reliance placed by a third party on this report. Any reliance placed is that party's sole responsibility.

1 Executive Summary

1.1 Introduction and purpose of report

Gas distribution networks in Victoria are subject to access regulation under the National Third Party Access Code for Natural Gas Pipeline Systems ('the Code'). Under the Code, each network operator is required to submit a revised Access Arrangement to the Essential Services Commission ('ESC') that establishes, amongst other things, revenues and tariffs policy for third-party access to the network. Part of this process involves applying a Weighted Average Cost of Capital ('WACC') to a capital base established for the network.

The Access Arrangement contains a number of fixed principles that oblige the ESC to maintain consistency in its approach across regulatory periods. Those relevant to the estimation of the WACC include:

- the use of a real, post-tax WACC with an explicit allowance for taxation; and
- the use of the Capital Asset Pricing Model.

Consultation Paper Number 2 outlines the ESC's intended approach to estimating a Rate of Return for the third regulatory period. In short it is intended to continue to apply its judgement when considering finance theory, market evidence, regulatory precedent and the views of market practitioners and other experts. The ESC states that financial theory forms the foundation for the it to development a plausible range for the regulatory Rate of Return, however, because the Rate of Return is not directly observable, assessing the Rate of Return based on theory alone will not be sufficient. The ESC continues on to suggest that it will give greater weight to market evidence, particularly as problems associated with the quality of data are remedied, the extent of available information improves and the techniques for interpreting the evidence are refined.

In circumstances where parameter estimates are subject to inherent uncertainty, KPMG's preferred approach is to provide a range of values for such parameters and to select a point estimate above the midpoint of the resulting WACC range having regard to the importance of providing incentives for investment and regulatory certainty. In this instance, KPMG has been instructed by SP AusNet and Multinet to provide 'most likely' point estimates for a real post-tax WACC and each of its underlying parameters for the WACC for use in the 2008 Gas Access Arrangements Review ("GAAR"). This report sets out our recommendations on these matters and the basis for our conclusions.

1.2 Structure of this report

This remainder of this report is structured as follows:

- section 2 outlines the key considerations relevant to assessing the cost of capital, including the ESC's price review objectives and recent regulatory developments; and

- section 3 sets out KPMG’s analysis of the appropriate values for the underlying WACC parameters and the evidence that we have relied upon in arriving at our choice of values.

1.3 Conclusion

Based on our review, KPMG considers that the rate of return for Victorian gas distribution networks should be set by reference to the values for the relevant underlying parameters as set out in Table 1 below.

Table 1: Summary of cost of capital estimate

Parameter	Recommended Point Estimate
Real risk free rate *	2.63%
Equity beta	1.0
Market risk premium	6.0%
CAPM cost of equity (real)	8.63%
Equity proportion	40%
Debt proportion	60%
Pre-tax cost of debt (real) *	3.91%
Debt margin *	1.28%
Value of imputation credits	0%
Vanilla WACC – real*	5.80%
<i>*estimate will be subject to movements in interest rates at the time of the ESC’s final determination</i>	

2 Considerations relevant to assessing the cost of capital

2.1 Objectives of the ESC's price review

The cost of capital is an important component of the overall revenue requirement that will be approved by the ESC for each gas distribution business. As such, in assessing the appropriate cost of capital, it is important to understand the objectives of the ESC's price review process and the context within which the ESC intends to assess the access arrangements put forward by gas distributors in setting the revenue requirement.

In the ESC's 2006 Consultation Paper Number 2 ('CP2') for the 2008-2012 GAAR, the ESC notes that in its consideration of reference tariffs that Section 8 of the Code states that:

...to achieve a number of objectives, including providing the Service Provider with the opportunity to earn a stream of revenue that recovers the costs of delivering the Reference Service over the expected life of the assets used in delivering that Service, to replicate the outcome of a competitive market, and to be efficient in level and structure.¹

The ESC will also consider the objective of the Code, which is to establish a framework for third party access to gas pipelines that:

- facilitates the development and operation of a national market for natural gas;
- prevents abuse of monopoly power;
- promotes a competitive market for natural gas in which customers may choose suppliers, including producers, retailers and traders;
- provides rights of access to natural gas pipelines on conditions that are fair and reasonable for both Service Providers and Users;
- provides for resolution of disputes.

The Access Arrangement contains a fixed principle requirement for incentive-based regulation adopting a CPI-X approach and not rate of return regulation. In relation to the WACC, the ESC states that:

...the objective when determining the Rate of Return is to establish a stable regulatory environment that provides an expected stream of income to investors that is sufficient to attract an appropriate level of investment into the industry.²

The ESC has outlined its intention that when considering a plausible range for the cost of capital it will put primary weight on market evidence.

¹ ESC, GAAR Consultation Paper No. 2, October 2006, page 90.

² Ibid, page 85.

2.2 Code requirements

Section 8.30 of the Code sets out requirements for the rate of return to be used in determining a reference tariff for a covered pipeline:

The Rate of Return used in determining a Reference Tariff should provide a return which is commensurate with prevailing conditions in the market for funds and the risk involved in delivering the Reference Service (as reflected in the terms and conditions on which the Reference Service is offered and any other risk associated with delivering the Reference Service).

Guidance on the methods which might be used to determine the rate of return required by section 8.30 is provided in section 8.31:

By way of example, the Rate of Return may be set on the basis of a weighted average of the return applicable to each source of funds (equity, debt and any other relevant source of funds). Such returns may be determined on the basis of a well accepted financial model, such as the Capital Asset Pricing Model. In general, the weighted average of the return on funds should be calculated by reference to a financing structure that reflects standard industry structures for a going concern and best practice. However, other approaches may be adopted where the Relevant Regulator is satisfied that to do so would be consistent with the objectives contained in section 8.1.

In its GasNet decision, the Australian Competition Tribunal ('ACT'), in responding to an application for review of a decision by the Australian Competition and Consumer Commission ('ACCC') on revisions to the access arrangement for the gas transmission system owned and operated by GasNet Australia (Operations) Pty Ltd, gave explicit consideration to:

- the application of sections 8.30 and 8.31 of the Code; and
- the role of the regulator in establishing the method to be used for the setting of the rate of return, and in assigning values to the parameters to be used in applying that method.³

In developing its response, the ACT noted the findings of the Full Court of Supreme Court of Western Australia in *Epic Energy*, and concluded:

It is clear in the reasoning in Michael that there is no single correct figure involved in determining the values of the parameters to be applied in developing an applicable Reference Tariff. The application of the Reference Tariff Principles involves issues of judgement and degree. Different minds, acting reasonably, can be expected to make different choices within a range of possible choices which nonetheless remain consistent with the Reference Tariff Principles. Where the Reference Tariff Principles produce tension, the relevant regulator has an overriding discretion to resolve the tensions in a way which best reflects the statutory objectives of the Law. However, where there are no conflicts or tensions in the application of the Reference Tariff Principles, and where the AA proposed by the Service Provider falls within the range of choice reasonably open and consistent with Reference Tariff Principles, it is beyond the power of the Relevant Regulator not to approve the proposed AA simply because it prefers a different AA which it believes would better achieve the Relevant Regulator's understanding of the statutory objectives of the Law.⁴

In the specific context of determination of the rate of return, the ACT observed that:

³ *Application by GasNet Australia (Operations) Pty Ltd* [2003] ACompT 6.

⁴ *GasNet*, paragraph 29.

Contrary to the submission of the ACCC, it is not the task of the Relevant Regulator under s 8.30 and s 8.31 of the Code to determine a 'return which is commensurate with prevailing conditions in the market for funds and the risk involved in delivering the Reference Service'. The task of the ACCC is to determine whether the proposed AA in its treatment of Rate of Return is consistent with the provisions of s 8.30 and s 8.31 and that the rate determined falls within the range of rates commensurate with the prevailing market conditions and the relevant risk.

As a matter of construction, s 8.30 involves issues of judgement and degree as stated in par [29] above as to whether the Rate of Return is commensurate with the prevailing conditions in the market for funds and the risk involved in delivering the Reference Service. Nevertheless, it involves making decisions as to the existence or otherwise of the underlying facts which are relevant to the statutory task and to the choice of a method of utilising those facts to produce a Rate of Return. The right to choose a methodology is found in s 8.31.⁵

Having found that the regulator's role was not to set the rate of return, but to assess whether the rate determined by the service provider fell within the range of acceptable rates obtained by applying sections 8.30 and 8.31 of the Code, the ACT concluded:

When the proposed AA was delivered by GasNet to the ACCC, insofar as it contained a Rate of Return which was used to determine the Reference Tariff established by the use of the CAPM, the only issue for the ACCC to determine in respect of the Rate of Return was whether GasNet had used the model correctly. That is, whether it had used the CAPM to produce a Rate of Return which was consistent with the conventional use of the model. If GasNet had done so, then there was no occasion to refuse to approve the proposed AA on the basis that the Rate of Return had not been determined on a basis which was consistent with the objectives contained in s 8.1.⁶

Finally, in assessing the approach the regulator had taken to the particular parameter value in question (the risk free rate), the ACT noted:

The position of the ACCC was that it was required to make an evaluative judgement for the purposes of s 8.30 as to what the appropriate rate of return should be. Its position was that although consistency was desirable, best estimates have to be used when perfect information is not available, and that at various stages of the CAPM, approximations and estimates are required. The ACCC contends that such a use of estimates and approximations does not invalidate the use of CAPM. While it is no doubt true that the CAPM permits some flexibility in the choice of the inputs required by the model, it nevertheless requires that one remain true to the mathematical logic underlying the CAPM formula.⁷

Key principles from the GasNet decision are that, subject to the requirements of sections 8.30 and 8.31 of the Code, a service provider's chosen method for determination of the rate of return is to be applied in a way which:

- is the conventional use of that method; and
- maintains the consistency of the method's internal logic.

⁵ GasNet, paragraphs 42 and 43.

⁶ GasNet, paragraph 45.

⁷ GasNet, paragraph 46.

Determination of a rate of return as a weighted average cost capital – a weighted average of the cost of funds from each source used to finance a business ('WACC') – is well established, and has a clearly defined internal logic.

The conventional method for determination of a WACC, and requirements for internal consistency in the application of that method, are set out in the next section of this report. The specific parameter values used in applying the conventional method of determining the WACC are discussed in the following section.

2.3 Estimating the Rate of Return

The rate of return can be expressed in a variety of ways, each one corresponding to a specific cash flow definition. The Fixed Principles in the Access Arrangements of SP Ausnet and Multinet provide that the rate of return will be calculated:

- On a real post-tax basis with an explicit allowance being made for taxation; and
- Using the Capital Asset Pricing Model ("CAPM").

Consistent with the principles for the Rate of Return as set out in Sections 8.30 and 8.31 of the Code, we have estimated the Rate of Return by reference to a real post-tax WACC defined as follows:

$$\text{Real post-tax WACC} = K_e * E/V + K_d * D/V$$

Where:

- E and D are that market values of the various classes of equity and debt (respectively) which sum to the total market capitalisation of the firm, V; and
- K_e and K_d are the expected costs of these respective classes of capital.

Within this WACC formulation, the adjustment for the value of imputation credits is made within the calculation of the benchmark cost of tax, which is calculated separately from the Rate of Return. Notwithstanding this, we have been instructed to outline our views on the appropriate value for imputation credits in this report.

The WACC formulation we have adopted is consistent with that applied by the ESC in the second regulatory period and with the ESC's stated intentions for determining the Rate of Return for this third regulatory period, as outlined in its Consultation Paper No. 1.

2.4 Recent regulatory developments

Over the past three years there has been a renewed focus on economic regulation in the energy sector. This renewed focus has followed the Ministerial Council on Energy's ('MCE')

December 2003 report on energy markets reform to the Council of Australian Governments⁸. In that report, the MCE noted that there had been progress with reform, and significant benefits were now being delivered. However, substantial policy issues remained to be resolved if the full benefits of energy market reform were to be realised. A second phase of reform was now required to capture those benefits.

The MCE's report set out principles and directions for further reform, and the processes and timelines for resolution of key issues that had to be addressed in finalising the details of the reform program.

In particular, Ministers agreed that further reform was required to:

*“Streamline and improve the quality of **economic regulation** across energy markets, to lower the cost and complexity of regulation facing investors, enhance regulatory certainty and lower barriers to competition.”⁹*

The need to enhance regulatory certainty to ensure that energy sector investment would proceed had been identified by the Productivity Commission in its review of the gas access regime. The MCE sought to address this need through:

- creation of two new statutory authorities:
 - the Australian Energy Market Commission (AEMC), which would have responsibility for rule-making and market development; and
 - Australian Energy Regulator (AER), which would be responsible for market regulation; and
- agreement in-principle to development of a national approach to energy access under the *Trade Practices Act 1974*, covering electricity and gas transmission and distribution.

A proposed national approach to gas pipelines access is now being implemented through a new *National Gas Law* ('NGL') and *National Gas Rules* ('NGR'), which are expected to replace the *Gas Pipelines Access Law* and the Code. An exposure draft of the NGL was released for public consultation in November 2006, and draft rules were released soon after.

At this time (March 2007), it is not clear when the NGL and the NGR will be finalised.

To advise on a model to achieve a common approach to network access pricing across the energy market, the MCE established the Expert Panel on Energy Access Pricing in December 2005. The Expert Panel reported in April 2006, and its report appears to have been influential in shaping the regulatory scheme of the NGL and the NGR.

In its report, the Expert Panel reiterated the need for regulatory certainty:

⁸ Ministerial Council on Energy, 11 December 2003, Report to the Council of Australian Governments: Reform of Energy Markets.

⁹ Ibid, p. 4.

A regulatory environment that is conducive to desirable investments being made in a timely way is important. This means not only appropriate returns in the short term but that potential investors can be confident that sound substantial long term investment decisions can be based on a well understood and predictable regulatory regime and not rendered loss-making by subsequent regulatory intervention.

Equally important is the predictability of those decisions – that is the development of an approach that gives energy users and investors in transmission and distribution infrastructure confidence that access and pricing outcomes will be guided by known principles that are applied in a consistent manner.¹⁰

The terms of reference given to the Expert Panel directed it to provide high level policy guidance and recommendations. Nevertheless, in respect of one matter, the Panel gave consideration to the detail of the future energy access regime. The Expert Panel clearly indicated its preference for greater prescription in, and regulator control over, the setting of the rate of return. This was, in the Panel's view, necessary to provide greater certainty for investors in regulated assets.

Earlier, the Productivity Commission had, in its review of the gas access regime, indicated its concern to improve certainty for investors (and to minimise the costs of regulation, while protecting customers from the misuse of market power). The Commission recommended changes to the Code which would, if they had been implemented, have allowed pipeline service providers greater flexibility in the setting of the rate of return.

In May 2006, the MCE effectively rejected the Productivity Commission's recommendations on the setting of the rate of return, in favour of the approach of the Expert Panel.¹¹

This policy position has not yet been incorporated in the draft NGR which adopts, in Rule 35, a simplified scheme similar to that of sections 8.30 and 8.31 of the Code.

However, recent amendments to the National Electricity Rules ('NER') provide an indication of the direction which may be taken in implementing a common national approach to energy access pricing. Chapter 6A of the NER now specifies the values to be used for certain parameters critical to determination of the rate of return. These are:

- market risk premium 6%
- beta 1.0
- gearing 60%
- gamma 0.5

¹⁰ Expert Panel on Energy Access Pricing, Report to the Ministerial Council on Energy, April 2006, page 59.

¹¹ Ministerial Council on Energy, Review of the National Gas Pipelines Access Regime: Decision, May 2006, Appendix 1.

Although currently fixed, these values are subject to periodic review. In accordance with the NER, the AER must initiate a first review on 1 July 2009, and subsequent reviews every five years thereafter.

In discussing the rationale for fixing the values of those parameters critical to determination of the rate of return, the AEMC stated:¹²

*The provision of stability in the short term regarding the determination of the WACC reduces an important source of potential variability in regulatory decision making providing a more certain and predictable environment for investment and financing decision-making.*¹³

More specifically, in relation to beta:

The equity beta is the most difficult parameter to estimate, as it cannot be measured accurately from empirical data that is available. The Commission understands that the value of 'one' that was adopted in the SRP represents a compromise between the difficulties of estimation and the consequent need to err on the side of caution. Regulators have applied equity betas above and below 'one', but 'one' has come to represent the most widely accepted practice.

*In the interests of certainty and predictability the Commission has sought to codify elements of the SRP where there is general acceptance.*¹⁴

Both policy makers and regulators have recognized the need for greater regulatory certainty to ensure that energy sector investment proceeds. However, they appear to be responding, not as the Productivity Commission recommended, by allowing pipeline service providers greater flexibility. Rather, they are attempting to provide greater certainty through more prescriptive regulation of the allowed rate of return.

In the case of gas, the provision of greater certainty through more prescriptive regulation may be tempered by the requirements of the (draft) NGL that, in the setting of revenue and pricing principles, regard should be had to economic costs and risks of the potential for under and over investment by pipeline service providers (NGL, s. 21(6)).

In subsequent sections of this report, we establish a feasible point estimate value of the rate of return to be used in determining reference tariffs for the Victorian gas distribution businesses. In establishing this point estimate value, we have sought to reflect both the commercial circumstances of the businesses, and recent regulatory settings. Our estimate is consistent with current market evidence, and with regulatory principles and methods. If the new regulatory regime of the NGL and the NGR is to enhance regulatory certainty to ensure that gas pipeline investment proceeds, this consistency must be maintained into the future, and unanticipated and unusual changes in the critical parameter values must be avoided.

¹² AEMC, Draft Rule Determination, 2006, pages 57-61.

¹³ AEMC, Draft Rule Determination, 2006, pages 57-61.

¹⁴ Ibid.

3 Estimating the underlying parameter values

3.1 Gearing

In selecting an appropriate capital structure for the purposes of estimating WACC, it is standard practice to examine the observed gearing levels of other businesses operating in the same industry.

In Australia, an assumed gearing level of 60% has emerged as the regulatory benchmark for regulated electricity and gas network businesses, as shown in Table 2 below.

Table 2: Gearing values adopted in recent gas and electricity determinations

Decision	Regulator	Gearing (D/V)
Envestra Gas Distribution (Jun 2006)	ESCOSA	60%
Queensland Gas Distribution (May 2006)	QCA	60%
Country Energy Gas Distribution (Nov 2005)	IPART	60%
Victorian Electricity Distribution (Oct 2005)	ESC	60%
Alinta Gas Distribution (Jun 2005)	ERA	60%
ETSA Utilities (Jun 2005)	ESCOSA	60%
AGL Gas Networks (Apr 2005)	IPART	60%
Queensland Electricity Distribution (Apr 2005)	QCA	60%
NSW Electricity Distributors (Jun 2004)	IPART	60%
Victorian Gas Distribution (Oct 2002)	ESC	60%

As shown in Table 3 below the empirical evidence that we have reviewed suggests that the regulatory benchmark capital structure of 60% debt to total assets is not an unreasonable assumption. However, KPMG also notes that the sample of proxy companies used to establish a reasonable gearing assumption is small and does not currently include businesses with solely gas distribution operations.

Table 3: Observed gearing (defined as year end debt to total enterprise value¹⁵) levels of comparable companies

Company	2005	2006
Australian Gas Light	16%	29%
Australian Pipeline Trust	42%	47%
Alinta	8%	56%
SP AusNet	80%	56%
Spark Infrastructure		89%

¹⁵ Enterprise value is defined as net book debt plus the market value of equity at the relevant year end.

Company	2005	2006
Envestra Limited	69%	70%
<i>Source: Various brokers reports</i>		

Overall, KPMG considers that a 60% gearing ratio is not an unreasonable assumption to adopt for the purpose of establishing the cost of capital for a highly asset-intensive gas distribution system with regulated revenues.

3.2 The risk free rate of return and inflation

For the purpose of establishing a cost of capital for input into the ESC’s revenue setting process, the basis upon which the risk free rate of return is established must address:

- choice of proxy for the real risk free security; and
- the sampling window over which the risk free rate of return is measured.

3.2.1 Choice of proxy

It is conventional practice to estimate the risk free rate of return by reference to the yield on the nominal 10 year government bond which financial markets regard as the benchmark 10 year government bond. However, given that the ESC adopts a ‘real’ Rate of Return, the appropriate proxy is the yield on an Indexed Linked Government Bond with a term to maturity corresponding with the benchmark nominal 10 year government bond.

The current benchmark 10 year nominal government bond is the February 2017 government bond. As there is currently no equivalent Indexed Linked Government Bond maturing in February 2017, this yield has been estimated by interpolating between the August 2015 and August 2020 Index Linked Government Bond yields.

KPMG is aware that there has been substantial debate concerning the choice of proxy for the risk free security for a number of years. This debate originally emerged due to the ACCC’s persistence in adopting a risk free rate of return that matches the length of the regulatory period, when other Australian regulators have universally accepted the approach we have adopted.

KPMG notes that this debate has now been resolved by the recent Australian Competition Tribunal’s (“ACT”) decision on GasNet’s appeal against the ACCC’s revisions to its access arrangements. In that decision, the Tribunal found in favour of GasNet that the ACCC’s use of the five year government bond rate as the risk free rate was inappropriate in the context of the CAPM.

3.2.2 Sampling window for measuring the risk free rate

It has been the standard practice in regulatory determinations to adopt some period of historical averaging in estimating the risk free rate of return rather than an “on the day” rate. Given that the rates observed on any particular day could be temporarily influenced by market anomalies, KPMG agrees that some short term averaging of recent historical rates is desirable.

In theory, the most recent interest rates embody the latest information about market conditions, and therefore, the longer the period of averaging, the less weight would be attached to the latest market rates. This has led some regulators to adopt a shorter sampling window (e.g. 10 days).

KPMG notes that in the recent electricity distribution determination, the ESC expressed the view that it was appropriate to adopt an average rate rather than an on-the-day rate. Specifically, the ESC adopted a 20 day sampling window in measuring the risk free rate of return, which is consistent with the practice adopted by most other regulators around Australia.¹⁶

KPMG is unaware of any rigorous technical analysis or justification that has been advanced to demonstrate a clear preference for either a 20 or 10 day sampling period. However, from a practical perspective, a sampling window that is too short could create problems for a regulated entity that is intending to seek to hedge over the sample period. KPMG also understands that the AER's position on the sampling window is to allow regulated businesses the discretion to select their preferred sampling window.

On balance, KPMG considers that a 20 day sampling period is a pragmatic choice. It would however be desirable for the ESC to provide advance notice regarding the date on which the 20 day sampling period would commence, or end, to facilitate forward planning with respect to hedging.

3.2.3 Issues with the conventional approach to measuring the risk free rate of return

As discussed above, the risk free rate of return is conventionally measured by reference to a proxy risk free security represented by nominal 10 year Commonwealth Government Bonds and Indexed Linked Government Bonds. The merits of continued use of this approach are however subject to some debate. The practice of regulators in the UK is one example of this.

Regulators in the UK often have not relied solely on existing market rates when setting the real risk free rate or the debt premium.¹⁷ This is despite having the world's second largest index linked bond market in absolute terms and the largest in proportional terms, and a large and sophisticated corporate bond market.

For example, in 2002 the Competition Commission states its preference for relying on market data:

“Unlike other inputs to the CAPM, the current risk-free rate can be observed directly from trading in liquid markets. The UK Government has issued index-linked securities (index-linked gilts) which are generally considered to have negligible default risk and inflation risk (inflation measured by the RPI, though lagged eight months). The redemption yield on these gilts provides an estimate of the real risk-free rate for different maturities. The Bank of England makes regular estimates of such rates over the whole yield curve which are, in addition, adjusted to a zero coupon basis which helps to deal with tax and other complications.”¹⁸

¹⁶ The ESC accepted that its original sampling window contained a downward bias, and therefore changed the time period covered in its sampling window

¹⁷ This also has implications for estimating the expected rate of inflation.

¹⁸ Competition Commission, BAA: A report on the economic regulation of the London airports companies, 2002, p. 172. It also noted that in more recent times corporate bonds had declined.

The Competition Commission, however, goes on to note that:

“There appears to be widespread recognition that gilt yields have been affected by special factors, including an increased demand from pension funds as a result of the introduction of the MFR requirements in 1997, just before the decline in gilt yields started. The strong demand has placed upward pressure on prices of both conventional and index-linked government securities. Relatively low UK Government borrowing in recent years could be another factor contributing to the upward pressure on gilts prices (and hence lower yields)...”¹⁹

As a result, the Competition Commission recommended a range of 2.5%-2.75% for the real risk free rate when 10 year gilt yields were around 2.3%.

More recently, Ofgem in its initial proposals for the Electricity Distribution Price Control Review states as follows:

“The issue for DPCR4 is the expected risk free rate going forward. It is therefore important to come to a view whether the current low market rates are likely to persist into the future or whether these are factors, which are not expected to persist, which depress rates at present.

At present, the UK yield curve is still slightly downward sloping at longer maturities. This has been attributed to institutional factors such as the minimum funding requirement (MFR) for pension funds and the health of public finances (resulting in low supply of government bonds).”²⁰

Ofgem conclude that:

“The cost of capital is very sensitive to the risk free rate with the risk-free rate being an important input both in the cost of debt and the cost of equity. Given this sensitivity and given the considerable uncertainty surrounding the expected risk-free rate, it seems appropriate to adopt a cautious approach and hence a relatively wide range at this stage.”

“Given the above, it seems appropriate to adopt a slightly wider range than the most recent Competition Commission range. Ofgem gas widened the Competition Commission range symmetrically by 0.25%, which gives a range for the risk free rate of 2.25% to 3.0%.”²¹

At the time, 10 year gilt yields were around 1.9%.

It is difficult to determine the extent to which these developments are being driven by changes in market expectations or by exogenous factors (the decline in government borrowing). However, there is some evidence that exogenous factors could be having a significant influence on Australia’s bond markets (eg. Australia faces similar demographic issues and has also reduced its government debt levels significantly in recent times). There is also some evidence to suggest that, to the extent that this is the case, the effects might be more pronounced.

For example, the Commonwealth Government bond market is already comparatively small by virtue of the Government’s fiscal position. Indeed, in 2002 this led to the Government holding an inquiry into whether it was necessary to maintain that market. The Government ultimately

¹⁹ Ibid., page 174.

²⁰ Ofgem, Electricity Distribution Price Control Review: Background information of the cost of capital, March 2004, 12.

²¹ Ibid., 13.

decided to retain the market, however, it decided that “*the issuance of Treasury Indexed Bonds will be suspended.*”²²

Since 1996 Commonwealth general government net debt has fallen from \$100 billion to \$30 billion. At the same time, funds under management in superannuation, a key investor in risk-free debt, have risen from about \$300 billion to \$600 billion. Indeed, some parties already argue that the market is already too small and less liquid than is desirable.²³ Moreover, the indexed link bond market in Australia is, by any measure, particularly small (around \$10 billion worth of bonds in total are on issue).

Legitimate questions can therefore be raised about the extent to which current market yields provide a reliable estimate of the expected risk free rate, which again highlights the uncertainties associated with estimating the cost of capital.

These questions are further emphasized by more recent developments.

- In the 2006 EDPR, the ESC decided to alter its measurement period for observing the market data from the index linked Government Bond market on the basis that the rates it originally proposed to use were unduly affected by the maturation of a bond. The inference that can be drawn from this is that the ESC appears to accept that the market is insufficiently deep (at least at certain times) to provide a reliable indicator of the real risk free rate, because otherwise such a maturation would not unduly affect market rates.
- The current estimates of expected inflation are slightly above 3% over the next ten years, which is also slightly above the Reserve Bank’s target range. If this situation started to occur, it is likely to lead to a policy response. This situation also exacerbates the ability of regulated businesses to manage their exposure to inflation risk. This is because regulated businesses typically borrow in nominal terms (and therefore pay ‘expected inflation’), but are only compensated for actual inflation (ie. CPI) in their allowed prices. They borrow in nominal terms because of the insufficient depth of the index linked market. However, this leaves them exposed to the risk that they will not recover their real cost of debt in price increases.
- The yield curve in recent times for both nominal and real interest rates has been inverted, meaning that the long term rates used by regulators to assess the cost of capital (eg. 10 years) are lower than shorter term rates (eg. 3-5 years). Inverted yield curves are atypical because investors usually want a higher rather than lower return for investing over a longer period.

We note that our concerns are supported by a recent study by NERA into the extent of the bias in indexed Commonwealth Government Bond yields as a proxy for the CAPM risk free rate.²⁴

²² Treasury, Statement 7: Budget Funding, <http://www.budget.gov.au/2003-04/bp1/html/bst7.htm>. None has been issued since February 2003.

²³ Skeffington, Business Review Weekly, ‘Australia’s illiquid bond market has its supporters, but others want it abolished, 18 July 2002, page 38.

²⁴ NERA Economic Consulting, Bias in Indexed CGS Yields as a Proxy for the CAPM Risk Free Rate, March 2007.

NERA's study examined the existence and extent of the bias in Commonwealth Government Security ("CGS") yields from two perspectives:

- the bias in indexed CGS yields *relative* to nominal CGS yields; and
- the *absolute* bias in the nominal CGS yields.

In relation to relative bias, NERA found that the trend in nominal and indexed CGS yields has diverged since late 2004, leading to an observed widening of the spread between the two types of yields. They attribute this to a downward bias in indexed CGS yields relative to nominal CGS yields. NERA also point out that similar observations have been made by the Reserve Bank of Australia. The magnitude of the relative bias is estimated at around 18 to 20 basis points.

In relation to the absolute bias in nominal CGS yields, NERA infers that given the relative bias is around 20 basis points, the absolute bias can be expected to exceed 20 basis points. They also observe that the bias in nominal CGS yields exists and is currently at historic highs. It measures around 42 to 44 basis points currently, reflecting an increase of 27 basis points since June 2003. NERA attributes this to the reduction in supply of CGS but concede that further research is required to verify the data used and further test the results.

3.2.4 Conclusion

It is KPMG's view that there is a strong case for regulators to use the prevailing yields observed in the indexed linked market with considerable caution given these circumstances, or at least take the limitations of this market into account when selecting a cost of capital from a feasible range.

For the purposes of estimating an appropriate WACC for gas distribution system, KPMG has adopted a real risk free rate of **2.63%**. This rate reflects the yield on an Indexed Linked Government Bond with a term to maturity corresponding with the February 2017 nominal government bond which financial markets regard as the benchmark security.

Given that there is currently no Indexed Linked bond maturing in February 2017 (for consistency with the maturity characteristics of the 10 year Commonwealth Government Bond), this yield has been estimated by interpolating between the August 2015 and August 2020 Index Linked Government Bond yields, and averaging over the 20 days to 28 February 2007.

Our estimate of the real risk free rate does not include any allowance for the bias that has been identified in the recent study by NERA. This does not imply our lack of acceptance of the results of NERA's study, but rather, reflects our view that a conservative position is warranted at this stage given that the study is recent, currently unpublished and yet to be subject to academic scrutiny. We expect the 2008 GAAR process to provide an opportunity to debate these issues in further detail.

3.3 Debt margin

For the purpose of determining the WACC for a regulated business, the debt margin is a premium that is added on to the risk free rate of return to derive the cost of debt financing.

For a regulated business, the debt margin is influenced by a number of factors including:

- the credit worthiness of the entity, which is indicated by the credit rating of the entity. This rating in turn depends upon the financial ratios that flow from the firm's projected cash flows (given the benchmark regulatory assumptions made); and
- debt raising / establishment costs.

3.3.1 Credit rating assumption

The appropriate debt margin for a business will vary depending upon the assumptions made regarding the credit rating profile of the business. We have examined two key sources of information for the purpose of assessing an appropriate debt margin for SP AusNet and Multinet:

- Credit rating assumptions adopted by regulators in regulatory determinations of comparable businesses; and
- Market evidence on the credit ratings of comparable businesses.

Regulatory determinations

The table below summarises the credit rating assumptions that have been adopted by Australian regulators for energy distribution businesses.

Table 4: Credit rating assumption in recent regulatory decisions

Decision	Regulator	Assumed credit rating
Western Power Electricity Transmission and Distribution (Mar 2007)	ERA	BBB+
SA Gas Distribution (Jun 2006)	ESCOSA	BBB to BBB+
Queensland Gas Distribution (May 2006)	QCA	BBB+
Country Energy Gas Distribution (Nov 2005)	IPART	BBB+
Victorian Electricity Distribution (Oct 2005)	ESC	BBB+
AlintaGas Distribution (Jun 2005)	ERA	BBB+
ETSA Utilities (Jun 2005)	ESCOSA	BBB+
AGL Gas Networks (Apr 2005)	IPART	BBB to BBB+
Queensland Electricity Distribution (Apr 2005)	QCA	BBB+
NSW Electricity Distribution (Jun 2004)	IPART	BBB to BBB+
Aurora (2003)	OTTER	A

The information from regulatory decisions support the view that the appropriate credit rating is likely to be between BBB and BBB+, with the most likely rating being BBB+.

KPMG also notes that a recent study in the appropriate credit rating for a transmission business, prepared by Allen Consulting Group (“ACG”) for the Electricity Transmission Network Owners Forum²⁵, advocated the use of a BBB+ credit rating for electricity transmission businesses. Whilst no direct conclusions were drawn regarding the use of a similar credit rating for gas distribution businesses, KPMG notes ACG’s observation that:

- *“As a matter of principle, we consider that, as it is not possible statistically to distinguish the credit rating for a transmission and distribution entity that are otherwise identical, then it is more appropriate to treat these entities as being approximately similar and to ‘pool’ all observations to obtain a better estimate of the appropriate credit rating for the ‘pool’. We note that, at a high level, the main cash flow characteristics of electricity transmission and distribution are similar – namely that both receive revenues that are calibrated to cost and then recalibrated at periodic intervals, and both are very capital intensive operations.”²⁶*
- *“The assumption that transmission and distribution entities are sufficiently similar to permit observations from both types of entities to be ‘pooled’ – and hence to provide a more robust estimate of the relevant parameter for the pool of entities – is consistent with the approach that Australian regulators typically adopt when deriving equity betas for regulated electricity transmission and distribution entities.”²⁷* and
- *“...it is a reasonable assumption that the credit rating for otherwise identical regulated electricity and gas businesses would not be materially different, so that it is appropriate also to include gas businesses in the sample set.”²⁸*

These statements by ACG would suggest that there is no strong basis upon which to conclude that the credit rating for a benchmark gas distribution business would be different from that of a benchmark electricity transmission business.

Market evidence

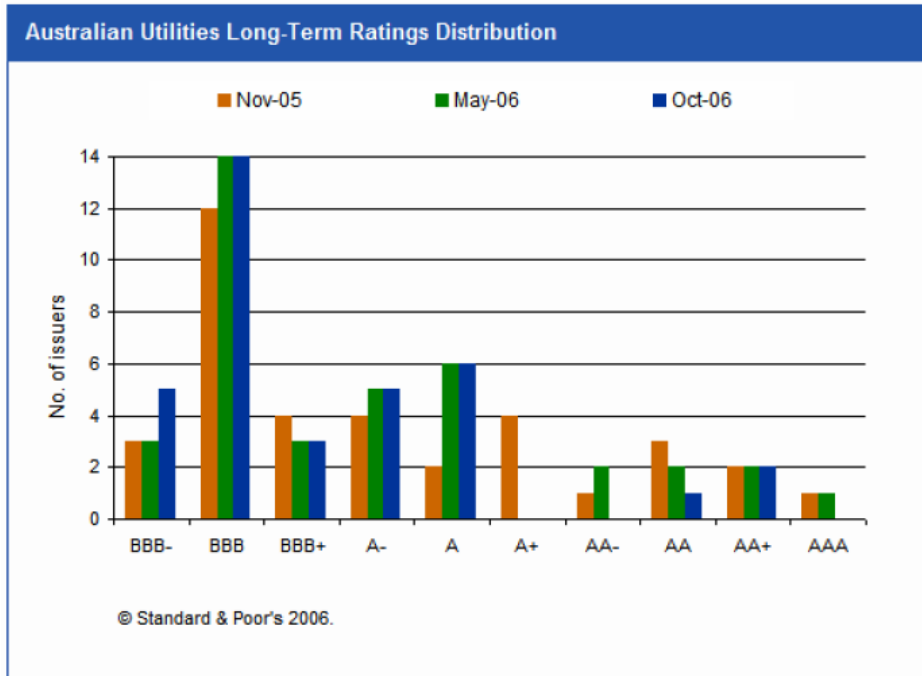
Recent information on the Australian utilities sector sourced from Standard & Poors indicates that the bulk of the issuers in the sector are currently rated “BBB” rather than “BBB+”. However, we note that the sample of companies included within S&P’s utilities database is very diverse and includes energy retailers, generators and other businesses operating in sectors upstream of energy distribution. We do not consider that such companies would be representative of a benchmark energy distribution business. Accordingly, we believe it is necessary to examine the credit ratings of specific comparable entities included in S&P’s analysis.

²⁵ Allen Consulting Group, May 2006, Credit Rating for a Benchmark Electricity Transmission Business, A Report for the Electricity Transmission Network Owners Forum

²⁶ ACG, May 2006, op cit, page 15

²⁷ ACG, May 2006, op cit, page 15

²⁸ ACG, May 2006, op cit, page 16.



Source: Standard and Poors, Ratings Direct, Industry Report Card: Australian Utilities, 26 October 2006

Examining only companies operating in the energy networks sector (i.e. transmission and distribution), we found that:

- Companies rated as BBB by S&P included Alinta Ltd, DUET and GasNet (prior to its acquisition by APT);
- Envestra was rated BBB-;
- ETSA Utilities, CitiPower and Powercor were rated “A-“; and
- An “A” rating applied to SP AusNet and SPI PowerNet.

S&P’s report did not include ratings for Spark Infrastructure nor Australian Pipeline Trust (now known as the APA Group).

Determination of an appropriate benchmark credit rating assumption clearly depends upon the financial characteristics of those entities considered to represent an appropriate benchmark. Also relevant is the assumed benchmarking gearing applying to the business.

Conclusion

Given the observed spread of the credit ratings for the companies that we considered (i.e. BBB- to A) as reported by Standard & Poors and the 60% benchmark gearing assumption, we consider that a BBB+ credit rating would be reasonably representative of the credit rating that would apply to a benchmark distribution business.

Data sources

Up until recently, the standard practice for estimating debt margins has been reference to credit spreads observed on corporate bonds sourced from the CBA Spectrum database. A recent report commissioned by the Energy Networks Association (“ENA”) and undertaken by NERA indicates that the credit spread data provided by CBA Spectrum is under-stated by approximately 25 basis points for long dated bonds:

“The CBA Spectrum estimation procedure is such that CBA Spectrum estimated yields are expected to be, and in practice are, on average, less than actual yields for long dated, low rated bonds. Between 30 June 2003 and 10 May 2005, actual yields on Australian bonds with more than 6 years to maturity and ratings of A or below averaged 17.1 basis points higher than CBA Spectrum estimated yields on such bonds. For bonds with more than 8 years to maturity and ratings of A or below, the difference has averaged 22.2 basis points.

On this basis we consider that the minimum reasonable adjustment to CBA Spectrum estimates by regulators seeking to estimate the cost of debt on 10 year low rated debt is 22.2 basis points. Using only data from CBA Spectrum, our best estimate of the appropriate adjustment to CBA Spectrum estimates of yields on 10 year debt rated A or below is to add 25.6 basis points.”²⁹

In submitting the research to the ESC as part of the 2006-2010 electricity distribution price review, the ENA noted that a copy of NERA’s report was provided to and discussed with representatives of CBA Spectrum, and that CBA Spectrum had not identified any factual error in the report.

NERA attributed the under-statement in CBA Spectrum spreads to the estimation technique adopted by CBA Spectrum, which predicts the “fair value” yields on corporate bonds by fitting a set of curves to the data. NERA observed that the procedure understates the yields on longer dated and lower rated bonds because the prediction process is based upon the yield on a bond of the next highest credit rating of equivalent maturity:

“For example, it introduces a phantom observation of a BBB rated 10 year corporate bond that has a credit spread that is equal to CBA Spectrum’s estimated credit spread for BBB+ 10 year bonds. Similarly, it introduces a phantom observation of a BBB+ 10 year bond that has a credit spread equal to CBA Spectrum’s estimated credit spread for A- 10 year bonds (and so on for higher credit ratings).”³⁰

Given the lack of depth in the market for long dated bonds (particularly low rated long dated bonds), the estimation technique results in the predicted yields understating the actual yields at the long end of the curve. NERA also compared CBA Spectrum predicted yields with Bloomberg yields and found that the latter exceeded the former by, on average, 25 basis points for low rated long dated bonds.

The information in the table below is reproduced from the NERA report. It sets out the average difference in actual yields over CBA Spectrum fitted yields for a sample of seven bonds.

²⁹ NERA, Critique of available estimates of the credit spread on corporate bonds, A report for the ENA, May 2005, page 2.

³⁰ NERA, op cit, page 5.

Table 5: Average differences between actual yields and CBA Spectrum fitted yields over the period 30 June 2003 through 10 May 2005 by bond

Bond	CFS Gandel 2010	Westfield	SPI Electricity	Tabcorp	Snowy	Stockland	CFS Gandel 2014
Average years to maturity	6.2	6.5	6.8	6.7	8.7	8.9	9.8
Credit rating	A	A	A-	BBB+	BBB+	A-	A
Average excess to CBA Spectrum (bp)	12.41	6.77	8.91	4.37	28.43	14.75	23.42

Source: NERA, Critique of available estimates of the credit spread on corporate bonds, A report for the ENA, May 2005, Table 2, page 10.

NERA also considered using data on yields from Bloomberg as an alternative to CBA Spectrum. This analysis was conducted on the same set of seven bonds shown in Table 5 above, and is shown in Table 6 below.

Table 6: Average differences between actual yields and Bloomberg representative yields over the period 30 June 2003 through 10 May 2005 by bond

Bond	CFS Gandel 2010	Westfield	SPI Electricity	Tabcorp	Snowy	Stockland	CFS Gandel 2014
Average years to maturity	6.2	6.5	6.8	6.7	8.7	8.9	9.8
Credit rating	A	A	A-	BBB+	BBB+	A-	A
Average excess to Bloomberg (bp)	1.12	3.02	7.82	-1.91	1.25	4.10	-4.58

Source: NERA, Critique of available estimates of the credit spread on corporate bonds, A report for the ENA, May 2005, Table 3, page 13.

As the information above indicates, the Bloomberg representative yields also differ from actual yields, however, the differences are not as marked as those with CBA Spectrum. In the case of Bloomberg, the estimation differences arise because Bloomberg representative yields are intended to be representative of yields on bonds within a similar ranking group (e.g. Bloomberg “A” rated bonds are intended to be representative of yields on A+, A and A- bonds). The estimation technique aims to minimise the sum of squared differences between actual observations on yields on A+, A and A- bonds and the Bloomberg representative yields on A

rated bonds. To this extent, the Bloomberg representative yields on A rated bonds may understate the actual yield on A- rated bonds.³¹

KPMG notes that in its draft decision on the 2006-2010 electricity distribution price review, the ESC undertook its own research on this matter and confirmed that the degree of under-statement in CBA Spectrum data claimed by the Victorian distribution businesses was true. This work was undertaken given that NERA's report had not been completed prior to the issue of the draft decision. Based on its own research, the ESC allowed an additional margin of 25 basis points to correct for this data measurement error in its draft decision.

Since then, we note that NERA's analysis has also been accepted by:

- the ERA in its final decision on the access arrangements for the mid-west and south-west gas distribution systems owned by AlintaGas. In this decision, the ERA accepted the validity of NERA's analysis based upon advice it had received from the Allen Consulting Group³²; and
- the QCA in its decisions on the 2005 access arrangements for the gas distribution networks in Queensland, which allowed a 20-25 basis point premium to account for the downward bias in the data from CBA Spectrum.

However, we also note that NERA's analysis was rejected by IPART in its 2005 decision on the access arrangements for Country Energy Gas, on the basis that it considered there was no credible evidence that CBA Spectrum consistently under-valued any class of bonds.³³ In addition, in its draft decision on Powerlink's transmission network revenue cap 2008-2012, the AER would appear to have accepted the measurement biases associated CBA Spectrum data but elected to rely on debt margin data from Bloomberg instead.³⁴ This approach was adopted by the AER in its decision on the Directlink Interconnector.

Whilst there would appear to be some residual uncertainty about the credibility of NERA's analysis amongst jurisdictional regulators and/or the appropriate data source to rely upon, we note that the ESC has satisfied itself about the credibility of NERA's research during the 2006-2010 electricity distribution price review. It is therefore likely that the ESC will adopt a similar approach for the 2008 Gas Access Arrangement Review. For this reason, we have examined data from CBA Spectrum for the purpose of estimating a debt margin for SP AusNet and Multinet.

Data from CBA Spectrum for 10 year BBB+ rated bonds average over the 20 days to 28 February 2007 was approximately 90 basis points. Allowing for the 25 basis points under-statement in CBA Spectrum data brings the debt margin (before debt establishment costs) to **115 basis points**.

³¹ No comments were provided on the impact on A+ rated bonds.

³² The Allen Consulting Group, Memorandum to Mr Peter Rixson, ERA, 11 July 2005 re: AGN cost of debt margin.

³³ IPART, Revised Access Arrangement for Country Energy Gas, Final Decision, November 2005, page 64.

³⁴ Powerlink Queensland, Transmission Network Revenue Cap 2007-08 to 2012-12, Draft Decision, December 2006, page 103.

3.3.2 Debt establishment costs

This category of costs represents the transaction costs associated with raising debt capital and is paid to the bank or financial institution arranging such debt. We note that in the Australian Competition Tribunal decision on GasNet's appeal against the ACCC's decision on its transmission revenues, the Tribunal ordered that an allowance of 25 basis points be provided. This is double the estimate adopted in recent regulatory estimates of 12.5 basis points, which would suggest that a number within this range is not unreasonable.

3.3.3 Conclusion

Based on the analysis outlined above, we have estimated a debt margin (inclusive of debt establishment costs) of **127.5 basis points** for a benchmark BBB+ rated energy network business geared to 60%.

3.4 The market risk premium

3.4.1 General

The equity market risk premium ("MRP") represents the additional return over the risk-free rate of return that an investor would require as compensation for the risks of investing in a diversified equity portfolio. It is essentially a measure of investors' appetite for risk.

Measurement of the MRP is a highly contentious issue. In theory, what we need to measure is essentially the size of the risk premium that investors, on average, *require* over the risk-free rate to invest in the stock market. In essence, what we are really seeking to determine is the *forward-looking* price that investors place on risk. The problem is that this forward-looking measure is not directly observable and the tools available to estimate the forward-looking MRP are inadequate.

In practice, there are three main ways in which the MRP has been estimated:

- by surveying of the expectations of investors or economists;
- by applying 'supply side' approaches (such as the Dividend Growth Model) to estimate an *ex-ante* MRP; and
- by measuring past levels of the MRP.

The case for relying on long term historical averages

In KPMG's view, the MRP is best estimated by reference to long term historical averages. Whilst all of the methodologies noted above are imperfect, we believe that past levels of MRP provide objective estimates of what the MRP has been and investors are likely to take into account past observations in forming their views on the required risk premium.

Our specific concerns regarding the other methodologies are set out below.

Firstly, we are sceptical about the qualitative evidence from surveys since the evidence is very much dependent upon the design of the survey question and the incentives of the survey promoter. In the Jardine Fleming Capital Markets Survey 2001, for example, which has been relied upon by other Australian regulators, we are aware that some respondents to the survey indicated negative expectations of the ex-ante MRP³⁵. In the minutes to the Trinity Best Practice Committee Meeting which discussed the survey results, Professor Robert Officer was quoted as stating that those responses were “completely irrational” and Professor Bruce Grundy stated that in his opinion, “..this survey was flawed because it asked the wrong question. It asked what the respondents thought the expected ERP would be, rather than asking what they though investors’ required ERP would be.”³⁶

We consider that estimates of the MRP produced by brokers or fund managers, and used in their marketing materials, should be viewed with caution. Advice provided to the Victorian gas distribution businesses as part of the 2001 price review by Professor Stephen Gray has noted that such material is often “*designed to encourage individuals to actively trade in equities*” whilst the lower estimates produced by pension fund managers are “*consistent with their incentive to motivate the use of lower benchmarks against which to assess their performance.*”³⁷

KPMG also questions the strength of the advice previously provided to the ESC in Victoria by Mercer Investment Consulting (“Mercer”)³⁸, which was obtained through interviews with fund managers. Our review of Mercer’s advice indicates that it is heavily qualified on some key issues. In particular:

- Mercer’s survey appears to be based on interviews with a small number of their contacts within institutional investment management. The strength of their survey results is therefore questionable;
- Mercer highlights that they perceive that “*brokers and investment managers maintain relatively higher estimates of the [MRP] than academics, and some academics have higher estimates of the [MRP] than asset consultants*”³⁹. This suggests that asset consultants (of which Mercer is one) tend to employ the lowest estimates of the MRP;
- Mercer notes that it does not actually require nor employ a forecast of the MRP in the context of giving strategic asset allocation advice to its clients. What matters, amongst other things, is the relativity between shares and bonds; and

³⁵ It is irrational to for investors to demand a negative risk premium for investing in risky stocks versus risk free bonds. Investors can expect or forecast a negative equity risk premium, however, this would imply that the investors in the survey have been asked the wrong question.

³⁶ Minutes of the meeting of the Trinity Best Practice Committee, “The Equity Risk Premium – An Australian Perspective”, 15 September 2000 (page references not provided).

³⁷ Gray, S., Issues in Cost of Capital Estimation, 19 October 2001, downloaded at http://www.esc.vic.gov.au/pdf/2001/sub_uqbs_gaspospapoct01.pdf (page 11).

³⁸ Letter dated 1 July 2002 from Mercer Investment Consulting to the ESC on the Australian Equity Risk Premium.

³⁹ Ibid, p. 7.

- Mercer states that the implied MRP from its forecast of returns on Australian shares is much lower than historical excess returns, however, they also state they “do not conclude which of these measures of the MRP is more correct.”⁴⁰

Finally, apart from estimates derived from historical averages, the only other source of quantitative evidence which suggests that the market risk premium is lower than indicated by historical averages are based on forward-looking supply side approaches. KPMG has concerns about the nature of the assumptions that underpin supply side approaches for estimating the MRP. Such approaches often require strong assumptions to be made regarding dividend growth rates in perpetuity, real GDP growth rates into perpetuity and constant levels of inflation, all of which are almost certainly to be violated in reality. For example, in Kortian (1998)⁴¹, the author recommended considerable caution in using the dividend discount model due to the high degree of sensitivity of equity prices to changes in the dividend yield, which is in turn dependent upon the real bond yield, the rate of growth in real dividends per share and the equity premium. Kortian (1998) calculated that if the dividend yield is currently 2%, then a 1% permanent decline in the equity premium would result in a 50% increase in share prices, all other things being constant. Such scenarios are highly unlikely to be borne out in reality.

Most importantly, we consider that estimates of the MRP derived from the application of approaches such as surveys and supply side approaches, should be treated with a high degree of caution due to the persistence of the ‘equity premium puzzle’. This puzzle describes the inability of economic theory to rationalise the size of the historical US equity premium. As the founders of the puzzle have noted:

“The puzzle cannot be dismissed lightly, since much of our economic intuition is based on the very class of models that falls short so dramatically when confronted with financial data. It underscores the failure of paradigms central to financial and economic modelling to capture the characteristics that appear to make stocks comparatively so risky.”⁴²

Furthermore:

“The data used to document the equity premium over the past 100 years is as good an economic data set as we have and this is long series when it comes to economic data. Before we dismiss the premium, not only do we need to understand the observed phenomena but we also need a plausible explanation why the future is likely to be any different from the past. In the absence of this, and based on what we currently know, we can make the following claim: over the long horizon, the equity premium is likely to be similar to what it has been in the past and the returns to investment in equity will continue to substantially dominate that in T-bills for investors with a long planning horizon.”

Given the lack of success that economic theory has had in rationalising the historical MRP to date, it would seem inappropriate to place weight upon studies that attempt to predict the ex-ante MRP using existing analytical approaches and economic rationale.

⁴⁰ Letter dated 1 July 2002 from Mercer Investment Consulting to the ESC on the Australian Equity Risk Premium, p. 8.

⁴¹ Kortian, T., Australian Sharemarket Valuation and the Equity Premium, 1998 mimeo, Department of Finance, University of Sydney.

⁴² Mehra, R., and E. Prescott, The Equity Premium in Retrospect, Forthcoming in the Handbook of Economics of finance, Edited by G.M. Constantinides, M. Harris and R. Stulz, North Holland, Amsterdam.

3.4.2 Australian empirical evidence – long term historical averages

Empirical evidence based on the historical market risk premium in Australia provides support for an MRP in the range of 6% to 8%⁴³

Table 7 below sets out the measured historical MRP in Australia reported in various studies and research.

Table 7: Measured historical MRP in Australia

Source	Period	Risk premium (%)
AGSM:		
Arithmetic average, incl. October 1987	1974-1995	6.2
Arithmetic average, excl October 1987	1974-1995	8.1
Arithmetic average ⁴⁴	1974-1998	4.8
Arithmetic average, incl. October 1987 ⁴⁵	1974 – Sep 2000	6.2
Arithmetic average, excl October 1987	1974 – Sep 2000	7.7
Officer (1989) – arithmetic mean	1882 – 1987	7.9
Officer (1989) updated – arithmetic mean ⁴⁶	1882 – 2001	7.2
Officer ⁴⁷ :		
Arithmetic mean	1946-1991	6.0 to 6.5
Hathaway (1996) ⁴⁸		
Arithmetic mean	1882-1991	7.7
Arithmetic mean	1947-1991	6.6
Gray (2001) (note 1)	1883 – 2000	7.3
Dimson, Marsh and Staunton (2000) ⁴⁹	1900 – 2000	7.6
Capital Research (2005) ²	1875 – 2005	4.5 (adjusted) 6.0 (unadjusted)
South Australia Centre for Economics Studies (2005) ³	1974 – 2003	4.5% to 5.0%

⁴³ This same conclusion was arrived at by the Queensland Competition Authority (“QCA”) after considering various historical measures of the MRP. Refer QCA, Proposed Access Arrangements for Gas Distribution Networks, October 2001, p.216.

⁴⁴ Refer ABN AMRO (1999) Submission to the Office of the Regulator General Victoria Regarding 2001 Electricity Distribution Price Review; the Cost of Capital Financing (Consultation Paper No. 4) p12. A copy of this is available at http://archive.esc.vic.gov.au/1999/electric_ConsPap4Resp_abnamro.pdf

⁴⁵ Referred to in independent expert report by Deloitte Touche Tohmatsu dated 19 December 2000 to Woodside Petroleum shareholders in relation to a takeover offer by Shell Investments.

⁴⁶ ABN AMRO (1999), op cit, p12

⁴⁷ Officer, R.R. (1992), Rates of Return to Shares, Bond Yields and Inflation Rates: An Historical Perspective, as updated for a 1993 Seminar at the University of Melbourne.

⁴⁸ ABN AMRO (1999), op cit, p12.

⁴⁹ Dimson, Marsh and Staunton, “Twelve Centuries of Capital Market Returns”, Business Strategy Review, 2000, Vol 11 Issue 2

Source	Period	Risk premium (%)
Allen Consulting Group (2006) ⁴	1975 – 2004	7.70%
	1970 – 2004	4.04%
	1960 – 2004	5.27%
	1955 – 2004	6.43%
	1950 – 2004	6.77%
	1930 – 2004	6.58%
	1905 – 2004	7.15%
	1900 – 2004	7.26%
	1885 - 2004	7.17%
Notes:		
1 Gray (2001) is based on an update of Officer's work as reported in S. Gray, <i>Issues in Cost of Capital Estimation</i> , 19 October 2001.		
2 Capital Research Ltd (2005), <i>Australian Market Risk Premium, January, Submission to the ESC Victoria in response to the Position Paper issued in relation to the 2005 electricity distribution price review.</i>		
3 SACES (2005), <i>The Market Risk Premium for Australian Regulatory Decisions</i> , 28 April, Adelaide, Submission to the ESC Victoria in response to the Position Paper issued in relation to the 2005 electricity distribution price review.		
4 Allen Consulting Group (2006), <i>Envestra's Proposed Revisions to its Access Arrangements, as referred to in SFG (3 May 2006), Issues on the regulated rate of return for gas distribution assets: A report prepared for Envestra.</i>		

General observations

In interpreting the evidence presented above, KPMG notes that the MRP estimates show some degree of variation but has remained largely within the 6% to 8% range. Although the degree of variation would appear to be relatively wide, we do not find the variance unusual given that it is widely accepted that the actual MRP varies from one point in time to another. Indeed, in its analysis of ACG's 2006 advice to ESCOSA on Envestra's proposed revisions to its access arrangements⁵⁰, SFG noted that the evidence published in ACG's report "...implies that there is about a 2/3 chance that the population mean lies within the range of 5.4% to 9.0%."⁵¹

Where historical averages are used, KPMG supports taking a longer term view on the MRP as it leads to a lower standard error of the estimated MRP. Table 8 below shows that over the period 1883 – 2000, the average Australian MRP (as previously estimated by Professor Stephen Gray) is 7.3% with a standard error of 1.56%, whereas the estimate from 1971 – 2000 is 4.8% but is much less reliable with a standard error of 4.4%. As Gray points out, the 4.8% average obtained for more recent decades (i.e. 1971 – 2000) is not statistically different from the longer term historical average.

⁵⁰ Allen Consulting Group (2006), *Envestra's Proposed Revisions to its Access Arrangements*

⁵¹ SFG (3 May 2006), *Issues on the regulated rate of return for gas distribution assets: A report prepared for Envestra*, page 14.

Table 8: Historical Australian Market Risk premium with varying start and finish years

Start Year	Finish Year	Mean %	Standard Error %
1883	2000	7.3	1.56
1883	1970	8.2	1.5
1971	2000	4.8	4.4

Source: Gray, S (2001), Issues in Cost of Capital Estimation, available at http://www.esc.vic.gov.au/PDF/2001/SubUQBS_GasPosPapOct01.pdf

Capital Research (2005) and SACES (2005)

The recent studies from Capital Research (2005) and the South Australian Centre for Economic Studies (2005) were tabled with the ESC in Victoria during the 2006 electricity distribution price review. Capital Research (2005) and SACES (2005) both claim that the long term arithmetic average MRP observed in the market is likely to significantly overstate the expected MRP. They reach this conclusion after making various selective adjustments to their data, and estimate that the current MRP lies in the range of 4.5 to 6.0 percent. However, a critique of the methodologies employed in these studies by Gray and Officer (2005)⁵² noted that it is inappropriate to make ad hoc adjustments to historical data for unanticipated events because unanticipated events are the reason that the market risk premium exists.

Gray and Officer (2005) also note that whilst the MRP is an ex-ante concept, it is difficult to obtain forecasts that can be used with any degree of confidence. Forward-looking models tend to have low forecast ability, and under such circumstances, it is common for many economic forecasts to be based on projections of historical data, relying on the notion that the expectations of investors will be framed on the basis of their past experiences.

Gray and Officer (2005) expressed preference for MRP estimates of between 6.4% and 7.7% after removal of the adjustments made by Capital Research and SACES, and application of their preferred methodology. The unadjusted data used in Capital Research (2005) and SACES (2005) also support the proposition that historical MRP is at least 6% over various measurement periods, both short and long.

Market practice

KPMG is aware that it is common market practice to assume a value of 6% for the market risk premium in company valuations. This evidence is reflected in a 2004 KPMG study which examined the valuation practices of independent experts in conducting valuations of companies subject to takeovers⁵³. Although the principal focus of the study was on the value adopted by experts in relation to imputation credits, the study also revealed that of those reports (i.e. 33 out of 118 reports) that adopted the Capital Asset Pricing Model for estimating the cost of equity:

- all adopted a value for the MRP within the range of 6% to 8%, and

⁵² Officer, R. R. and S. Gray, (Aug 2005), "A review of market risk premium and commentary on two recent papers: A Report prepared for the Energy Networks Association"

⁵³ KPMG (2005), Cost of Capital – Market practice in relation to imputation credits, prepared for the Victorian electricity distributors, July 2005.

- 25 reports (or 76%) adopted 6% as a point estimate for the MRP. The report observed that this value prevailed despite the fact that most expert reports acknowledged the uncertainty surrounding the measurement of the parameter and raised the possibility that the MRP has fallen below historical levels. This evidence suggested that such factors were not considered by the expert as being sufficient to warrant adopting a value for the MRP much higher or lower than 6%, on average.

MRP and the value of franking tax credits

KPMG also notes that post-1987 MRP data is biased downwards since the market index used to measure the MRP does not capture the average value of franking tax credits. We note that its final determination on the 2003 Victorian gas access arrangements, the ESC estimated that the inclusion of the average value of franking credits since 1987 would add 0.2 percentage points onto the long term average. However, in the minutes to the Trinity Best Practice Committee Meeting which discussed the results of the Jardine Fleming Capital Markets Survey 2001⁵⁴, Professor Robert Officer stated that:

“...if you assume that franking credits represent about 20% of total stock returns, the historic ERP could be biased downward by as much as 1%.”⁵⁵

3.4.3 Regulatory precedents

The table below sets out a summary of the MRP assumptions that have been recently adopted by Australian regulators for energy distribution businesses.

Table 9: MRP values adopted in recent energy distribution business regulatory decisions

Decision	Regulator	MRP value
ERA Western Power Electricity Transmission & Distribution (Mar 2007)	ERA	5% to 6%
SA Gas Distribution (Jun 2006)	ESCOSA	6%
Queensland Gas Distribution (May 2006)	QCA	6%
Country Energy Gas Distribution (Nov 2005)	IPART	6%
Victorian Electricity Distribution (Oct 2005)	ESC	6%
AlintaGas Distribution (June 2005)	ERA	5% to 6%
ETSA Utilities (Jun 2005)	ESCOSA	6%
AGL Gas Networks (Apr 2005)	IPART	5.5% to 6.5%
Queensland Electricity Distribution (Apr 2005)	QCA	6%
NSW Electricity Distribution (Jun 2004)	IPART	5% to 6%

⁵⁴ Jardine Fleming Capital Partners Limited, The Equity Risk Premium – An Australian Perspective, Trinity Best Practice Committee, September 2001.

⁵⁵ This increment of 1% estimated by Officer is also consistent with the increment that Mercer Investment Consulting advised that it would apply to the equity premium to account for imputation credits. Refer page 330 of the ESC’s 2003 Review of Gas Access Arrangements, Final Determination.

With the exception of the NSW regulator, IPART, and the WA regulator, the ERA, regulators around Australia have consistently adopted a point estimate of 6% for the MRP.

IPART

KPMG notes that in IPART's NSW Electricity Distribution Pricing 2004/05 to 2008/09 decision, the NSW regulator adopted a range of 5% to 6% for the MRP.

KPMG questions the credibility of IPART's choice of values for the MRP. In particular, it is difficult to escape the impression that the Tribunal has been selective in the basis for its decisions and its choice of values for the MRP and the value of imputation credits. For example, the Tribunal has justified its choice of an MRP range of 5% to 6% on the basis that "...there is insufficient evidence to change the market risk premium range from that used in the 1999 determination."⁵⁶ If the weight of available evidence (as presented in Table A7.23 of IPART's draft determination) is a principle to be consistently applied in considering individual parameter values, the application of this principle should have led IPART to retain a value for gamma in the range of 30% to 50% (not a point estimate of 50%), particularly given the Tribunal's own admission that the reliability of the study by Chu & Partington (2001) – which was the only study quoted in the draft determination in support of a value for gamma that is closer to 1 - was questionable⁵⁷.

In addition, IPART's final determination concluded that its own review of historical studies of the Australian MRP found that "...several of these studies did estimate the MRP to be around 6 per cent" and that "...to reflect the findings of all the studies, an MRP derived from historical studies would be between 4.8% and 8.1 per cent, implying a midpoint of 6.5 per cent."⁵⁸ It is difficult to understand how the Tribunal could have concluded that the appropriate value for the MRP should lie between 5% to 6% on the basis on these statements.

In light of the above evidence, KPMG has serious concerns regarding the credibility of IPART's choice of values for the MRP. On this basis, we do not consider that any weight should be accorded to this evidence.

It would appear that since the 2004-2009 electricity distribution price determination, IPART has reconsidered its position on the appropriate value for the MRP. This is evident in its subsequent decisions on:

- AGL Gas Networks – In the final decision, IPART commented that it was "... satisfied that a market risk premium of 5.5% to 6.5% uniformly distributed meets the requirements of the Code."⁵⁹; and

⁵⁶ Draft Determination, page 223.

⁵⁷ IPART draft determination, page 236.

⁵⁸ IPART final determination, page 223. We note that in the final determination, IPART introduced two new pieces of evidence (by Brown & Clarke (1993) and Walker & Partington (1999)) both of which were not considered in the draft determination, but which – interestingly and conveniently – contributed to the Tribunal not changing its views from the draft determination.

⁵⁹ Revised Access Arrangements for AGL Gas Networks, April 2005, Final Decision, page 97.

- Country Energy Gas Networks – In its final decision, IPART stated that it was satisfied that CEG’s proposed market risk premium of 6.0 per cent was commensurate with prevailing conditions in the market for funds and met the requirements of Section 8.30 of the Code.⁶⁰

ERA

In its most recent determination in relation to Western Power, the ERA has adopted a range of 5% to 6% for the MRP. This same approach was also adopted in relation to its determination on AlintaGas Distribution.

In its determination on Western Power, the ERA provided the following reasons for its views on the MRP:

- 1 Values above 6% reflect too great a weight being placed on analysis of historical returns in the Australian stock market, and insufficient weight being given to factors that suggest that the expectation of future market returns may be less than historical returns. These factors include:
 - Changes in the Australian stock market over the course of its history, particularly a shift in market composition away from resources stocks, which have higher risk and hence, on average, higher expected returns;
 - Changes in the Australian economy, particularly increased financial integration with other developed economies, which may enable greater diversification of risk and reduce the risk premiums required by investors; and
 - Declining transaction costs, which has also allowed greater diversification by market participants reducing the risk premium they require;
- 2 The Authority considered that the value for the MRP should reflect the expected MRP at the current time rather than historical averages of the realised MRP from past periods. International analysis on the former suggests that the MRP in the future can be expected to be lower than the MRP realised in the past;
- 3 Survey evidence reported by the Essential Services Commission in Victoria⁶¹ as part of the 2003 Gas Access Arrangements Review indicated that the historical MRP was 5.87% on average and that the average of future expectations of the MRP was about 1% less;
- 4 More recent forward-looking analyses of the MRP and surveys of market practitioners’ expectations of the future MRP support the assumption of an MRP of 6% or less. This evidence has been noted in a report prepared by the Allen Consulting Group⁶²; and

⁶⁰ Revised Access Arrangements for Country Energy Gas Networks, November 2005, Final Decision, page 64.

⁶¹ Jardine Fleming Capital Partners Limited, September 2001, The Equity Risk Premium – An Australian perspective, Trinity Best Practice Committee.

⁶² Allen Consulting Group, Cost of Capital for Queensland Gas Distribution, Report to the Queensland Competition Authority, December 2005.

- 5 Ex-ante estimates (from a range of different sources) of the MRP made for Australian equity markets using the dividend growth model (“DGM”) methodology suggest that historical realised MRP values will overstate the future MRP.

KPMG does not support the ERA’s rationale for adopting an MRP value in the range of 5% to 6% for the following reasons:

- Firstly, the MRP is a parameter that has been subject to much debate particularly in relation to the way in which its value is empirically measured. As such, in arriving at a view on the appropriate value of the MRP, it is necessary to focus on the quality of the evidence produced by different measurement techniques. Whilst the ERA has questioned the use of historical averages of the realised MRP as a proxy for the future expected MRP, it has not adequately considered the quality of some of the alternative forward-looking methodologies that it has relied on, namely, survey-based evidence and estimates produced by the DGM methodology. Adequate consideration of the quality of the evidence would result in a lower weight being placed on estimates derived from forward-looking and survey-based methodologies.
- Secondly, the ERA has relied heavily on analysis contained in a report prepared by the Allen Consulting Group (“ACG”) for the Queensland Competition Authority (referred to as ACG (2005)), which suggests that long term historical average MRP measurements significantly overstate the expected MRP, and that structural changes in the composition of the Australian stock market and the Australian economy over time have reduced the volatility of the Australian market, which “should have” resulted in investors lowering their required rates of return⁶³. Although these factors have been advanced as being possible reasons for a reduced risk premium, it may be considered speculative as ACG does not provide any hard evidence that investors have in fact reduced their required returns. We therefore believe that limited reliance should be placed on the views expressed in ACG (2005). ACG’s report draws support for its views by reference to reports prepared by Capital Research (2005)⁶⁴ and SACES (2005)⁶⁵ which attempt to adjust the historical realised MRP for non-recurring and other events, in order to arrive at what could be considered a normalised forward-looking MRP. However, as discussed earlier in our report, the critique by Gray and Officer (2005)⁶⁶ of Capital Research (2005) and SACES (2005) provide compelling reasons to question the theoretical and empirical validity of that work.

In view of the above considerations, we consider that the ERA’s justification for its conclusions on the value for the MRP are not appropriately supported.

3.4.4 Conclusion

KPMG supports the estimation of the MRP by reference to long term historical averages. The evidence that we have reviewed provides strong support for an Australian MRP in the range of 6% to 8%, with a point estimate of 6% representing the value most commonly adopted by

⁶³ Allen consulting Group (December 2005), op cit, page 64.

⁶⁴ Capital Research Ltd 2005, op cit.

⁶⁵ SACES, 2005, op cit

⁶⁶ Gray, S and R.R. Officer (2005), A review of the market risk premium and commentary on two recent papers – A report for the Energy Networks Association, August.

independent experts in valuations of companies subject to takeovers. Whilst there are limitations associated with historical based estimates, we consider these limitations to be lesser than those associated with the alternative methodologies for estimating the MRP.

As highlighted earlier, ex-ante approaches – which are probably the leading alternative estimation approach for the MRP – require the use of some highly questionable assumptions. Furthermore, the credibility of attempts to predict the forward looking MRP using ex-ante approaches can be questioned given the fact that economic theory has failed to explain why predicted MRPs (based on what economic theory or fundamentals suggests the MRP should be) consistently understate the actual measured MRP. This phenomenon has been dubbed the ‘equity premium puzzle’ in financial economics literature. As the founders of the puzzle have noted:

“The puzzle cannot be dismissed lightly, since much of our economic intuition is based on the very class of models that falls short so dramatically when confronted with financial data. It underscores the failure of paradigms central to financial and economic modelling to capture the characteristics that appear to make stocks comparatively so risky.”⁶⁷

Furthermore:

“The data used to document the equity premium over the past 100 years is as good an economic data set as we have and this is long series when it comes to economic data. Before we dismiss the premium, not only do we need to understand the observed phenomena but we also need a plausible explanation why the future is likely to be any different from the past. In the absence of this, and based on what we currently know, we can make the following claim: over the long horizon, the equity premium is likely to be similar to what it has been in the past and the returns to investment in equity will continue to substantially dominate that in T-bills for investors with a long planning horizon.”

Given the lack of success that economic theory has had in predicting the MRP to date, it would seem inappropriate to place weight upon ex-ante approaches in estimating the MRP, particularly for investment in long lived network assets.

On balance, given the evidence from long term historical averages and market practice, we consider that it is reasonable to adopt a point estimate of **6%** for the MRP.

3.5 Beta

3.5.1 Introduction

Under the CAPM, the total risk of an asset can be divided into two parts: systematic risk and unsystematic risk. Systematic risk is a function of broad macroeconomic factors that affect the prices of all assets. Unsystematic risk⁶⁸ is a function of the characteristics associated with a particular asset as opposed to the overall market.

Under CAPM theory, investors can eliminate unsystematic risk by holding a diversified portfolio of assets. The rationale is that in a diversified portfolio, positive events affecting some

⁶⁷ Mehra, R., and E. Prescott, The Equity Premium in Retrospect, Forthcoming in the Handbook of Economics of finance, Edited by G.M. Constantinides, M. Harris and R. Stulz, North Holland, Amsterdam.

⁶⁸ Unsystematic risk is also commonly referred to as unique risk, diversifiable risk or non-market risk.

stocks will be offset by negative events affecting other stocks, so that on average, the overall return on a diversified portfolio will equate to the weighted average expected return on all stocks in the portfolio. Hence, it is assumed that investors will not care about unsystematic risk and will not require any compensation for such risk in the form of a higher return. By contrast, diversification cannot eliminate systematic risk since it affects all stocks. Under the CAPM, the systematic risk of an asset is measured by its 'beta' factor, which reflects the contribution of that asset to risk of a diversified investor's portfolio.

In statistical terms, the beta factors reflect the extent to which possible future returns are expected to co-vary with the overall market return. A beta of 1 means the asset has the same risk as the market whereas a low risk asset will have a beta less than one and display less systematic response to market-wide events than will the average asset.

3.5.2 Estimation method and issues

Equity beta

Betas are usually estimated by regressing historical share market returns against a market index. There are a number of services that provide such estimates including, the Risk Measurement Service of the Centre for Research in Finance at the Australian Graduate School of Management's ("AGSM") Centre for Research in Finance ("CRIF"), London Business School, Bloomberg, DataStream, and Value Line. These services can assist in quantifying the likely equity beta for a stock, however, we stress that such estimates provide a *guide* rather than a definitive estimate of the appropriate equity beta for a stock. There are a number of reasons for this.

- Estimation error is high. Confidence intervals around beta estimates are quite wide and in addition, betas vary over time and often, significantly so. The AGSM beta estimates shown later in Table 10 of this report demonstrate the extent of the imprecision in the estimates.
- Beta estimates are highly sensitive to outlier observations. Some beta estimates can shift substantially (e.g. from negative to positive) when outliers are removed.
- In theory, the market portfolio under the CAPM should be a market value weighted index of the entire universe of investable assets – not just equity. However, in practice no such index exists. As a result, it is necessary to adopt a proxy for the market portfolio. An overall market index is the most common choice for a proxy, however, even so, many market indices exist and each one will produce a different measure of the equity beta for a stock.
- Beta estimates can be measured over different return intervals – daily, weekly (including weekly ending or starting on specific days) or monthly. Depending on the size of the return interval, return correlations between the stock and the market may or may not be properly captured.
- Beta estimates from different data sources are measured using different techniques and timeframes. For instance, CRIF at AGSM uses 48 monthly observations and the default for

Bloomberg's is 60 monthly observations. These different measurement bases can cause differences in estimates.

- Comparables are used as a guide if the business under examination is not listed or there is too much estimation error to rely solely on the beta estimate for one business alone if it is listed. Unfortunately listed, pure play comparables are few and far between, particularly in Australia and for gas distribution. Often, comparables from other countries are used as a guide in order to present an expanded data set for consideration. However, interpretation of overseas data presents additional challenges because different tax regimes can influence financial leverage and different mixes of industries and sectors can mean betas relative to the home country index would not be the same as those relative to an Australian index. The Australian economy is quite unusual in that it is very heavily influenced by the resources sector. Thus translating betas from other countries to Australia requires careful judgment.
- Since financial leverage can vary across industries, countries and firms, and furthermore, financial leverage is a determinant of equity beta, it is common to de-lever comparable betas to arrive at an "asset" beta then to re-lever at the target financial leverage considered appropriate for the business in question. However, there are a number of different formulas that can be applied to de-lever/re-lever betas which adds a further layer of complexity.
- For regulated utilities which face an asymmetry in their return distribution⁶⁹ due to limitations in upside price potential, there is some evidence to indicate that the conventional CAPM cost of equity understates the true cost of equity. Conine and Tamarkin (1985) demonstrates this with testing on a sample of 60 utilities over the period from 1971 – 1980 and their results indicated that on average, the cost of equity was understated by approximately 1.35 percentage points.⁷⁰ The Productivity Commission, in its draft report on the Review of the Gas Access Regime also noted that "*The total risk distribution is relevant considering ROR truncation. The reason being that the asymmetric truncation of unsystematic risk causes its mean to be less than zero, thereby reducing the expected value of ROR.*" [emphasis added]⁷¹ In particular, the PC's analysis highlighted that:
 - regulators typically institute benefit sharing arrangements under price capping regimes when realised returns exceed expected returns to benefit users. However, "*In implementing such a process, the regulator risks truncating the distribution of the ROR (total risk). If this occurs, the expected value and standard deviation of the ROR for these regulated assets will be altered and the expected ROR will no longer be consistent with the choice of asset beta.*"⁷²; and
 - the consequence of asymmetric truncation of returns for regulated utilities is that "*...as the degree of asymmetric truncation increases, the coefficient of variation increases, distorting the risk-return trade-off for the investment. Compared with the unregulated*

⁶⁹ Specifically, regulated utilities faced a truncated distribution of returns. Factors contributing to this includes regulatory lag, unexpected price inflation, and risks arising from the discretions afforded to price regulators.

⁷⁰ Conine, T.E., and M. Tamarkin, Implications of skewness in returns for utilities cost of equity capital, Financial Management, Winter 1985, p. 66-71. Specifically the study noted that the standard CAPM estimate for the utilities in their sample was 15.81% as compared with 17.16% under a model that was adjusted to deal with skewness.

⁷¹ Productivity Commission 2003, Review of the Gas Access Regime, Draft Report, Canberra, page 393.

⁷² Ibid, page 396.

situation, the regulated investment offers a lower expected value of ROR for comparable levels of risk.”⁷³

The discussion above serves to highlight that selection of an appropriate value for beta for a regulated utility entails more than merely selecting a number from a beta measurement service. It also requires an understanding of the limitations of the CAPM particularly as the concept is applied to regulated utilities that face an asymmetric truncated return distribution, the measurement biases that can arise and careful judgment. KPMG’s estimate of the appropriate value for beta for the GAAR is the outcome of a number of processes guided by theory, evidence and practice.

3.5.3 Equity beta estimates

3.5.3.1 Evidence from recent regulatory decisions in Australia

Table 10 and Table 11 below provide a summary of betas assumed during recent regulatory reviews of gas and electricity distribution pricing. The information displayed below indicates that most regulators are now adopting an equity beta value in the range of 0.80 to 1.00.

The approach used by most regulators has been to recognize that available empirical information suggests that equity betas may have declined in recent times, however, there is concern that the data is not sufficiently robust to enable full reliance on such data. Hence, regulators have also chosen to rely upon precedents set by other regulatory decisions. The outcome of this approach is reflected in equity beta values which place a higher degree of reliance on empirical data at the low end of the range and a lower degree of reliance at the high end of the range. The reverse applies in relation to the degree of reliance placed upon regulatory precedents.

Table 10: Beta values determined at recent gas distribution access arrangement reviews

Gas decision	Date	Regulator	Equity beta	Asset beta
Envestra SA	Jun 2006	ESCOSA	0.80-1.00	Not reported
Envestra QLD	May 2006	QCA	1.10	0.60
Allgas QLD	May 2006	QCA	1.10	0.60
Country Energy Gas	Nov 2005	IPART	0.80-1.00	Not reported
AlintaGas	Jun 2005	ERA	0.80-1.00	Not reported
AGL Gas Networks	Apr 2005	IPART	0.80-1.00	Not reported
Victorian Gas Distribution Businesses	Oct 2002	ESC	1.00	0.40-0.54

Table 11: Beta values at recent electricity distribution regulatory reviews

Electricity decision	Date	Regulator	Equity beta	Asset beta
Western Power Electricity Transmission and Distribution	Mar 2007	ERA	0.80-1.00	Not reported
Victorian Electricity distribution businesses	Oct 2005	ESC	1.00	Not reported

⁷³ Ibid, page 400.

Electricity decision	Date	Regulator	Equity beta	Asset beta
ETSA Utilities (Final Revised Decision)	Jun 2005	ESCOSA	0.90	Not reported
Qld Electricity Distribution Businesses	Apr 2005	QCA	0.90	0.45
NSW Electricity Distribution Businesses	Jun 2004	IPART	0.78-1.12	0.35-0.45

KPMG acknowledges that increasingly, the equity beta values adopted in recent regulatory decisions are reflecting the view that the equity beta for regulated network businesses have declined from their past levels. Nevertheless, KPMG remains unconvinced that the basis for such a conclusion is valid. KPMG understands that the market evidence on equity betas is sufficiently mixed and is highly affected by measurement errors. This matter is discussed further in the section below.

3.5.3.2 *Market evidence – equity betas*

AGSM data

As noted above, it is conventional practice to estimate an appropriate beta having regard to recent empirical evidence on the betas of comparable publicly listed companies.

With the public listing of entities such as Spark Infrastructure, Alinta Infrastructure, Hastings Diversified Trust, DUET and SP AusNet over recent years, the Australian proxy group has expanded significantly from what was previously a group of five proxy companies – AGL, Alinta, GasNet, Envestra and the Australian Pipeline Trust.

However:

- there is presently insufficient data on Spark Infrastructure, Alinta Infrastructure, Hastings Diversified Trust and SP AusNet for AGSM betas to be estimated;
- as at September 2006, the AGSM beta for DUET was based on only 25 observations; and
- with the transfer to network-related assets from AGL to Alinta, AGL will no longer represent a suitable proxy for determining the beta of network assets going forward.

A further problem is that the beta estimates of these companies display a high degree of variation. Table 12 below, for example, sets out the betas of these six Australian publicly listed comparable companies commonly included in the analysis of proxy betas, and highlights the extent of the instability of the data over time. The betas have been derived from the AGSM Risk Measurement Service as reported over the past six quarters. The figures shown in parentheses indicate the high-low ranges provided by the AGSM.

Table 12: AGSM equity betas

Company	Equity beta estimates measured over the 48 months ended					
	Jun 2005	Sep 2005	Dec 2006	Mar 2006	Jun 2006	Sep 2006

Company	Equity beta estimates measured over the 48 months ended					
	Jun 2005	Sep 2005	Dec 2006	Mar 2006	Jun 2006	Sep 2006
Australian Gas Light	0.17 (-0.07 to 0.22)	0.17 (0.01 to 0.33)	0.21 (0.05 to 0.37)	0.14 (-0.02 to 0.29)	0.42 (0.22 to 0.62)	0.35 (0.11 to 0.58)
Alinta	0.42 (0.12 to 0.72)	0.34 (0.01 to 0.67)	0.48 (0.15 to 0.81)	0.47 (0.17 to 0.76)	0.71 (0.41 to 1.01)	0.86 (0.53 to 1.19)
GasNet	0.14 (-0.05 to 0.32)	0.24 (0.06 to 0.43)	0.17 (-0.02 to 0.35)	0.13 (-0.06 to 0.32)	0.15 (-0.06 to 0.36)	0.3 (0.02 to 0.57)
Envestra	0.12 (-0.02 to 0.27)	0.11 (-0.05 to 0.28)	-0.08 (-0.23 to 0.06)	-0.16 (-0.29 to -0.03)	-0.10 (-0.24 to 0.04)	-0.02 (-0.17 to 0.13)
Australian Pipeline Trust	0.62 (0.41 to 0.84)	0.46 (0.21 to 0.71)	0.33 (0.08 to 0.58)	0.29 (0.05 to 0.54)	0.41 (0.16 to 0.67)	0.68 (0.39 to 0.96)
DUET	n.a	n.a	n.a	n.a	0.37 (0.11 to 0.63)	0.5 (0.24 to 0.76)

Source: AGSM Risk Measurement Service

1 DUET beta estimate for June 2006 is based on only 22 observations and 25 observations for September 2006.
2 AGSM data for the December 2006 quarter were not available at the date of writing this report

The variation is, in part, attributable to the sensitivity of beta estimates to outlier observations.

SFG (2005a)

Comprehensive research and analysis on the estimation of the equity beta for Australian energy distribution businesses has been undertaken by SFG (2005a)⁷⁴. The key points made in SFG (2005a) are:

- estimates of beta obtained from commercial data service providers such the Risk Measurement Service (RMS) provided by the AGSM are typically measured mechanically. That is, they are estimated by applying the Ordinary Least Squares (“OLS”) technique without any adjustment for statistical outliers, non-representative data points, or market episodes such as crashes or bubbles. Without such adjustments, the statistical precision of estimates of beta is often very low:
- 95% confidence intervals constructed around the December 2004 AGSM estimates of the equity betas for AGL, Alinta, Envestra and APT (re-levered to 60% gearing), indicates that the range is so broad that the estimates are virtually meaningless. In most cases it is

⁷⁴ SFG Consulting & Officer, 17 April 2005, The Equity Beta of an Electricity Distribution Business, Report prepared for ETSA Utilities (referred to as SFG (2005a)).

impossible to reject the hypothesis that the equity beta is well above 1.0, just as it is impossible to reject the hypothesis that it is below 0;⁷⁵ and

- The R² statistic, which is a measure of the proportion of variation in stock returns that is explained by variation in market returns, is also typically low for unadjusted beta estimates. Reference is made to Bowman and Bush (2004)⁷⁶ which recommended that beta estimates for comparable firms should be used only if the R² statistic is above 10%. Where more than 90% of the variation is caused by firm-specific diversifiable risk factors, estimates of beta are too unreliable to be of any use.
- Estimates of beta derived mechanically often may not make any sense. It was noted that:

“...for example, in the most recent beta report from the Risk Measurement Service at the AGSM (December 2004) more than 10% of the reported OLS beta estimates are negative. This implies that one in ten Australian firms can raise equity capital by promising returns lower than the yield on risk-free government bonds. Clearly, this is more a reflection of statistical problems in the mechanical analysis than prevailing market conditions. For this reason, OLS equity beta estimates from commercial data services should only ever be the starting point when determining a forward-looking equity beta and should always be subjected to and compared with the results of a much broader analysis.”⁷⁷

- In an earlier report, SFG (2004) noted that there was substantial time variation in beta estimates. In particular, “...it is not uncommon for beta estimates to change by more than 0.3 from one quarter to the next, even though the samples differ by only three observations. This further illustrates how fickle and unreliable standard beta estimates are.”⁷⁸. In that report, SFG goes on to conclude that the time series variation is most likely reflective of the statistical imprecision and unreliability of the equity beta estimates rather than any fundamental change in the structure of the businesses or the relationship between the businesses and the broad Australian market. This conclusion was preferred because:
 - the degree of time series variation was so large that it could not possibly have been driven by changes in the risk of the businesses – adopting that interpretation would imply that investors change their required return on these stocks by up to 3% from quarter to quarter; and
 - there were several instances where the change from one quarter to the next saw the estimated betas of different firms move in substantially different directions. The interpretation of this change is more consistent with firm-specific estimation errors than with the risk of the businesses having changed;
- there are a number of statistical techniques that could be used to improve simple OLS beta estimates. These are:

⁷⁵ SFG (2005a), op cit. para 4.3.14.

⁷⁶ Bowman, R.J. and S.R. Bush (2004), “A Test of the Usefulness of Comparable Company Analysis”, Department of Accounting and Finance, University of Auckland.

⁷⁷ SFG (2005a), op cit., para. 4.3.8.

⁷⁸ SFG (2004), 12 October 2004, The Equity Beta of an Electricity Distribution Business, Draft report prepared for ETSA Utilities. p.14.

- removal of unrepresentative outliers. Outlier observations can often have a significant impact on an estimate of beta. AGSM beta estimates are based on a maximum of 48 return observations – given the few data points utilised, a single outlier can significantly influence the final estimate. The paper illustrates this point using AGL as an example:

“For example, AGL produced a +5% stock return on the back of positive results announced in September 2001. The fact that this occurred in a month in which the broad market was down 6% (primarily due to terrorist activities in the US) causes the estimated beta to be significantly lower than it would otherwise have been.”

If implemented appropriately, this process can often lead to noticeable improvements in the R² statistic.

- applying the “Blume” adjustment for non-persistent estimation error. SFG (2005a) reports that commercial providers of beta estimates, including Bloomberg and ValueLine, apply a statistical adjustment that is designed to correct for the type of estimation error that pervades simple OLS regression estimates. This adjustment is based on the work of Blume (1975) who shows that beta estimates exhibit mean reversion over time⁷⁹. Blume (1975) recommended that a statistical adjustment be applied to simple OLS beta estimates to incorporate this observed mean reversion.

The use of the Blume adjustment was previously rejected by the ESC. Whilst the ESC acknowledged the empirical support for the tendency for mean reversion in beta estimates, it argued that mean reversion was most likely due to the conscious diversification and gearing strategies employed by businesses, which caused companies with low betas to move towards higher betas. No evidence, however, was presented to support the ESC’s contentions. SFG (2005a) therefore consider that the ESC has rejected the Blume adjustment in error. SFG (2005a) considers that the explanation for mean reversion in beta estimates may lie in the possibility that the *estimates* of beta revert to one over time, but the true betas are stable over time. They postulate that a very low beta estimate is more likely to be contaminated by negative measurement error and a high beta estimate is more likely to be contaminated by positive measurement error. If these errors were random over time, this would manifest itself as beta estimates regressing towards one over time, even if the true betas were constant.

- Using longer data sets. A longer data set provides more observations but it also increases the likelihood that the nature of the business has changed over that time. Similarly, sampling more frequently (i.e. using weekly returns rather than monthly returns data) can increase the number of data points however, if there are thin trading problems in the data, this approach will exacerbate the problem. SFG (2005) notes that the theory behind the CAPM provides no guidance about the appropriate data period to be used to estimate equity betas. Commercial practice is to use four or five years of monthly data.

⁷⁹ That is, the estimate is more likely to move towards one from one period to the next.

- After applying a range of statistical methods⁸⁰ to several different data sets⁸¹ with a view to determining the equity beta that best characterises the likely future relationship between the stock and market returns for an Australian energy distribution business, SFG (2005a) found that:

“All of the empirical techniques we examine, when properly applied to a range of market data sources, lead us to the conclusion that the appropriate equity beta for an Australian energy distribution business (with 60% gearing) is at least one. An equity beta estimate of 0.8 is unreasonable in light of the empirical evidence and the purpose for which it is to be used.”⁸²

KPMG does not propose that market evidence should be ignored when estimating the equity beta. However, the measurement issues highlighted in SFG (2005a) provide some important reasons for exercising caution and common sense in the selection of an appropriate value for this parameter, particularly given the importance of regulatory certainty in regulatory access pricing.

In a further report commissioned by the Energy Networks Association on the problems associated with measurement of the equity beta, Gray et al (2005)⁸³ argues that:

“In the absence of information any regarding the systematic risk of the firm, the best estimate of the equity beta of any stock is unity. Even where information is available, unity may still be the best estimate of the equity beta if that information contains substantial estimation error or is particularly imprecise.”⁸⁴

3.5.4 Conclusion

Given the inherent imprecision with the estimates of beta as discussed above, KPMG questions whether it is possible for regulators to conclude with a sufficient degree of confidence, that the equity betas of distribution businesses have in fact declined from the past. The inherent imprecision in available estimates of beta mean that it is difficult conclude whether currently observed estimates of beta are lower than previous observations because of true market conditions or because of statistical error.

KPMG considers that if a point estimate value is to be selected for the equity beta, the best estimate is 1.0. We observe that like the MRP, the issues surrounding the measurement of the equity beta are not new and have been widely debated amongst Australian regulators for several years. The response of most regulators to this concern has been to acknowledge the statistical uncertainty in empirical measurements and to adopt a value of 1.0 in line with established regulatory practice, and also to give effect to qualitative considerations such as the desirability of reasonable certainty and consistency in the outcomes of regulatory processes over time, and the risk of regulatory error. Indeed, we note that the AEMC has decided to adopt a value of 1.0 in its rules for the regulation of electricity transmission revenues.

⁸⁰ The adjustments included the Blume adjustment, elimination of certain outlier observations and removal of the impact of the technology bubble (which involves eliminating data from July 1998 to June 2001)

⁸¹ The data sets included a four year, five year and 3.5 year period. The latter was tested as this is the period since the end of the technology bubble.

⁸² SFG (2005a), para. 1.19.

⁸³ Gray, S., J. Hall, J. Bowman, T. Brailsford, R. Faff, and R. Officer, “The performance of alternative techniques for estimating equity betas of Australian firms”, a report prepared for the Energy Networks Association, May 2005.

⁸⁴ Gray et al (2005), page 11.

3.6 Value of imputation credits

3.6.1 Introduction

The parameter represented by γ in the WACC formula, represents the market value of every dollar of the tax credit associated with a franked dividend distributed to a shareholder. Most of the earlier regulatory determinations in Australia have adopted a value of 50% for imputation credits. However, in more recent determinations, regulators have been prepared to accept a range of values for gamma, typically around 30% to 60%.

Table 13: Value attributed to imputation credits in recent energy distribution business regulatory decisions

Decision	Regulator	Assumed value of imputation credits
ERA Western Power Electricity Transmission & Distribution (Mar 2007)	ERA	30% to 60%
SA Gas Distribution (Jun 2006)	ESCOSA	35% to 60%
Queensland Gas Distribution (May 2006)	QCA	50%
Country Energy Gas Distribution (Nov 2005)	IPART	30%
Victorian Electricity Distribution (Oct 2005)	ESC	50%
AlintaGas Distribution (June 2005)	ERA	30% to 60%
ETSA Utilities (Jun 2005)	ESCOSA	50%
AGL Gas Networks (Apr 2005)	IPART	30% to 50%
Queensland Electricity Distribution (Apr 2005)	QCA	50%
NSW Electricity Distribution (Jun 2004)	IPART	50%

In KPMG’s view, there are currently three points of contention surrounding this parameter:

- the issues revolving around the different methodologies used to estimate a value for imputation credits;
- market practice in relation to imputation credits; and
- the consistency of the assumption made in relation the value of imputation credits in light of the assumptions made on the MRP.

3.6.2 Estimates of gamma from empirical studies

The value attributed to γ consists of two elements – the rate at which franking credits are distributed by the firm (“distribution rate”) and the rate at which franking credits are utilised by shareholders (“utilisation rate”).

3.6.2.1 Distribution rate

The ESC has previously adopted a distribution rate assumption of 82%.⁸⁵ This assumption was based upon the study by Hathaway and Officer (1999), which found that the value of franking credits distributed in each year averaged 82% of the value of credits created.

An update of this study by Hathaway and Officer (2004) using more recent data and improved analysis estimates the appropriate distribution value at 71% for the period from July 1987 to June 2002⁸⁶. This ratio represents the average over all Australian companies that submitted tax returns over the 19 year period in question. In the absence of any other data, to the extent that reliance is placed on this approach to estimating the value of gamma, it is reasonable to rely upon the updated estimate provided by Hathaway and Officer (2004).

3.6.2.2 Utilisation rate - empirical studies

Table 14 below summarises the various estimates of the franking credit utilisation rate that have been derived from empirical studies. All of these studies use data from Australian-based companies, to create a sample that is representative of the overall Australian market.

Table 14: Empirical estimates of the utilisation rate of imputation credits

Study	Methodology	Utilisation rate estimate
Brown & Clarke (1993)	Dividend drop-off	72%
Bruckner, Dews and White (1994)	Dividend drop-off	33.5% - 68.5%
Walker & Partington (1999)	Dividend drop-off	88% or 96%
Hathaway & Officer (1999)	Analysis of tax statistics	60%
	Dividend drop-off	49% (large co., all stocks)
		44% (all companies, all stocks)
Chu & Partington (2001)	Rights issues	Close to 100% ⁸⁷
Twite & Wood (2002)	Inference from analysis of trading in derivatives	45%
Cannavan, Finn & Gray (2004)	Inference from value of individual share futures and low exercise price options	0%
Hathaway & Officer (2004)	Analysis of tax statistics	40%
	Dividend drop-off	50%

⁸⁵ ESC, 2003 GAAR Final Decision, page 393.

⁸⁶ Hathaway & Officer (2004), page 11. The study refers to this ratio as the access ratio.

⁸⁷ Whilst the results suggest imputation credits are close to fully valued, it should be noted that the standard error of the estimate is 97% which indicates substantial variation around the mean estimate.

Study	Methodology	Utilisation rate estimate
<p>Sources:</p> <p>Brown, P. and A. Clarke, 1993, <i>The Ex-Dividend day behaviour of Australian share prices before and after dividend imputation</i>, <i>Australian Journal of Management</i>, 18, 1, pp. 1-40; Bruckner, K., N. Dews and D. White, 1994, <i>Capturing value from dividend imputation</i>, McKinsey & Company; Hathaway, N. and R. R. Officer, 1999, <i>The Value of Imputation Tax Credits</i>, Unpublished manuscript, Graduate School of Management, University of Melbourne; Hathaway, N. and R. R. Officer, 2004, <i>The Value of Imputation Tax Credits Update 2004</i>, Capital Research Pty Ltd; Walker, S. and G. Partington, 1999, <i>The Value of Dividends: Evidence from cum-dividend trading in the ex-dividend period</i>, <i>Accounting and Finance</i>, vol 39, p293; Cannavan, D., F. Finn and S. Gray, 2004, <i>The value of imputation tax credits</i>, <i>Journal of Financial Economics</i>, Vol. 73, Issue 1, July 2004; Chu, H. and G. Partington, 2001, <i>The market value of dividends: Theory and evidence from a new method</i>, working paper, University of Technology, Sydney, p39; Twite, G. and J. Wood, February 2002, <i>The Pricing of Australian imputation tax credits: Evidence from individual share futures contracts</i>, working paper.</p>		

It is worth briefly commenting on the most recent study by Hathaway and Officer (2004) which updates the work the authors previously undertook in 1999. The results of the 1999 study have been heavily relied upon by regulators around Australia to support a value of 50% for imputation credits in regulatory revenue-setting.

Hathaway and Officer (2004) arrived at their estimate of the utilisation rate firstly, by examining the rate at which individuals, superannuation funds and some companies redeemed imputation credits distributed to them⁸⁸, and secondly, by applying dividend drop-off analysis. Using the redemption rate approach, the authors estimated an average utilisation rate of 40%, but they stressed that this ratio was affected by some necessarily broad inferences made regarding the rate of credit redemption for superannuation funds. Using dividend drop-off analysis, Hathaway and Officer (2004) estimated a drop-off ratio of around 51% of face value.⁸⁹ Combined with a distribution rate of 71%, Hathaway and Officer (2004) estimate the value of imputation credits at around 35%.

It is important to note that Hathaway and Officer (2004) highlighted that their estimated value of imputation credits ignores any uncertainty attached to the timing of payment of credits and size of dividend payments:

“Clearly our analyses demonstrate that imputation credits have significant value. However, a word of caution is in order. Both measures of value are taken after the company has announced the payment of the dividend and the credits. This means there is no uncertainty about the timing and the amount of the credit within the measures we obtain for the value of credits. Credits cannot be redeemed until distributed with accompanying dividends and stocks cannot be traded cum-dividend until dividends are declared. Hence both methods of valuing credits give conditional

⁸⁸ Note that this definition of the utilisation rate is different to that advocated by Envestra in its 2006 proposed access arrangements for gas distribution in Queensland. Envestra would appear to have defined the utilisation rate as the rate at which tax paid was converted into imputation credits. This notion of the utilisation rate was challenged by Lally (refer: Lally, M., A Review of the Value of Imputation Credits for Regulatory Purposes, December 2005) who argued that this definition of the utilisation rate implied a value close to 1 given that there was nothing in the legislation which suggested that tax paid did not immediately convert into imputation credits. We do not regard the arguments in Lally (Dec 2005) as being relevant to the discussion in this report as it dealt with Envestra’s specific calculations which adopted different definitions to Hathaway & Officer (2004).

⁸⁹ Hathaway & Officer (2004), page 24.

valuations: the value of the credit conditioned on the company deciding to pay a franked dividend. Neither method accurately measures the value of the credits which remain locked inside the company. Typically there is uncertainty about when such credits will be paid out and the amount of the credits to be issued ... To allow for this uncertainty in distribution we would have to apply a discount rate to allow for the uncertainty in accessing the credits. The exact discount rate remains obscure.”⁹⁰

In other words, the values estimated by Hathaway & Officer (2004) should be regarded as upper bound values.

Dividend drop-off analysis

As is evident from the above table, the existing empirical evidence on the utilisation rate of franking credits is dominated by studies that employ a methodology known as dividend drop-off analysis. Under this methodology, the utilisation rate is analysed by comparing the cum-dividend share price of a dividend-paying company with its ex-dividend share price. As the difference between these share prices (i.e. the drop-off) theoretically represents the value of the money distributed, any decline in the share price in excess of the cash dividend entitlement is assumed to be attributed to the value of the imputation credit attached to the dividend.

KPMG has a number of concerns with the quality of the evidence on γ from dividend drop-off studies. Our review of advice provided by Professor Stephen Gray to AGL Electricity as part of the ESC’s last electricity distribution price review indicates that the studies by Bruckner, Dew and White (1994) and the dividend drop-off analysis contained in Hathaway & Officer (1999) suffer from the statistical problem of multicollinearity, which makes it difficult to separate the value of cash dividends from the value of imputation credits.⁹¹ This problem occurs because the cash dividend and the imputation credit variables are highly correlated, making it impossible to obtain a reliable measure of their individual coefficients. Professor Gray’s advice notes that the methodological flaw in Bruckner, Dews and White (1994) means that the study could just as easily support the view that imputation credits are of negligible value.⁹² Indeed, such a result would be consistent with a number of research papers which suggest that cash dividends are fully valued by those who trade around ex-dates. Gray suggests that such evidence, coupled with the estimate of the joint effect of dividends and imputation credits, implies that imputation credits have negligible value.

For similar reasons, Gray also notes that the results of the dividend drop-off analysis of Hathaway & Officer (1999, 2004) are unreliable. Gray demonstrates that summing the values of the cash dividends (in table 1 of Hathaway & Officer) and the franking credit (in table 2 of Hathaway & Officer) yields results that suggest that “...a \$1 dividend and an accompanying 64 cent franking credit are associated with a drop of around \$1 in the stock price”⁹³, which implies that franking credits are worthless.

In relation to the study by Walker & Partington (1999), Gray’s analysis indicates that the main concern with this study is its focus on a special market available at the ASX which is very small

⁹⁰ Hathaway & Officer (2004), page 25.

⁹¹ Refer Strategic Finance Group, October 2004, The Value of Imputation Franking Credits: Gamma, Report for AGL in relation to the ESC Electricity Distribution Review.

⁹² Ibid, page 19, 20.

⁹³ Ibid, page 23.

and which exists only for a very limited number of shares. The results of this study display an extremely wide variation in the estimates of the value of dividends and franking credits for different ex-dividend events, which Gray notes is unusual given the nature of market examined in the study.⁹⁴

Inference from value of individual share futures and low exercise price options

The recent published study by Cannavan, Finn & Gray (2004) employs a methodology that compares the differences in the pricing of certain derivation securities and their underlying shares. Cannavan, Finn & Gray (2004) infer the value of imputation credits from the value of individual share futures (“ISF”) and Low Exercise Price Options (“LEPOs”), as compared with the price of the underlying shares. Advice provided by Professor Gray suggests that this methodology has several advantages over the dividend drop-off regression technique:

- “every time an ISF or LEPO trades within one minute of a trade in the underlying share, it is possible to infer the value of dividends and imputation credits. Thus, instead of two observations each year for each company, there are potentially thousands. This increased sample size brings statistical benefits and also enables calculations to be done on a company-by-company basis.
- ISFs and LEPOs trade well in advance of ex-dividend dates, so prices are not contaminated by the activities of short-term arbitrage traders.”⁹⁵

The results in Cannavan, Finn & Gray (2004) suggest that market participants place a low value on imputation credits, particularly since the 1997 introduction of the 45-day holding period rule:

*“We find that: (i) cash dividends are fully valued relative to futures payoffs, (ii) prior to the 45-day rule, imputation credits were valued at up to 50% of face value for high-yielding firms, and (iii) since the 45-day rule, imputation credits are effectively worthless to the marginal investor of ISFs and LEPOs.”*⁹⁶

On this basis, Professor Gray has suggested that setting gamma equal to zero is more appropriate than assuming a 50 percent value.

Valuation of imputation credits, Allen Consulting Group, December 2005 and March 2006

KPMG is aware of a recent study undertaken by the Allen Consulting Group (“ACG”) for the QCA⁹⁷, which seeks to obtain a more current estimate of the value of imputation credits (i.e. more current than Cannavan Finn and Gray (2004)) As shown in the table above, the key conclusion from ACG (2005) is that in the July 2003 to June 2005 period, investors were valuing distributed imputation credits at 74% of their face value. This is reflected in the value of the implied θ . Across the whole 2000-2005 period, the average distributed value of the credits was 29%. This result led ACG to draw the following conclusion:

⁹⁴ Ibid, page 29.

⁹⁵ Ibid, page 27.

⁹⁶ Cannavan, D., F. Finn and S. Gray, 2004, The value of imputation tax credits, Journal of Financial Economics, Vol. 73, Issue 1, July 2004, page 26.

⁹⁷ Allen Consulting Group, Cost of Capital for Queensland Gas Distribution, Report to the Queensland Competition Authority, December 2005

“Thus, ACG’s empirical analysis supports the proposition that the imposition of the 45-day rule in 1997 did eliminate the value that franking credits previously had. However, the strongly statistically significant result for the past two years indicates that, presently at least, imputation credits are being valued in the Australian market at around three quarters of their face value. Such a result is consistent with the notion that currently Australian tax paying investors are the marginal (price setting) investors in large Australian companies.”⁹⁸

However, ACG also noted that it was puzzling why the valuation impact of franking credits was not seen immediately after the introduction cash rebate in July 2000.

In advice provided by ACG to ESCOSA on the 2006 proposed revisions to Envestra’s gas distribution access arrangements, ACG drew upon these same conclusions. In the draft decision on Envestra’s proposed access arrangements, ESCOSA advocated the adoption of a range of 0.35 to 0.60 for the value of imputation credits. ESCOSA stated that in arriving at this range, it had relied upon ACG’s analysis which provided support for a value for gamma as high as 0.74, reflecting a distribution rate of 100% and a utilisation rate of 74%. It also relied upon ACG’s observation that in the recent Hathaway and Officer (2004) study, time series data on utilisation rates indicated that whilst the average over the period of study was 0.35, utilisation rates had climbed to around 60% in more recent periods. Based on a balanced consideration of the evidence, ESCOSA concluded that a range of 0.35 to 0.60 was appropriate for gamma.

The integrity of ACG’s analysis has been challenged by Envestra’s consultants, SFG Consulting. During the course of the debate, SFG identified a number of cases of double-counting and data misclassification with respect to the data used by ACG⁹⁹. These claims were reviewed by ACG, and resulted in a significant change to the results for the July 2003-June 2005 period of ACG’s analysis¹⁰⁰. Specifically, the difference between the means for 100% and 0% franked dividends fell to 0.21 and the implied θ for the period was reduced to 0.49¹⁰¹. In light these changes, it is now no longer possible to rely upon ACG’s analysis for to support a value for gamma above 50%.

It should be noted that SFG has also raised a number of other concerns regarding ACG’s analysis. Specifically, SFG has argued that even after the corrections made, there is no economic or statistical reason why there should be a shift in the value of distributed franking credits between the July 2000-June 2003 and the July 2003-June 2005 periods. Furthermore, SFG reasons that if the hypothesis is that the introduction of the cash tax rebate in July 2000 increased the value of distributed franking credits for the marginal investor, then the relevant result from ACG’s analysis is the result for the entire July 2000 to June 2005 period. This result indicates that the mean value of distributed franking credits is 33%.

KPMG understands notwithstanding ACG’s corrections, ESCOSA has decided to retain a value for gamma in the range of 0.35 to 0.60 in its final decision on Envestra’s proposed gas

⁹⁸ Allen Consulting Group, Cost of Capital for Queensland Gas Distribution, December 2005, Report to the Queensland Competition Authority, page 45

⁹⁹ SFG Consulting, 18 August 2006, Value of distributed imputation credits implied by large, high-yield firms from 2000-2005, Report prepared for Envestra.

¹⁰⁰ Allen Consulting Group, 14 September 2006 Memorandum to ESCOSA on Preliminary response to SFG report on the value of distributed imputation credits.

¹⁰¹ It should be noted that SFG’s analysis of ACG’s work indicated that the results for the July 2000-June 2003 were also affected, however, no corrections have been reported by ACG.

distribution access arrangements, and that Envestra has lodged an appeal in relation to this aspect of ESCOSA's decision (in addition to several other matters).¹⁰² Amongst other things, Envestra's appeal claims that ESCOSA's choice of a range of 0.35 to 0.60 for gamma is contrary to empirical evidence that gamma is zero and that it has failed to give consideration to admitted data errors in its own consultant's advice by maintaining that the appropriate range for gamma is 0.35 to 0.60. In view of the problems that have been identified in ACG's analysis, KPMG considers that there is little basis to rely on the results of their analysis on the value of gamma. In particular, the available (and credible) evidence on gamma continues to support the conclusion that a value of zero is likely to be a more valid assumption for gamma than a value of 50%. At any rate, there is no reliable basis upon which to conclude that the value of gamma would exceed 50%.

3.6.3 Market practice

It is worth noting that it remains common market practice to assume that imputation credits are not fully valued or not valued at all¹⁰³. Evidence drawn from expert reports on takeovers to support such practices was provided in recent analysis, which showed that of 122 reports reviewed only 48 (or 39%) provided support showing how they had arrived at the WACC used in their reports. Of these, 42 (or 88%) used the classical CAPM model and made no adjustment for dividend imputation. Only six reports made an adjustment to reflect dividend imputation¹⁰⁴. Furthermore, of the seven reports (6%) that did attribute value to imputation credits, it appears that five attributed little or zero net effect on the value of the company being assessed."¹⁰⁵

This study goes on to provide a long list of conceptual grounds cited in reports for not adjusting for imputation credits, including:

- the value of franking credits is dependent on the tax position of each individual shareholder;
- there is no evidence that acquirers of businesses will pay additional value for surplus franking credits;
- there is little evidence that the value effects of dividend imputation are being included in valuations being undertaken by companies and investors or the broader market;
- foreign shareholders are the marginal price-setters of the Australian market yet many such shareholders cannot avail themselves of the benefit of franking credits; and
- there is a lack of certainty about future dividend policies, the timing of taxation and dividend payments and consequently about franking credits.

¹⁰² Amended Application for Review, 2 February 2007, In the Matter of a Review Under Part 6 of the Gas Pipelines Access (South Australia) Act 1997, in the District Court of South Australia Administrative and Disciplinary Division, No 502 of 2006.

¹⁰³ Lonergan does not state which form of CAPM was used in each of the expert reports he reviewed. Based on our experience, however, market practitioners tend to utilise the domestic form of the CAPM. This is evident from their approach to estimating parameters such as the risk free rate, beta and the market risk premium.

¹⁰⁴ Lonergan, W., Autumn 2001, "The disappearing returns, why dividend imputation has not reduced the cost of capital", JASSA, page 13.

¹⁰⁵ Lonergan, W., Autumn 2001, op cit, page 14.

We note that Lonergan’s analysis does not provide any indication of which form of CAPM had been adopted in the expert reports he reviewed, however, the list of conceptual grounds cited for not adjusting for imputation credits (which effectively implies a gamma of zero) did not include “use of an international form of CAPM” as a reason. This suggests that the reports reviewed by Lonergan employed a domestic form of CAPM.

More recently, one of the most topical issues in unregulated markets at the moment that relates to valuation and thus the cost of capital has been the recent takeover activity surrounding Western Mining Corporation.

For example, Grant Samuel’s expert report suggests that WMC’s assets are likely to be priced on the basis of costs of capital established in international capital markets. It therefore uses a US risk free rate for the US dollar denominated businesses of Western Mining but also uses its judgement to derive a value based on a mix of 10 and 30 year securities to address the problems associated with prevailing risk free rate for 10 year securities.

Most importantly, it makes no adjustment for the value of imputation credits and uses a market risk premium of 6%, which as discussed below is an important issue in terms of the consistency of the parameters underpinning cost of capital estimation.

3.6.4 Consistency between franking credits and the market risk premium

A recent published study by Gray and Hall (2006)¹⁰⁶ draws into question the internal consistency of regulators assuming a value for gamma of 0.5 and a value for the market risk premium of 6%. By deriving the mathematically deterministic relationship between the value of franking credits and the MRP, Gray and Hall (2006) demonstrate that the values that can be reasonably used for these parameters are dependent upon information on dividend yields and effective tax rates. In doing so, Gray and Hall (2006) shows that the regulatory practice of attributing a value of 50% for imputation credits and 6% for the MRP is internally inconsistent.

Gray and Hall (2006) observe that the standard procedures for estimating the MRP in the CAPM ignore the value of franking credits. If franking credits do affect the corporate cost of capital, their value must be added to the standard estimates of MRP. This requirement was demonstrated in Officer (1994), and is shown below:

$$\text{MRP (fc)} = \text{Rf} + \text{MRP (dc)} / (1-t) / [1-t(1-\gamma)] - \text{Rf}$$

Where MRP (fc) and MRP (dc) are the respective MRPs with and without franking credits, Rf is the risk free rate, t is the corporate tax rate and γ is gamma.

Based on this, Gray and Hall (2006) go on to demonstrate that irrespective of whether it is assumed that the MRP value of 6% used by regulators is measured with or without franking credits, a value of 6% for the MRP used with a corporate tax rate of 30% and a value for gamma of 50%, implies a dividend yield on the market portfolio that is much higher than that observed in the market in practice. This combination of values for the MRP, gamma and the tax rate is therefore internally inconsistent.

¹⁰⁶ Gray, S and J. Hall, Relationship between franking credits and the market risk premium, Accounting and Finance, 46, (2006), pp. 405-428.

Gray and Hall (2006) go on to examine various ways of restoring consistency in the relationship. They note that the simplest approach (involving a change to a single parameter), is to adopt a value for gamma of zero. Adopting a value for gamma of zero in combination with a value of 6% for the MRP would produce implied dividend yields that were consistent with empirical observations. There are also a range of combinations of parameter changes that could be applied to restore consistency assuming the MRP is set at 6%, however, most of these involve implausible scenarios.

KPMG is aware that during the 2006-2010 Electricity Distribution Price Review, the issue of consistency between the value of franking credits and the MRP was raised by the distributors by reference to similar analysis conducted by SFG Consulting¹⁰⁷. In the ESC's Final Determination for that review, the ESC – based on advice from the Allen Consulting Group – rejected SFG's analysis for the following reasons:

“In deciding between the values generated by the SFG and ESC/Hathaway methods, it is important to note that the results from applying the SFG methods depend upon the assumption that is adopted about the average effective tax rate of listed entities (that is, tax paid as a proportion of economic income). SFG has not presented any empirical justification for this input, but has merely assumed that the rate is equal to the statutory rate of taxation. The SFG methodology is also dependent upon the view taken on the market risk premium.” (page 406)

The ESC's Final Decision argued that if economic income (defined as the return from franking credits, dividends and capital gains, that is, the return on equity) from the market portfolio was 12% as SFG had assumed, it could be expected that the rate of tax as a proportion of economic income would be substantially less than the 30% corporate tax rate also assumed by SFG. In support of this position, the ESC relied on evidence in Hathaway (2005):

“Hathaway (2005, p. 10) shows that the average earnings yield (accounting income as a proportion of equity value) of listed entities over the period since 1990 has averaged approximately 6 per cent. Thus, if average economic income over this period were indeed 12 per cent of equity value, this information would suggest that accounting income would be approximately half of economic income. It follows that if the rate of tax paid on accounting income was 30 per cent (which itself may overstate the effective tax rate of firms), the rate of tax paid as a proportion of economic income would be about half of this rate (i.e. 15 per cent).” (footnote 122).

By altering the assumed corporate tax rate in SFG's model to 15%, the ESC went on to demonstrate that the franking credit yield derived from SFG's approach would be consistent with the ESC / Hathaway's approach.

KPMG notes that Gray and Hall (2006) contains a discussion of the concept of the corporate tax rate assumption. Gray and Hall (2006) note that:

- in their model, the corporate tax represents the corporate tax rate that is implied by the corporate taxes paid by all Australian firms in aggregate over time. In this model, timing differences eventually reverse such that over a large sample of firms any such differences would be diversified away. The concept of an effective tax rate that is due to timing differences has no place in this model; and

¹⁰⁷ SFG Consulting, The Relationship between Franking Credits and the Market Risk Premium, Implications for the Regulatory Cost of Capital, 18 August 2005.

- the most plausible reason for an effective tax rate being lower than the statutory corporate tax rate is that a portion of the profits earned by Australian firms are earned offshore and taxed in another jurisdiction. An effective tax rate of 15% therefore refers to the ratio of Australian corporate taxes to total (domestic and offshore) corporate profit.

Gray and Hall (2006) also refer to recent analysis by Buffini and Fabro (2005)¹⁰⁸ which report that the average tax rates of Australia's largest 150 listed firms is 27-28.5 per cent.

Given the concept of the effective tax rate as discussed in Gray and Hall (2006), KPMG considers that the ESC's rejection of SFG's analysis in the 2006-2010 EDPR may have been premature.

3.6.5 Conclusion

A considerable degree of uncertainty surrounds the estimation of the appropriate value for γ . KPMG believes that it is appropriate to err on the side of conservatism by adopting a lower rather than higher value for γ .

Recent developments on the value of gamma indicate that:

- there is no basis for regulators to argue for an increase in the value of γ above the existing upper bound of 50%;
- more recent research demonstrates that there is good reason to question the appropriateness of a value of γ of 50% since it relies upon evidence from studies that suffer from methodological flaws;
- more recent research demonstrates that a value of 50% is likely to overstate the appropriate value for γ ; and
- a value for γ of zero is consistent with a value for the MRP of 6%.

If a point estimate value of gamma is to be selected, KPMG considers that a value of zero is likely to be a more valid assumption for γ than a value of 50%. This value is also consistent with an assumed value of 6% for the MRP. There is little basis on which to select a point estimate between zero and 50%. We therefore recommend a point estimate value of zero be adopted for gamma.

¹⁰⁸ Buffini, F. and A. Fabro, 2005, Push to ease growth in corporate tax, Australian Financial Review, 29. 1-51