KPMG

Alinta Networks

The Weighted Average Cost of Capital for Gas Distribution

March 2004

This report contains 54 pages

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1 Overview

1.1 Introduction and purpose of report

Alinta Networks Pty Ltd ("Alinta") owns and operates the Mid-West and South-West gas distribution systems in Western Australia ((hereinafter, collectively referred to as the "gas distribution system"). The gas distribution system is covered under the National Third Party Access Code for Natural Gas Pipeline Systems ("the Code" or "National Gas Code"). Coverage means that as the owner and operator of the gas distribution system, Alinta is required to lodge an Access Arrangement for approval by the relevant regulator. The relevant regulator in this instance is the Economic Regulation Authority ("ERA").

The Access Arrangement currently applying to the gas distribution system is due to expire on 31 December 2004. In accordance with the requirements of the Code, Alinta must submit a revised Access Arrangement to the ERA for approval, to take effect on 1 January 2005.

Alinta has appointed KPMG to provide advice and recommendations on what constitutes an appropriate Rate of Return for the gas distribution system. Under section 8.30 of the National Gas Code, the Rate of Return is one of the inputs required for the determination of Reference Tariffs for a covered pipeline.

This report sets out our recommendations on the appropriate Rate of Return for Alinta's gas distribution system, and the basis for our conclusions.

1.2 Pre-tax real WACC formulation

We have estimated a Rate of Return for Alinta's gas distribution system as a pre-tax real Weighted Average Cost of Capital ("WACC"), defined as follows:

$$\textbf{Pre-tax real WACC} = \{(1+\textbf{Pre-tax nominal WACC \%}) / (1+\text{CPI})\} - 1$$

Where

$$\textbf{Pre-tax nominal WACC \%} = K_e * 1 / \{1-t*(1-\gamma)\} * E/V + K_d * D/V$$

And

t	represents the corporate tax rate
γ	or "gamma" represents the average value attributable to imputation tax credits
K_e	represents the post-tax nominal cost of equity as determined under the Capital Asset Pricing Model ("CAPM")

K_d	represents the pre-tax nominal cost of debt
E/V and D/V	represent the weightings of equity and debt, respectively, in the capital structure of the business

1.3 Conclusions

KPMG considers that an appropriate rate of return to adopt for the purpose of setting the revenue stream of Alinta's gas distribution system in accordance with the requirements of the National Gas Code is currently a pre-tax real WACC of **8.5%.**

Our preferred estimate is drawn from a feasible range of 8.0% to 8.7% for the pre-tax real WACC, which in turn, has been estimated from the underlying parameter value ranges discussed in this report and summarised in the table below.

Table 1: Pre-tax real WACC – parameter estimates

Parameter	
Nominal risk free rate *	5.9%
Real risk free rate *	3.6%
Inflation expectation (implied)	2.2%
Asset beta	0.40 - 0.52
Equity beta	1.00
Debt beta	0.00 - 0.20
Market risk premium	6.0% - 8.0%
Equity proportion	40%
Debt proportion	60%
Pre-tax cost of debt	7.3% - 7.7%
Debt margin *	1.4% - 1.8%
Corporate tax rate	30%
Value of imputation credits	50%
** estimate will be subject to movements in interest rates at the time of the ERA's final determination*	

In selecting a point estimate from within the feasible range, KPMG has taken into account the weight of evidence from independent and authoritative experts on the current misapplication of access regulation. This evidence is outlined in Section Two.

The arguments in support of this are best summarised in the findings of the Productivity Commission's ("PC") inquiry into the effectiveness of Australia's national access regime. In its final report, the PC identified the potential for access regulation to deter investment in essential infrastructure as the key risk to continued investment in infrastructure in Australia.

The PC noted that irrespective of how well regulators perform their task, the determination of efficient access prices was a formidable task, particularly given that many of the tools and methodologies available to regulators to set access prices were inherently imperfect. Furthermore, the consequences of "getting it wrong" can have significant adverse ramifications for infrastructure investment and economic welfare. In this context, the PC urged regulators to not be "*too ambitious*" in terms of their attempts to remove perceived monopoly rents.

KPMG considers that the following statement, extracted from the PC's 2000-01 Annual Report, appropriately summarises the approach that regulators should take:

> *"Given uncertainties and information difficulties, there are limits to what regulators can achieve. Rather than aiming for an ideal, but unattainable outcome, the public policy goal should be a set of regulatory arrangements that will improve efficiency through time and that will reduce some of the bigger risks of making regulatory errors. A framework is needed in which regulators are encouraged to intervene only when significant improvements in efficiency are in prospect and not be overly ambitious in finetuning the prices they regulate… The Commission's recent inquiries have revealed a need to re-balance the emphasis away from achieving immediate gains for users and consumers from existing infrastructure – much of it government owned or previously government owned – to a regulatory framework that will also facilitate efficient investment in augmented and new facilities."*

KPMG believes that a pre-tax real WACC of 8.5% would, in the current environment, appropriately balance the interests of Alinta and its customers, and provide appropriate incentives for investment.

1.4 Qualifications and disclaimer

This report has been prepared by KPMG on the basis of information available as at the date of this report. Nothing in this report should be taken to imply that KPMG has verified any information supplied to us, or has in any way carried out an audit of the books of accounts or other records of Alinta for the purposes of this report. We have considered and relied upon information from a range of sources, including information provided by Alinta, which we believe to be reliable, complete and not misleading. We have no reason to believe that any material facts have been withheld from us but do not warrant that our inquiries have revealed all of the matters which an audit or extensive examination might disclose.

In accordance with KPMG's policy, we are obliged to advise that neither KPMG nor any member nor employee undertakes responsibility in any way whatsoever to any person or organisation (other than Alinta) in respect of the information set out in this report, including any errors or omissions therein, arising through negligence or otherwise, however caused.

2 Putting the cost of capital into context

KPMG's estimate of the cost of capital for Alinta's gas distribution system recognises that:

- there is now a significant body of opinion from independent and legal bodies that regulatory decisions need to give greater weight to investment incentives and the provision of incentives consistent with those found in workably competitive markets; and
- the inevitable imprecision of cost of capital estimates, including the methodological limitations associated with approaches such as the CAPM, mean that the estimated cost of capital needs to be applied and interpreted with care. This is particularly relevant in a regulatory context because the impacts are magnified.

The first of these issues is addressed below, while the second is addressed in the context of the parameter analysis that follows this section.

2.1 Recent regulatory developments

Recent events have provided greater clarity on what should be the objectives of regulation. These have included the:

- PC's report on its Review of the National Access Regime[1] and the Government's Response[2];
- PC's draft report on the Review of the Gas Access Regime[3];
- Parer Report[4];
- Minister Ian Macfarlane's Statement of Reasons in his Final Decision[5] to revoke coverage of parts of the Moomba-Sydney Pipeline overturning the National Competition Council ("NCC")'s Final Recommendations;
- Epic Decision[6];

[1] Productivity Commission, Review of the National Access Regime: Inquiry Report, 28 September 2001.

[2] Government Response to the Productivity Commission Review of the National Access Regime, released 17 September 2002.

[3] Productivity Commission, Review of the Gas Access Regime: Draft Report, Canberra, December 2003.

[4] Council of Australia Governments Energy Market Review Panel, Towards a Truly National and Efficient Energy Market: Final Report [Parer Report], 20 December 2002.

[5] Final Decision: Applications for Revocation of Coverage on Certain Portions of the Moomba-Sydney Pipeline System, 19 November 2003.

[6] *Re Dr Ken Michael AM; Ex parte Epic Energy (WA) Nominees Pty Ltd* [2002] WASCA 231.

- The Australian Competition Tribunal ("ACT")'s decision on an appeal by Epic Energy in relation to the ACCC's decision on the Moomba to Adelaide pipeline[7]; and
- The ACT's decision on an appeal by GasNet[8].

These statements represent reassertions of the objectives of regulation from authoritative and independent sources.

2.1.1 The Productivity Commission

Review of the National Access Regime

The first and one of the strongest reassertions of the objectives of regulation came from the PC's Review of the National Access Regime, which was intended as an interim assessment of the effectiveness of the regime after five years of operation. One of the major themes of this assessment was the issue of "regulatory error" risk, and the realisation that the potential costs associated with too little infrastructure investment are far greater than those associated with too much investment. In short, there is asymmetry in the consequences of regulatory pricing errors:

> *"Given that precision is not possible, access arrangements should encourage regulators to lean more towards facilitating investment than short term consumption of services when setting terms and conditions …*
>
> *[and] given the asymmetry in the costs of under- and over-compensation of facility owners, together with the informational uncertainties facing regulators, there is a strong in principle case to 'err' on the side of investors".*

It is in this vein that the PC provided a clear warning against an excessive focus on the removal of so-called "monopoly rents" from the revenue streams of facility owners, quoting a submission to the review by Network Economics Consulting Group ("NECG"), which stated:

> *"In using their discretion, regulators effectively face a choice between (i) erring on the side of lower access prices and seeking to ensure they remove any potential for monopoly rents and the consequent allocative inefficiencies from the system; or (ii) allowing higher access prices so as to ensure that sufficient incentives for efficient investment are retained, with the consequent productive and dynamic efficiencies such investment engenders.*
>
> *There are strong economic reasons in many regulated industries to place particular emphasis on ensuring the incentives are maintained for efficient investment and for continued productivity increases. The dynamic and productive efficiency costs associated with distorted*

[7] Application by Epic Energy South Australia Pty ltd [2003] AcompT 5, 10 December 2003.

[8] Application by GasNet Australia (Operations) Pty Ltd [2003] AcompT 6, 23 December 2003.

> *incentives and with slower growth in productivity are almost always likely to outweigh any allocative efficiency losses associated with above-cost pricing. (sub. 39, p. 16)"*

As a result the PC review highlighted the need to modify implementation of the regime and made 33 recommendations to improve its operation. In particular it identified as a:

"threshold issue, the need for the application of the regime to give proper regard to investment issues" and "the need to provide appropriate incentives for investment"[9]. *The Commonwealth Government's response*

This was supported by the Commonwealth Government's response: it decided to make changes to the Trade Practices Act which "*endorse the thrust"* of the PC's recommendations.[10] In particular, it will modify the regime to:

- Include a clear objects clause:

  "The objective of this part is to promote the economically efficient operation and use of, and investment in, essential infrastructure services thereby promoting effective competition in upstream and downstream markets…"

- Insert pricing principles:

  "The ACCC must have regard to the following principles:

  (a) that regulated access prices should:

  (i) be set so as to generate expected revenue for a regulated service or services that is ***at least sufficient*** *[our emphasis] to meet the efficient costs of providing access to the regulated service or services;*

  (ii) include a return on investment commensurate with ***the regulatory and commercial risks involved*** *[our emphasis]…"*

- Include a provision for merit review of decisions by the ACCC on proposed undertakings.

The Review of the Gas Access Regime

More recently, the PC has argued in its Draft Report on the Review of the Gas Access Regime that:

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[9] PC, Review of the National Access Regime: Inquiry Report, 28 September 2001, p.xxii.

[10] Commonwealth Government, "Government Response to Productivity Commission Report on the Review of the National Access Regime: Interim Response", September 2002, p. 1.

> *"…there are problems with the current regime, mainly arising from the considerable costs it imposes and its potential to distort and deter investment."*[11]
>
> *"There is uncertainty about the regulatory outcomes. The building block and incentive regulation approaches used to assess access arrangements are intrusive and costly for service providers and have a high potential for regulatory error because of uncertainty about the multitude of assumptions and parameters used."*[12]

The Draft Report on the Review of the Gas Access Regime identified setting the ex ante regulatory rate of return as one of the key uncertainties.

The PC's concerns regarding regulatory implementation has continued to be reinforced by the PC's Chairman, Gary Banks, who recently highlighted the *"problem of regulatory overreach, or undue ambition"*, expressed the need for *"the requisite policy humility for such abstention"*, and warned against the *"seductiveness of controlling 'market power'"*[13].

2.1.2 The Parer Report

More recently, the Parer report on the Energy Market Review has called for a less intrusive approach to utility regulation. It concluded that there are *"distorted and inappropriate signals from the current network regulation framework."*[14] It also noted *"that future debate would be most effective if it focussed on moving regulation to a less intrusive form."*[15]

2.1.3 The Commonwealth Government

In addition to endorsing the PC's findings on the review of the National Access Regime, the Commonwealth Government has been providing its views on how the Gas Code should be interpreted.

The Minister for Industry Tourism and Resources, Ian MacFarlane, recently overturned the NCC's recommendation on the application for revocation of coverage of certain portions of the Moomba-Sydney Pipeline ("MSP") System.[16] Instead, the Minister decided that coverage of part of the MSP Mainline (the part that extends from Moomba to Marsden) was to be revoked. This decision is now understood to be the subject of several appeals to the ACT.

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[11] Productivity Commission, Review of the Gas Access Regime: Draft Report, December 2003, page XXV.

[12] Ibid., page XXVIII.

[13] Gary Banks, "The good, the bad and the ugly: economic perspectives on regulation in Australia", Address to the Conference of Economists, Business Symposium, 2nd October 2003, page 10.

[14] Council of Australian Government's Energy Market Review Panel, Towards a Truly National and Efficient Energy Market, 20 December 2002, p. 12. This was quoted by the ACCC in its submission to the PC Review of Gas Access Regime, September 2003, p.46.

[15] Ibid., p. 16.

[16] Final Decision: Applications for Revocation of Coverage on Certain Portions of the Moomba-Sydney Pipeline System, 19 November 2003.

While the Minister's decision relates to a case for lifting regulation – and it follows over 20 (mostly successful) revocation applications – the Minister in his Statement of Reasons emphasised a number of important points of regulatory implementation. The Minister stressed the need to move away from *"a presumption of access regulation or monopoly service provision"* and to provide evidence of the "*actual circumstances"* of pipelines as opposed to making a "*generic"* assessment or any assessment that "*bears limited relationship to the market realities"*, or arguing from a "*theoretical proposition."*[17]

The decision therefore highlighted the need for regulators to exercise their powers with a recognition of the commercial situation and market realities.

2.1.4 Judicial decisions

There has been a series of recent judicial decisions that have assisted in clarifying the role of the regulator and how access regulation should be applied.

The Epic Decision

The Western Australian Supreme Court ordered the Western Australian Independent Gas Access Regulator – the predecessor to the ERA - to revise its Draft Decision for the Dampier-Bunbury Natural Gas Pipeline's ("DBNGP") access arrangement to be more in line with the objectives of the regulatory regime. More specifically, in applying the Gas Code to set revenues for regulated gas businesses, the regulator is bound by the considerations in section 2.24 over all other parts of the Gas Code. That is to say, the regulator must take into account the interests of the Service Providers, Users and Prospective Users, and the public interest[18].

In particular, the Court considered that the Western Australian regulator (and by implication other regulators in Australia, given the similarity in the approaches they are adopting) have been approaching regulation in a way that is reflective of an underlying "perfect competition" model - which is inconsistent with the Gas Code. In contradistinction, the Court considered that regulation should be based on a model of "workable competition".

What the Epic Decision highlights is the need to regulate in accordance with the fundamental objectives of the Hilmer reforms, from which the regulatory regime and the Gas Code are descended. It notes: "*it would be surprising if what was contemplated was a theoretical concept of perfect competition, as the subject matter involves very real-life commercial situations*" [19]. It goes on to note that "*Workable competition seems far more obviously to be what is contemplated. This is clearly consistent with the approach of the Hilmer Report …".*

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[17] Statement of Reasons, 19 November 2003, sections 56-58, page 15.

[18] Noted in Re Dr Ken Michael AM: ex parte Epic Energy (WA) Nominees Pty Ltd & Anor [2002] WASCA 231 ("the Epic decision"), at 85. The WA Supreme Court has rightly highlighted that this section echoes the principles set out in the Hilmer Report, at 97.

[19] *Re Dr Ken Michael AM; Ex parte Epic Energy (WA) Nominees Pty Ltd* [2002] WASCA 231, para. 124.

There is an issue of specific relevance to Alinta's gas distribution system in this context. In applying the principles emerging from the Epic Decision in its Final Decision, the regulator appeared to have restricted the application of the principle that it is bound by the factors in Section 2.24 as fundamental considerations, primarily to its assessment of the Initial Capital Base. In other words, the regulator's interpretation of the Epic decision was that the requirement to be bound by the factors in Section 2.24 as fundamental considerations, applied only its assessment of the Initial Capital Base but not to other parameters underlying the reference tariffs. For example, the final decision indicates that the regulator has assessed the cost of capital by making a *"best estimate of the true cost of capital"* as required under Section 8.2(e) of the Code, rather than by considering the factors in Section 2.24.

While the regulator has adopted this narrow interpretation of the Court's decision in making its Final Decision on the DBNGP, it is not an option that is open to the ERA when assessing Alinta's access arrangements. The requirement to observe Section 2.24 was discussed in the context of the Initial Capital Base in the Epic Decision presumably because that was the key issue of contention in that dispute. It does not follow from this that the requirement to observe Section 2.24 in assessing access arrangements generally should be restricted to considering the Initial Capital Base.

For the purpose of Alinta's access arrangements, the Initial Capital Base has been set and does not require approval by the ERA as was the case with the DBNGP. However, the ERA is still required to treat the factors in Section 2.24 as fundamental considerations in assessing other terms and conditions – such as the Rate of Return - in Alinta's proposed access arrangements.

The Australian Competition Tribunal

Two recent ACT decisions have offered important clarifications on issues such as the role and powers of the regulator and the way in which access arrangements should be assessed under the Code.

In December 2003, the ACT handed down its decision on Epic Energy's appeal against the ACCC's refusal to approve its access arrangements for the Moomba Adelaide pipeline ("MAP"). Some of the guiding principles emerging from this decision concern how the regulator should select estimates under circumstances where a range of possible values exist:

- regulators must give clear and substantiated reasons for reaching their conclusions regarding the values they select where a range of possible values exist;[20]

- where a range of possible values exist, there is no requirement in the Code that the lowest value should be selected.[21] The Tribunal specifically stated that:

[20] Application by Epic Energy South Australia Pty ltd [2003] AcompT 5, 10 December 2003, para. 32, 48, 84.

[21] Application by Epic Energy South Australia Pty ltd [2003] AcompT 5, 10 December 2003, para. 92.

"*Epic must be allowed the opportunity to earn a revenue stream that recovers the efficient costs of operating the Reference Service, and the need to replicate the outcomes of a competitive market does not demand the use of the lowest indicated price based on general, albeit informed, inquiries."*

- under conditions of uncertainty, a reasonable and prudent service provider would not select a value that lies at the low end of a range of possible values. Doing so creates an asymmetric exposure to risk.[22]

Important principles regarding the role and powers of the regulator can also be drawn from the recent ACT decision on GasNet's appeal against the ACCC's final decision on its access arrangements. In this decision, the Tribunal expressed the view that it is beyond the power of the regulator not to approve the service provider's access arrangements where the arrangements proposed fell within reasonable and acceptable ranges:

> *"…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."*[23]

The view expressed by the Tribunal reinforces the Court's finding in the Epic decision that there is no single correct value for most of the parameters used in setting reference tariffs. In this context, it is not open to the regulator to reject the service provider's proposed access arrangements and replace it with its own judgments as to what is more appropriate, unless it is found that the proposals do not comply with the factors listed in Section 2.24 of the Code.

Importantly, these concepts can be extended to the regulator's assessment of the Rate of Return. At paragraph 42 of the decision, the Tribunal stated that:

> *"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."*

Having clarified that the regulator's role is not to set the Rate of Return but to assess if it falls within acceptable ranges under the provisions of Section 8.30 and 8.31 of the Code, the Tribunal concluded that:

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[22] Application by Epic Energy South Australia Pty ltd [2003] AcompT 5, 10 December 2003, para. 62, 94.

[23] Application by GasNet Australia (Operations) Pty Ltd [2003] AcompT 6, 23 December 2003, paragraph 29.

> *"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."*[24]

Collectively, KPMG considers that the following guiding principles on access regulation emerge from recent judicial precedents:

- the role of the regulator is not to set the terms of the service provider's access arrangements, but to assess if the access arrangements are consistent with the provisions of the Code;
- the outcomes of a workably competitive market are the appropriate benchmark against which to make these assessments;
- there is no requirement that regulators must establish reference tariffs based on the lowest value for any underlying parameters. Under conditions of uncertainty, a reasonable and prudent service provider would not pick the lowest value since this would expose the service provider to the highest risk of under-estimation;
- the regulator can only reject the service provider's access arrangements if the proposals are found to be inconsistent with the provisions of the Code;
- there is sufficient uncertainty regarding the principles that are applied in setting reference tariffs such that *"…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.*[25]*"*; and
- given the uncertainty noted above, the regulator cannot reject the service provider's access arrangements because the regulator prefers a different access arrangement that it considers are more consistent with the provisions of the Code.

2.2 Conclusion

KPMG's application of the CAPM, and our estimate of the cost of capital for Alinta's gas distribution system, is consistent with recent regulatory developments, which have reasserted the proper objective of regulation.

[24] Application by GasNet Australia (Operations) Pty Ltd [2003] AcompT 6, 23 December 2003, paragraph 45.
[25] Application by GasNet Australia (Operations) Pty Ltd [2003] AcompT 6, 23 December 2003, paragraph 29.

There is now a significant independent body of opinion that demonstrates the importance of avoiding regulatory error and the nature of that error as posing significant risks to a regulated business's future investments, and hence the level of economic welfare.

In addition, there is now sufficient judicial precedent that confirms that the role of the regulator is not to set the terms and conditions of the service provider's access arrangements, but to assess if the access arrangements fall within reasonable and acceptable ranges, and are consistent with the provisions in the Code. There is also no requirement that the lowest value of underlying parameters must be adopted in order for reference tariffs to comply with the requirements of the Code.

As the remaining sections in this report point out, estimation of WACC is an inherently imprecise exercise, given both the methodological uncertainties underlying the theory and limitations in relation to the measurement of underlying parameters. Such considerations are relevant to the ERA's assessment of the reasonableness of the WACC that we have recommended for Alinta's gas distribution system.

We consider that application by the ERA of the set of principles we have used and highlighted above would provide an outcome that is consistent with the correct interpretation of the Code. It would also encourage an investment environment that is far more conducive to maximising the economic welfare both of consumers and infrastructure owners than alternative approaches, thereby addressing the concerns of PC and the Government.

3 The cost of capital

3.1 Introduction

The cost of capital is the rate of return required by the marginal investor in a firm (i.e. the last investor willing to contribute funds). Equivalently, it represents the minimum return on capital that a firm must expect to earn on its investments to attract new capital and to maintain its current value.

The cost of capital of a firm is typically measured by reference to the current cost of raising funds via the various classes of its capital (e.g. equity, debt, etc.), each weighted by the target proportion of each class of capital to the total market value of capital of the firm. Hence, the cost of capital of a firm is often referred to as a WACC.

In estimating WACC, the CAPM is widely applied to estimate the cost of equity[26]. The CAPM is based on the assumption that an investor in a risky asset requires additional return to compensate for bearing additional risk. In simple terms, the CAPM asserts that the required rate of return on a risky asset is a function of the risk free rate of return (Rf) plus a risk premium that reflects the return on a well-diversified portfolio of risky assets over the risk free rate (Rm – Rf), scaled by the "beta" of the risky asset.

Therefore, the required rate of return for equity securities (K_e) is determined as follows:

$$\mathbf{K_e = Risk\ free\ rate + Risk\ premium}$$

$$\mathbf{K_e = R_f + \beta_e * \{R_m - R_f\}}$$

Beta (denoted by β_e) is a measure of the risk of the risky asset relative to the market index. In theory, the only risks that are captured by beta are those risks that relate to the co-movement of returns with the overall market, that cannot be eliminated by the investor through diversification. Such risks are referred to as systematic, undiversifiable or uninsurable risks. Portfolio diversification is assumed to eliminate all other risks. In practice, however, there is evidence to suggest that investors are not diversified to the extent the CAPM assumes[27]. For this reason, some investors are likely to require compensation for risks that are considered to be diversifiable under the CAPM.

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[26] There are a number of other theories that can be applied to estimate the cost of equity. However, the CAPM remains the most popular theory.

[27] For example, Goeztman, W. and A. Kumar, *Diversification Decisions of Individual Investors and Asset Prices*, January 2004, unpublished working paper Yale School of Management, conducted an empirical study of 60,000 individual investors during a six year period (1991-1996) and found that the vast majority of investors in their sample were under-diversified. The authors suggest that if investors systematically hold less than fully diversified portfolios, they are likely to demand compensation for the idiosyncratic risk in their equity portfolios. Further analysis suggested that the diversification decisions of these investors will also be reflected in asset prices. In addition, we are also aware of research which has found that the non-systematic risk related to the risk

The risk-return concepts underlying the CAPM are applicable to any risky asset. Therefore, the required rate of return for risky debt securities can be similarly estimated:

$$\mathbf{K_d = Risk\ free\ rate + Risk\ premium}$$

$$\mathbf{K_d = R_f + \beta_d * (R_m - R_f)}$$

However, in practice, the beta for debt securities (β_d) is much more difficult to measure compared with the beta for equity securities (β_e) given the relatively lower level of liquidity and depth in many debt markets.

In addition to the CAPM, capital structure theory is also applied to estimate the target weights that are applied to the cost of equity and the cost of debt in estimating WACC. Capital structure theory focuses on the factors which influence the mix of capital employed by the firm.

In the context of revenue setting by regulators, the cost of capital is effectively converted into a cash flow item. That is, it is applied to a measure of the value of the regulatory asset base, and the result is then added to other revenue building blocks to derive a measure of the required revenue of the regulated entity. In order to ensure that the revenue derivation formula is internally consistent, it is clear that the cost of capital cannot be considered in isolation of the definition of other components of overall revenue determination in regulatory decisions. Care must be taken to ensure this mutual dependency is recognised. This also applies to the treatment of inflation, risk and tax. It is in this context that capital structure theory and the CAPM also intersect. For example, the variance of possible future costs influences capital structure choice, the cost of debt and possible cash flows under conditions of distress. Consequently both the cost of capital and the expected operating costs are influenced by variance however the CAPM focuses only on the non-diversifiable element of variance.

Estimating the cost of capital may initially require a simple application of the CAPM formula, however, in practice, the application of the CAPM is complicated by several factors. For example:

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of the firm has increased in recent times, and due to this, elimination of non-systematic risk is no longer possible by holding a portfolio of 20 to 30 stocks. (refer Campbell, Lettau, Malkiel and Xu, *Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk*, Journal of Finance, Vol. LVI, No. 1, February 2001). Finally, Malkiel and Xu (2002) also postulate that if there are investors who cannot hold the market portfolio for exogenous reasons (i.e. they are not diversified to the extent the CAPM presumes), other remaining investors will also be unable to hold the market portfolio (since the sum of the two make up the whole market). Under such a scenario, investors will care about total risk, not just market risk. (refer Malkiel, B and Y. Xu, *Idiosyncratic risk and security returns*, December 2002, unpublished working paper).

- whilst various tests of the CAPM have generally lent support to the broad concepts of risk that underpin the model, empirical testing has also shown that the CAPM does not fully explain security pricing and therefore the cost of equity[28];
- there are significant information constraints, estimation challenges and uncertainties in applying such a model in practice. The impacts of these challenges and methodological limitations are magnified in a regulatory context where an important component of revenues and profitability is underpinned by the regulatory allowed WACC;
- in theory, a number of parameters underpinning the CAPM should reflect forward-looking estimates, which are unobservable. A considerable amount of careful judgment and pragmatism is required in selecting appropriate parameter values; and
- the model requires consistency in the treatment of components of the expected cash flow items and components of the cost of capital in circumstances where distinctions are blurred in practice. The treatment of a number of cash flow "risks" are cases in point.

Given the challenges in applying guidance from theoretical models, and the importance of the cost of capital to infrastructure investors and the overall level of investment, it is important that the WACC be set in a way that takes due account of these factors and is furthermore consistent with regulatory objectives. A number of recent regulatory developments have been particularly important in highlighting the proper understanding of regulatory objectives, and these were reviewed briefly in section 2.

3.2 WACC formula

3.2.1 Post-tax nominal ("textbook") WACC

WACC can be expressed in a variety of ways. For each definition, there is a corresponding cash flow definition.

The standard "textbook" WACC formula is set out below.

$$\textbf{Post-tax nominal WACC} = K_e * E/V + K_d*(1-t)*D/V$$

where t represents the corporate tax rate.

3.2.2 Officer WACC

In Australia, an "imputation adjusted" version of the post-tax nominal WACC is often applied. This formula is also commonly known as the "Officer" definition by reason of its association with Professor Robert Officer:

$$\textbf{WACC} = K_e * (1-t)/\{1-t*(1-\gamma)\} * E/V + K_d*(1-t)*D/V$$

[28] The Roll critique also highlights the difficulties of testing the theory; Richard Roll, 1997, "A critique of the asset pricing theory's test", Journal of Financial Economics, 4.

Where t represents the corporate tax rate and γ or "gamma" represents the average value attributable to imputation tax credits. The term (1-t)/{1-t*(1-γ)} in this formula is the imputation adjustment factor.

The Officer WACC is similarly expressed in post-tax nominal terms.

3.2.3 Pre-tax real WACC

The pre-tax real WACC that has been applied for revenue setting in many regulatory decisions around Australia is based upon the Officer WACC, grossed up by 1 minus the statutory corporate tax rate to obtain the pre-tax nominal WACC:

$$\textbf{Pre-tax nominal WACC \%} = K_e * 1/\{1-t*(1-\gamma)\} * E/V + K_d * D/V$$

and then adjusted for inflation:

$$\textbf{Pre-tax real WACC} = \{(1+\textbf{Pre-tax nominal WACC \%}) / (1+\textbf{CPI})\} - 1$$

3.2.4 Pre-tax real framework and transformation issues

As noted above, in transforming the Officer WACC into a pre-tax real WACC, the early regulatory decisions in Australia adopted the sequence of firstly grossing up the Officer WACC by 1 minus the statutory corporate tax rate, and secondly adjusting the result for inflation. Some regulators expressed concern regarding this transformation sequence. In addition, regulators such as the ACCC and the ESC in Victoria became increasingly concerned that businesses were being over-compensated for their actual tax obligations under a pre-tax WACC approach (because tax concessions such as accelerated tax depreciation are not captured by the statutory corporate tax rate applied). Together, these concerns led to a move towards a revenue setting framework that seeks to explicitly calculate the cost of tax (known as the post-tax framework).

There are essentially two alternative transformation sequences that could be applied to convert a nominal post tax WACC to a real pre-tax WACC:

- convert the post-tax nominal WACC into a pre-tax nominal WACC by grossing up by a factor of (1-t), then deflate the pre-tax nominal WACC to obtain a pre-tax real WACC. This is the methodology described above and is known as the forward or market transformation; or

- deflate the post-tax nominal WACC to obtain a post-tax real WACC, then convert the post-tax real WACC into a pre-tax real WACC by grossing up by a factor of (1-t). This approach was initially introduced by Macquarie Risk Advisory Services in advice provided to the ACCC and the ESC in their 1998 review of the Victorian gas access arrangements, and is referred to as the reverse transformation approach.

Due to the interaction between tax and inflation, these transformation approaches produce different results. In theory, it is accepted that neither approach will produce a post-tax nominal cash flow return on assets that equates to the targeted post-tax nominal WACC. Where asset lives for regulatory purposes and tax purposes are aligned, there is a tendency for the forward transformation approach to produce a cash flow return on assets that *exceeds* the target post-tax nominal WACC, and this tendency is magnified when tax depreciation allowances are high relative to regulatory depreciation allowances. By contrast, the reverse transformation approach tends to produce a cash flow return on assets that *understates* the target post-tax nominal WACC where asset lives for regulatory purposes and tax purposes are aligned. However, it would also appear that this tendency reduces where accelerated tax depreciation allowances are high relative to regulatory depreciation allowances.

To illustrate the above points, we have constructed a numerical example based on an asset costing $100 with a 10 year economic life. We have assumed that the target post-tax nominal WACC (i.e. the textbook WACC) of 7.38% and that the inflation rate is 2.5% p.a. For simplicity we have assumed zero operating costs and that the straight-line depreciation methodology is adopted.

The table below highlights how the post-tax cash flow return on assets (determined through an IRR analysis) changes under the forward and reverse transformation approaches, as the assumed tax depreciation life is varied.

Table 2: Change in post-tax cash flow return

		Target post-tax cash flow return = 7.38%	
Economic life (years)	Tax life (years)	Post-tax cash flow return – Forward transformation	Post-tax cash flow return – Reverse transformation
10	10	7.52%	6.76%
10	9	7.68%	6.90%
10	8	7.85%	7.06%
10	7	8.03%	7.23%
10	6	8.23%	7.41%
10	5	8.45%	7.61%
10	4	8.70%	7.83%
10	3	8.97%	8.08%
10	2	9.28%	8.36%
10	1	9.63%	8.67%

As highlighted in the foregoing discussion, both transformation approaches suffer from some bias. In one sense, the forward transformation approach is arguably preferable to the reverse transformation approach since the latter suffers from the fundamentally flawed assumption that tax is levied in real cash flows when this is not in fact the case.

Neither approach can, however, be argued to be "better" than the other on the basis of the "accuracy" of the results they each produce. As we have discussed, however, imprecision is an inherent feature of the entire revenue setting process and in the estimation of the appropriate rate of return. Imprecision is therefore not a sufficient reason for abandoning a

formula-based approach to allowing for tax in favour of an explicit cash flow based approach.

Given the removal of accelerated tax depreciation benefits for assets put in place post- 21 September 1999 and changes to tax rules to align asset lives for tax and accounting purposes resulting from the Ralph Business Taxation Review, the gap between tax depreciation allowances and regulatory depreciation allowances can be expected to progressively diminish. Accordingly, over time, the effective tax rate (taking into account tax depreciation) and the regulatory tax rate should converge. This means that the pre-tax real WACC derived using the forward transformation method should become a less biased estimate of the target post-tax nominal return. On this basis, we prefer the forward transformation approach.

Admittedly, the pre-tax real WACC derived using a forward transformation approach and incorporating the full statutory corporate tax rate, would still produce above-target returns in the transitional period. Nevertheless, we believe that it is inappropriate for regulators to confiscate the benefits of accelerated tax depreciation from regulated businesses on the basis that these benefits reflect the residue of those that previous policy makers explicitly sought to deliver to facility owners through the accelerated depreciation schemes put in place prior to the most recent round of business taxation reforms.

4 The risk free rate of return and inflation

There are two main issues currently surrounding the estimation of the risk free rate of return in the WACC:

- the appropriate term to maturity of the underlying risk free security; and
- the period over which the rate is measured.

4.1 Choice of proxy for the risk free asset

KPMG has estimated:

- the nominal risk free rate by reference to the yield on 10 year Commonwealth Government bonds, as currently represented by the benchmark May 2013 Commonwealth Government Bond; and
- the real risk free rate by reference to the yield on an Indexed Linked Government Bond with a term to maturity corresponding with that on the nominal risk free rate of return. This yield has been estimated by interpolating between the August 2010 and August 2015 Index Linked Government Bond yields.

Our approach is consistent with the majority of the regulatory determinations by various regulators around Australia. These decisions recognise that in Australia, the ten year Commonwealth Government Bond is commonly adopted as a proxy for the nominal risk free rate for the purposes of estimating WACC, given the good depth and liquidity of the market for this security. Furthermore, in investment analysis, it is generally accepted that the appropriate government bond is usually one with a maturity that most closely matches the life of the underlying investment.

Up until recently, the only regulator in Australia that has continued to reject the above approach has been the ACCC. The ACCC's practice has been to adopt a risk free rate with a maturity matching the length of the regulatory period. We note that this issue has recently been resolved by the ACT decision on GasNet's appeal against the ACCC's revisions to its access arrangements. In that case, 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.

4.2 Period of averaging for 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.

KPMG understands that the ERA's practice has been to adopt a 20 day period of averaging when measuring the risk free rate of return. 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 period of averaging (e.g. 10 days). However, from a practical perspective, a period of averaging that is too short could create problems for a regulated that is intending to hedge over the sample period.

On balance, KPMG believes that there would be little material or practical benefit from shifting from the ERA's current practice of adopting a 20 day sampling period. What is necessary is that advance notice be given regarding the date on which the 20 day sampling period would commence or end to facilitate the regulated entity's forward planning with respect to hedging. The 20 day sampling period is also consistent with the approach adopted by the Essential Services Commission in Victoria ("ESC"), the Independent Pricing and Regulatory Tribunal ("IPART") and the Queensland Competition Authority ("QCA").

4.3 Inflation

KPMG has estimated the rate of expected inflation by inputting the nominal and real risk free rates of return into the Fisher equation, and solving for the implied inflation rate.

4.4 Conclusion

For the purposes of estimating an appropriate WACC, KPMG recommends the following values:

- a nominal risk free rate of **5.9%.** This rate reflects the yield on 10 year Commonwealth Government bonds, as currently represented by the benchmark May 2013 Commonwealth Government Bond, averaged over the 20 days to 9 December 2003; and

- a real risk free rate of **3.6%.** This rate reflects the yield on an Indexed Linked Government Bond with a term to maturity corresponding with that on the nominal risk free rate of return. Given that there is currently no Indexed Linked bond maturing in May 2013, this yield has been estimated by interpolating between the August 2010 and August 2015 Index Linked Government Bond yields, and averaging over the 20 days to 9 December 2003.

Collectively, the above rates imply an expected inflation rate of around **2.2%.**

5 The market risk premium

5.1 Introduction

KPMG supports the estimation of the market risk premium ("MRP") by reference to long term historical averages. The evidence that we have reviewed suggests that the appropriate range for the MRP is between 6% to 8%.

We are aware that there is a range of other methodologies available for estimating the MRP such as surveys and supply side approaches. However, we place a lower level of confidence on such estimates given our concern that they are likely to introduce even greater estimation error than the historical estimates.

While there is evidence of regulators adopting an MRP of 6% - which is at the low end of the range of values observed from long term historical averages - there is also considerable evidence to suggest that this figure may not be appropriate and does not represent a valid precedent. KPMG has some concerns that this "precedent" is more of a "follow-the-first-decision" outcome (admittedly in a difficult area) than the result of a rigorous review of the evidence combined with a recognition that it is less costly to err on the side of encouragement to invest than to discourage investment.

We note that as part of the 2003 Gas Access Arrangements Review, the Victorian gas distributors commissioned Professor Stephen Gray from the University of Queensland to advise on the appropriate value for the MRP. His paper, which strongly supported the adoption of an MRP estimate of 7%, was submitted as Attachment A of TXU's response to the ESC's Position Paper[29].

The evidence on the market risk premium has been presented and reviewed in numerous regulatory decisions since the ESC's first Gas Access Decision in 1998. KPMG's summary of this evidence and surrounding discussion is set out in Sections 5.2 and 5.3 below.

5.2 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%[30]. Table 3 below sets out the measured historical MRP in Australia reported in various studies and research.

[29] Refer S. Gray, Issues in Cost of Capital Estimation, 19 October 2001 downloadable at http://www.esc.vic.gov.au/PDF/2001/SubUQBS_GasPosPapOct01.pdf

[30] 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.

Table 3: Measured historical MRP in Australia

Source	Period	Risk premium (%)
AGSM:		
Arithmetic average, incl October 1987	1974-1995	6.2
Geometric average, incl October 1987	1974-1995	4.1
Arithmetic average, excl October 1987	1974-1995	8.1
Geometric average, excl October 1987	1974-1995	6.6
Arithmetic average[31]	1974-1998	4.8
Geometric average	1974-1998	2.8
Arithmetic average, incl October 1987[32]	1974 – Sep 2000	6.2
Geometric average, incl October 1987	1974 – Sep 2000	4.4
Arithmetic average, excl October 1987	1974 – Sep 2000	7.7
Geometric average, excl October 1987	1974 – Sep 2000	6.4
Officer (1989) – arithmetic mean	1882 – 1987	7.9
Officer (1989) updated – arithmetic mean[33]	1882 – 2001	7.2
Officer[34]:		
Arithmetic mean	1946-1991	6.0 to 6.5
Hathaway (1996)[35]		
Arithmetic mean	1882-1991	7.7
Arithmetic mean	1947-1991	6.6
Gray (2001) (note 2)	1883 – 2000	7.3
Dimson, Marsh and Staunton (2000)[36]		
Geometric mean	1900 – 2000	7.6

Notes:

1. *Both arithmetic and geometric mean results are shown. Arithmetic average returns are generally considered to represent better estimates of future returns because they take into account more observations on realised returns. By contrast geometric average returns can be calculated by knowing only two observations.*
2. *Gray (2001) is based on an update of Officer's work as reported in S. Gray, Issues in Cost of Capital Estimation, 19 October 2001 downloadable at http://www.esc.vic.gov.au/PDF/2001/SubUQBS_GasPosPapOct01.pdf*

[31] 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

[32] 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.

[33] Refer ABN AMRO (1999) Op cit

[34] 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.

[35] Refer ABN AMRO (1999), Op cit

[36] Dimson, Marsh and Staunton, "Twelve Centuries of Capital Market Returns", Business Strategy Review, 2000, Vol 11 Issue 2

In interpreting the evidence presented above:

- the high volatility of the market risk premium in the recent past suggests that it cannot be inferred that recent averages represent a departure from the long-term historical average. Given the nature of recent events, such as the so-called "tech-wreck" and September 11th, it is even more difficult to assume that risk has fallen (or risk aversion has fallen to offset this recent change) and the MRP is now below the historical average; and

- in addition, we must be wary of relying on post-1987 MRP data as the market index is biased downwards because it does not capture the average value of franking tax credits, which is non-zero.

The empirical study by Dimson, Marsh and Staunton (2000) referred to in Table 3 provides an Australian series from 1900 to 2000[37] and finds the arithmetic average market risk premium relative to long-term bonds to be 7.6% (8.6% relative to short term bills). Additionally it states that the average market risk premium for the 12 developed countries examined has been 7.2%.

The authors adjust this estimate downwards to reflect "today's best guesses about future equity market volatility levels" (which they assume to be lower than historical figures). The adjustments lead to a market risk premium (over bills) of 8.1% for Australia and 6.7% over long-term bonds as the average for all 12 countries. The Australian adjustment was small compared with the adjustment for other countries. Interpolating for the premium over bonds rather than bills would mean a premium of around 7.1%. The authors then examine the historical risk premium over the first and second half of the century and note a decline in the second half. Based on this observation they postulate reasons and suggest that the premium may now be lower. Interestingly, however, they note that Australia was an exception – the market risk premium in the second half of the century was not lower.

Dimson et al (2000) cites a survey of 226 financial economists undertaken by Welch[38]. Those surveyed were asked to forecast the arithmetic equity risk premium over various time horizons. The mean forecast for 30 years was approximately 7%. By inference, the market risk premium for Australia would be expected to be at least at this level. This estimate is within the 6% to 8% range and does not signify a view by academics that the equity risk premium in the US has fallen to a range of 5% to 7%. As the article notes:

> *"These survey figures represent what is being taught in the world's leading business schools and economics departments. As such they will also be widely used by finance professionals and corporate executives. Similarly they will be cited by regulators and used in rate-of-return regulation disputes."*

[37] The source data is not independent of other Australian studies eg AGSM, Officer

[38] Ivo Welch (2000), "Views of Financial Economists on the Equity Risk Premium and Other Issues", Journal of Business, 17 pp501 - 537

The Welch paper is discussed in the paper written by Gray which forms Attachment A to TXU's submission to the ESC's Position Paper.

The data presented below, and discussed in Gray's paper, reinforces the conclusions that:

- the appropriate range for the MRP is 6 to 8%; and
- there is no substantive evidence to support a decline in the risk premium below this range.

Gray's paper also re-iterates the benefit of a long term perspective in estimating the MRP and the challenge faced in forming a sound and supportable view that the MRP has changed recently.

There has been substantial variation in the MRP by decade, both in Australia and the US, as shown in Table 4 below.

Table 4: Comparison of MRP in Australia and the US, by decade

	USA[39]	Australia[40]
1926 – 1929	17.6%	11.2%
1930's	2.3%	5.7%
1940's	8.0%	6.4%
1950's	17.9%	13.5%
1960's	4.2%	9.6%
1970's	3.0%	0.4%
1980's	7.9%	7.9%
1990's	7.9%	2.9%

Taking a longer term view leads to a lower standard error of the estimated MRP. Table 5 below shows that over the period 1883 – 2000, the average MRP 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 is not statistically different from the longer term historical average.

[39] Anmin, M., Falaschetti, D., *Equity Risk Premium, Valuation Strategies*, January / February 1998, obtained at http://www.ibbotson.com/Research/papers/Equity_Risk_Premium/

[40] Updated data to 2000 from Officer, R. R. (1989), *Rates of Return to shares, Bond Yields and Inflation Rates: An Historical Perspective*, in Ray Ball, Phil Brown, Frank Finn and Bob Officer, *Share Markets and Portfolio Theory*, University of Queensland Press, pp. 207-211.

Table 5: 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

Given the importance of the cost of capital to revenue determination and new investment, KPMG does not believe the ERA should be adopting a pre-emptive view (in the absence of sound evidence) that there has been a decline in the risk premium. Rather, the ERA should adopt a conservative approach that is consistent with the long term empirical evidence.

5.3 Views of Australian academics

KPMG notes that, faced with all available evidence, and their own research, a number of Australian academics have recommended an MRP in the 6 to 8% range:

Hathaway states that:

> *"The recommended range of values to use for the expected risk premium for the Australian equity market is 6.6 – 7.0% p.a. When using a single estimate for the Australian expected risk premium, the best such point estimate is 7% p.a. while the best post-war such estimate is 6.6% p.a."*[41]

In addition, Twite states that:

> *"While seeking a sufficiently large sample from which to obtain a 'reasonable' estimate of the market risk premium, we believe it is appropriate to adjust for the influence of 'unusual' events, such as October 1987. Excluding October 1987, the average risk premium is 6.4%"*[42]

Gray finds no statistical support for the hypothesis that the MRP has fallen:

[41] Hathaway, N. "Market Risk Premium", MBS seminar entitled Cost of Capital: Imputation Credits and other issues.

[42] Dr G. Twite, Senior Lecturer in Finance, AGSM in ABN AMRO "Submission to the Office of the Regulator General, Victoria, regarding 2001 Electricity Distribution Price Review: The Cost of Capital Financing", 4 June 1999, p.13.

> *"The average market risk premium was 7.3% per annum over the period 1883 to 2000. There is no statistical basis for concluding that there has been a reduction in the market risk premium in recent times."*[43]

Finally, Brealey, Myers et al recommend an MRP of 8% for Australia.[44]

5.4 Conclusion

KPMG considers that the value of the MRP should be estimated by reference to the long term historical average Australian MRP. The evidence reviewed in this report indicates that there is strong support for an MRP in the range of 6% to 8%.

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

[44] Brealey, R, Myers, S, Partington, G, Robinson, D (2000), Principles of Corporate Finance, 1st Australian Edition, McGraw-Hill, Australia, p. 166.

6 Beta

6.1 Introduction

KPMG's estimate of the pre-tax real WACC for Alinta's gas distribution system is based on the CAPM framework. Under this model, the risk component of the return on capital is a function of the equity beta and the MRP. The equity beta reflects the contribution of an individual investment to the risk of an investor's portfolio and, in the context of the CAPM, all investors will hold some combination of the risk free asset and the risky market portfolio. Consequently, beta captures the contribution of a risky asset to the risk of the market portfolio. Assets are priced in accordance with this contribution, referred to as beta, which is a subset of the total risk of an asset. The diversifiable component of an asset's total risk is not part of the pricing of the asset in the assumed world of the CAPM.

The beta reflects 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. This construct provides the intuition behind thinking about the risk of an asset and behind the use of regression techniques to estimate beta based on events that have occurred.

While not a lot is known about the underlying determinants of beta, it is argued to be a function of the underlying cyclicality of an asset's revenue stream, operating leverage and financial leverage[45]. That is, the equity beta can be viewed as a function of a beta of revenue magnified by operating leverage to the beta of assets (as it is observable) and magnified again by financial leverage to the beta of equity (as it is also observable).

Both the rationale underpinning the estimation techniques and the underlying determinants of beta guide the selection of a beta of equity for gas distribution assets from empirical estimates.

6.2 Estimation method

6.2.1 Background

Betas are usually estimated statistically 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

[45] Operating leverage reflects the proportion of fixed operating costs to total operating costs. The higher is this proportion, the greater is the variability (and covariability) of an EBIT stream relative to an underlying revenue stream. It is analogous to financial leverage which reflects the proportion of fixed interest costs in determining a net income stream. The higher is this fixed interest cost, the higher is the variability of the net income stream for a given variability in the underlying EBIT stream.

School of Management's ("AGSM") Centre for Research in Finance ("CRIF"), London Business School, Bloomberg, DataStream, and Value Line. These services provide a guide to the beta to be used for assessing a return on equity component of the overall WACC. A key point is that the empirical regressions are a *guide* rather than a definitive estimate. The reasons for this include:

- The CAPM, hence beta, does not fully explain the historical returns on financial assets. As a consequence, the estimation of beta involves a degree of careful judgment.

- The underlying market portfolio is not easily identified. A stock market index is generally used as a proxy. Theoretically the index should be a market value weighted index of *all* assets (i.e. the broadest index possible). Some stock market indexes are market value weighted, others are equally weighted but none contain all assets.

- Investors invest across borders so there is a challenge in selecting the "best" market index. The use of a domestic market index, although inexact, is commonly adopted by market practitioners and regulators.

- The beta estimates (derived from regression analysis) are historical estimates even though the CAPM is forward looking. Therefore there is an assumption of stability in betas across at least the estimation period and the period for which it is used. The selection of an estimation period is a trade off between:

  - being long enough to obtain enough observations to minimise the standard error of the estimate; and

  - minimising an error in the estimate due to changes in the underlying determinants of beta.

  The measurement period varies across risk measurement services. For instance, the CRIF at AGSM uses 48 monthly observations and the default for Bloomberg's is 60 monthly observations. Beta estimates derived from these different sources can differ due to the time period selected.

- 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 only one listed business. 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.

- The difference in economies has led Gray and ABN Amro to recommend adjusting overseas betas when translating them to an Australian context. Gray recommends that US and UK estimates be divided by 0.72 and 0.88 respectively whereas ABN Amro recommends 0.88 and 0.97[46].

- Financial leverage can vary across industries, countries and firms. Since the equity beta is influenced by the degree of financial leverage in a firm, 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 available formula for doing so, which adds a further layer of complexity.

- Estimation error is high. Thus confidence intervals around beta estimates are quite wide and many betas will be insignificantly different from 1. In addition, betas vary over time and often, significantly so. Further evidence on this is presented at section 6.3.1.

- Beta estimation is subject to error due to thin trading. Market-wide events are not translated into observable effects on share prices until a trade occurs. Consequently the impact is observed at different times for companies that trade at different points in time. This induces autocorrelation in the market index and a bias for both 'thickly' and 'thinly' traded shares.

The key point is that beta estimates are just that. They assist in informing the process, but caution and judgment must be combined with the estimates to arrive at a beta of equity to determine the required rate of return for investors in gas distribution assets. Our estimate of the appropriate beta for Alinta's gas distribution system is the outcome of a number of processes guided by theory, evidence and practice.

The need for caution and judgment in estimating the cost of capital and the inputs has been recognised by the QCA which has stated:[47]

> *"[The] rate of return should reflect discretion and judgment based on realistic, commercial experience and understanding."*[48]

The QCA is consistent with the PC in recognising that it is better to be conservative than aggressive in setting the cost of capital:

> *"However, the Authority considers that in applying CAPM in a regulatory setting, regard must be had to the risks of allowing too low a rate of return in the sense that considerably more social harm could be caused by selecting too low a rate of return (leading to no investment in the network) than one that is in the upper bound of a reasonable range."*

[46] ABN Amro (1999) p. 3; op cit and Stephen Gray, "Response to Consultation Paper No. 4: Cost of Capital Financing", 4 June 1999, p. 14.

[47] Working Paper 4, p. 41, in the context of recognising adjusted rather than raw betas.

[48] Draft Decision, Chapter 15, page 194.

In some recent regulatory decisions the ACCC has argued that empirical analysis undertaken by the Allen Consulting Group ("Allens") indicated that the appropriate equity beta for regulated gas networks, based upon current observations of equity betas of comparable Australian companies (as the primary source of evidence), and to a lesser extent overseas companies, and re-levered for the regulatory standard gearing level of 60%, is around 0.70. By allowing an equity beta of 1.0 in recent decisions, the ACCC has therefore noted that it is adopting a conservative approach in light of the current market evidence.

The ACCC's characterisation of its approach as conservative or generous presumes some precision in the methodology and data used by Allens in estimating the equity beta. We note that in its report, Allens has refrained from making such a presumption. In particular, Allens states that whilst the evidence suggests an equity beta of 0.70 is appropriate, a revision downwards from the regulatory precedent of 1.0 may not be appropriate because "*it cannot be concluded definitively that this quality of evidence exists at this time."*[49] The report goes on to cite two major concerns with the data:

- first, the primary source of information is derived from listed Australian entities that comprises a group of only four firms, and of these, "*only two of the firms have been in existence long enough to permit the AGSM's-preferred four years of observations to be used, with the beta estimate of one of these – the Australian Pipeline Trust – being based upon only 21 observations…";* and

- second, Allens expressed concern over the uncharacteristically low levels of the re-levered equity betas for the US firms compared with past estimates. Allens note that it could be possible that stock prices in the US have been affected by recent events.

In forming our view on an appropriate beta for Alinta's gas distribution system, KPMG has considered market evidence on betas for Australian, UK and US comparables. This information is discussed in section 6.3.2.

6.3 Beta estimates

6.3.1 Analysis of recent regulatory decisions

According to CAPM theory, observed equity betas of companies are affected by the target level of gearing of a business. For this reason, it is often useful to conduct comparisons on the basis of a company's asset beta, which is derived by de-levering (i.e. stripping out the gearing component) the observed equity beta of the company. There are various "de-levering formulas" available to achieve this (refer Table 6 below). Some of these formulae also assume positive value for the debt beta, and others purport to take into account the value of imputation tax credits.

[49] Allen Consulting Group, "Empirical Evidence on Proxy Beta Values for Regulated Gas Transmission Activities", July 2002, page 42.

Table 6: Some alternative formulas for unlevering equity beta

Description	Formula
Equation 1: Simple formula	$\beta e = \beta a + (\beta a - \beta d)\ D/E$
Assumes active debt management policy, non-zero debt beta	OR
Credited to Brealey & Myers, "Principles of Corporate Finance", Fifth Edition	$\beta a = \beta e\ E/V + \beta d\ D/V$
Equation 2: Hamada formula	$\beta e = \beta a + (\beta a - \beta d)\ (1\text{-}T)\ D/E$
Assumes passive debt management, non-zero debt beta	
Equation 3: Appleyard and Strong, Non-zero debt beta	$\beta e = \beta a + (\beta a - \beta d)\ \{1\text{-}\ T[kd / (1+Kd)]\}\ D/E$
Equation 4: Monkhouse formula	$\beta e = \beta a + (\beta a - \beta d)\ \{1\text{-}\ Te[kd / (1+Kd)]\}\ D/E$
Modified version of equation 3, by replacing T with an effective corporate tax rate (Te) that is defined as: Imputation credits payout ratio X imputation credits utilisation rate X Statutory corporate tax rate	

Notes:
"Active" debt management refers to a debt management policy where the dollar value of debt is assumed to change each in such a way that the ratio of debt to enterprise value remains constant. "Passive" debt management refers to a debt management policy where the dollar value of debt is assumed to be fixed and held constant, with payments made on a predetermined basis. The WACC formula effectively assumes an ***active*** *debt management policy.*

Table 7 and Table 8 below provide a summary of betas and de-levering formulas assumed during recent regulatory reviews of gas and electricity distribution pricing. The information displayed below indicates that an equity beta around 1.0 has been adopted in a large number of regulatory decisions. In some cases, this has resulted from reliance placed on equity betas in other regulatory decisions, whilst in other cases, the equity beta value has been estimated from empirical analysis of implied asset and debt betas, and applying the de-levering formula.

Table 7: Beta values determined at recent gas network access arrangement reviews

Gas decision	Equity beta	Asset beta	Debt beta	De-levering formula
Moomba Sydney (2003)	1.00	Not reported	Not reported	Not reported
DBNGP (2003)	1.20	0.60	0.20	Simple
NT Gas (2002)	1.02	0.50	0.15	Monkhouse
GasNet (2002)	0.98	0.50	0.18	Monkhouse
Victorian Gas Distributors (2002)	1.00	0.40 – 0.54	0.00-0.23	Monkhouse
Average	**1.04**	**0.52**	**0.16**	

Table 8: Beta values at recent electricity network regulatory reviews

Electricity decision	Equity beta	Asset beta	Debt beta	De-levering formula
SPI PowerNet (2002)	1.00	0.40	0.00	Monkhouse
ElectraNet (2002)	1.00	0.40	0.00	Monkhouse
Envestra (2001)	1.10	0.50	0.12	Not reported
Powerlink (2001)	1.00	0.40	0.00	Monkhouse
Average	**1.00**	**0.425**	**0.03**	

It is also evident that regulators do not appear to have come to a landing on whether a zero or positive value should be adopted for the debt beta. The ACCC, for example, appears inclined towards positive debt betas in its gas decisions and zero values for debt betas in electricity decisions, with no justification given for this apparent difference in assumed values. In addition, some regulators adopt a "reverse-engineering" approach to estimating the debt beta using the CAPM formula whilst others have elected to adopt more complicated approaches. For example, the ESC in Victoria estimates the debt beta value by deducting the cost of the embedded default margin and an illiquidity premium from the cost of debt, prior to reverse-engineering the CAPM.

Ultimately however, the precise value of the debt beta does not distort the calculation of the resulting equity beta provided that the debt beta used for de-levering observed equity betas is also used when re-levering asset betas for the target level of gearing.

6.3.2 Market evidence

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. We have identified a selection of publicly listed companies in Australia, the USA and UK with activities that are comparable with the activities undertaken by Alinta's gas distribution system. Given that perfect comparability is impossible to achieve, inter-company comparisons will only provide guidance on the appropriate beta for a business.

We are also aware of the questions that exist in relation to the appropriateness of relying upon overseas betas and the issues associated with translating them into a "domestic" beta. Notwithstanding this, we consider that overseas evidence on beta may be useful as a secondary source of information in the analysis.

Table 9: Comparable company beta analysis

Company	Gearing	Equity beta	Asset beta Min	Asset beta Max
AlintaGas	35%	0.20	0.13	0.20
Australian Gas Light	33%	0.06	0.04	0.11
Australian Pipeline Trust	53%	0.77	0.36	0.47
Envestra Limited	79%	0.34	0.07	0.23
Energy South Inc	43%	0.24	0.14	0.22
Northwest Natural Gas	43%	0.35	0.20	0.29
Peoples Energy Corp	44%	0.54	0.30	0.39
Cascade Natural Gas Corp	42%	0.52	0.30	0.39
Laclede Group Inc	48%	0.58	0.30	0.40
Nicor Inc	29%	1.25	0.88	0.94
AGL Resources	44%	0.54	0.30	0.39
Atmost Energy Corp	49%	0.48	0.25	0.34
El Paso Corp	48%	2.32	1.20	1.30
NUI Corp	61%	0.05	0.02	0.14
Piedmont Natural Gas	33%	0.52	0.35	0.41
Southwest Gas Corp	59%	0.47	0.19	0.31
Southern Union Co	56%	0.80	0.35	0.46
WGL Holdings	38%	0.48	0.30	0.37
New Jersey Resources Corp	35%	0.32	0.21	0.28
RGC Resources Inc	52%	0.10	0.05	0.15
Northern Border Partners –LP	44%	0.30	0.17	0.26
Cheasapeake Utilities Corp	46%	0.10	0.05	0.15
Sempra Energy	48%	0.56	0.29	0.39
NiSource Inc	60%	0.64	0.26	0.38
Semco Energy Inc	71%	1.01	0.29	0.43
Williams Co Inc	60%	1.88	0.75	0.87
Enbridge Inc	48%	0.27	0.14	0.24
Transcanada Pipelines	45%	0.29	0.16	0.25
Pacific Northern Gas	62%	0.45	0.17	0.30
Terasen Inc	62%	0.22	0.08	0.21
National Grid Transco PLC	52%	0.50	0.24	0.34
Scottish & Southern Energy	20%	0.35	0.28	0.32
Viridian Group PLC	45%	0.20	0.11	0.20
Range			**0.02 – 1.20**	**0.11-1.30**
Average			**0.27**	**0.37**

Notes:

1 Equity betas represent raw equity betas sourced from Bloomberg, except for Australian equity betas which have been sourced from the March 2003 AGSM Risk Measurement Service.

2 The asset beta is obtained using the formula: $\beta a = (\beta e*E/V + \beta d*D/V)$. In applying this formula, we have calculated a range of values for the asset beta based on a zero debt beta and a debt beta of 0.20. The "min" values shown are consistent with a zero debt beta assumption and the "max" values shown are consistent with a debt beta of 0.20.

3 Gearing is calculated as an average of the gearing levels for the most recent two years for which reported data is available.

The comparable company analysis above indicates that the asset betas for gas transportation businesses falls within a range of 0.02 to 1.30[50]. Clearly, the most striking feature of the data in Table 9 above is the extent of variation in the observed equity betas and de-levered asset betas. This characteristic of the empirical data makes it difficult to comfortably form a view on what might be an appropriate asset and equity beta for Alinta's gas distribution system.

Empirical measurements of beta are also intrinsically volatile over time. Table 10 below, for example, sets out the betas of the four Australian publicly listed comparable companies[51] 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 four quarters. The figures shown in parentheses indicate the high-low ranges provided by the AGSM.

Table 10: AGSM equity betas

		Equity beta estimates measured over the 48 months ended			
Company	**Code**	**June 2002**	**Sep 2002**	**Dec 2002**	**Mar 2003**
AlintaGas (see note)	ALN	0.10	0.13	0.15	0.20
		(-0.37 to 0.58)	(-0.27 to 0.53)	(-0.23 to 0.54)	(-0.14 to 0.54)
Australian Gas Light	AGL	0.36	0.09	0.08	0.06
		(0.03 to 0.69)	(-0.21 to 0.40)	(-0.24 to 0.40)	(-0.24 to 0.36)
United Energy	UEL	0.25	0.18	0.25	0.08
		(-0.19 to 0.70)	(-0.29 to 0.65)	(-0.23 to 0.73)	(-0.37 to 0.53)
Envestra	ENV	0.59	0.31	0.33	0.34
		(0.32 to 0.86)	0.04 to 0.57)	(0.05 to 0.60)	(0.10 to 0.58)
Australian Pipeline Trust	APT	1.30	0.94	0.79	0.77
		(0.26 to 2.33)	(0.28 to 1.61)	(0.08 to 1.50)	(0.16 to 1.37)

Source: AGSM Risk Measurement Service, June 2002, September 2002, December 2002 and March 2003
Note: Betas quoted for APT are thin-trading adjusted betas. This was indicated as being appropriate under the AGSM calculations.
Note: AlintaGas equity betas are based on less than 48 months of data and therefore, should be interpreted with some caution. For example, the June 2002 equity beta is based on only 20 observations of monthly returns, which represents the minimum number of data points required by AGSM.

Due to the high degree of variation in beta estimates, some regulators have recognised that whilst in principle, it is appropriate to reflect recent market evidence in beta estimates, there are problems with the practice of relying solely upon such evidence for the purpose of estimating beta, particularly given that the information is used to set the cost of capital for the regulated business that will not be revisited for five years. For these reasons, recent decisions by the ACCC and Victoria's ESC have tended to place greater weight on betas adopted in other regulatory decisions, and have put correspondingly less weight on recent market evidence. This has resulted in equity betas defaulting towards a value of 1.0.

[50] There is strong evidence that betas are less stable for individual securities than they are for portfolios of securities. For this reason, it is preferable to estimate the beta of a company by examining the beta of a portfolio of companies operating in the same business, rather than relying solely on the beta of one company.

[51] The data we used for United Energy was before its recent ownership change which led to its delisting.

6.4 Systematic risk of gas distribution compared to a diversified portfolio

Given the tendency of Australian regulators to adopt equity beta values of around 1.0 for regulated networks, it is worth examining the relative level of systematic risk implied by an equity beta of 1.0 (at a gearing of 60% debt to total assets), with reference to the average level of systematic risk across the entire market (that is, an equity beta of 1.0 at the market average level of gearing).

As noted in Section 6.1 above, the equity beta is a function of:

- the undiversifiable (systematic) risk of the asset; and
- the level of debt (gearing) employed in the financing of the asset.

Consequently, when deriving estimates of the proxy equity beta from market data, or when comparing the equity beta values of two different firms, it is essential that appropriate adjustments be made for any differences in the levels of gearing employed by different firms.

Notwithstanding these fundamental principles of the CAPM, some stakeholders - including regulators - occasionally make invalid comparisons between the equity betas estimated for regulated companies, and the equity beta of the market as a whole. For instance, page 83 of the ACCC's Draft Decision on the Tasmanian Electricity Revenue Cap (September 2003) states:

> *"The ACCC has used an equity beta of one [and a gearing assumption of 60% debt to total assets] in its previous revenue cap decisions, suggesting that the Transmission Network Service Providers face the same volatility as the market. However, there is a view that gas and electricity transmission businesses are less risky as their earnings are more stable than the market portfolio - suggesting an equity beta of less than one."*

As already noted:

- It is invalid to directly compare the equity beta of a 60% geared entity with the market average equity beta of 1.0, because the average level of gearing employed in the market is likely to be substantially less than 60% debt to total assets.
- It is necessary to make adjustments for different gearing levels before making any direct comparisons of equity betas.

A valid basis on which to make such comparisons is to compute asset (ungeared) betas. This approach was adopted by the ESC (then Victorian Office of the Regulator-General) in its 1998 Gas Access Arrangements Review.[52] The ESC's 1998 analysis found that:

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[52] Office of the Regulator-General, Victoria, *Staff Paper Number 1: Weighted Average Cost of Capital for Revenue Determination - Gas Distribution*, 28 May 1998, page 66. A copy of the document is available at: http://www.esc.vic.gov.au/docs/Gas/wac98519.pdf

- the average level of gearing employed by a sample of 47 of Australia's top 100 listed companies was around 33% debt to total assets;
- this implied an average asset beta for the sample of around 0.7; and
- applying a gearing assumption of 60% debt to total assets to the sample produced an estimated equity beta of around 1.6.

In a more recent study, NECG estimated that an average asset beta of listed firms on the Australian Stock Exchange is around 0.64.[53] The conclusions of the analysis completed more recently by NECG are consistent with those of the Victorian regulator's 1998 work. Both analyses demonstrate clearly that an equity beta of 1.0 (at an assumed gearing of 60% debt to total assets) represents a level of systematic risk that is ***materially below*** the average level of systematic risk of the market, taking into account the average level of gearing employed in the market.

Given these considerations, we consider that an equity beta value of *no less than* 1.0 (at the benchmark gearing level of 60% debt to total assets) represents a fair and reasonable allowance for the systematic risk attributable to gas distribution. Given the views already adopted in a number of other regulatory decisions in Australia, we propose adopting an equity beta value of 1.0.

6.5 Conclusion

Having regard to the market evidence on betas that we have reviewed, our concerns as to the stability or robustness of the data, and our awareness that the WACC for Alinta's gas distribution system will apply for a five year regulatory period, KPMG considers that under current circumstances, it is reasonable to adopt an equity beta of **1.00**[54] for the purpose of estimating an appropriate WACC. This approach is consistent with the approach currently adopted by the ACCC and the ESC in Victoria.

Using the simple de-levering formula, and assuming a debt beta in the range of 0.0 to 0.20 and a gearing level of 60%, an equity beta of 1.0 would correspond with an asset beta in the range of 0.40 (zero debt beta) to 0.52 (debt beta of 0.20).

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[53] NECG, *2003 Review of the Draft Statement of Principles for the Regulation of Transmission Revenues: Submission to the ACCC for the Electricity TNSPs*, November 2003, page 5. A copy of the document is available at: http://www.accc.gov.au/content/item.phtml?itemId=419802&nodeId=file4005f8eccb970&fn=NECG%20Submission%20on%20behalf%20of%20TNSP's.pdf

[54] Estimated using the 'simple' formula.

7 Gearing

In selecting an appropriate capital structure for the purposes of estimating the WACC, it is often instructive 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 industry norm for regulated gas and electricity network businesses, as shown in Table 11 below.

Table 11: Gearing values adopted in recent gas and electricity determinations

Decision	Gearing (D/V)
Moomba Sydney (2003)	60%
DBNGP (2003)	60%
NT Gas (2002)	60%
GasNet (2002)	60%
Victorian Gas Distributors (2002)	60%
SPI PowerNet (2002)	60%
ElectraNet (2002)	60%
Envestra (2001)	60%
Powerlink (2001)	60%

As shown in Table 12 below the empirical evidence that we have reviewed suggests that the regulatory benchmark capital structure of 60% debt to total assets is reasonably consistent with market practice.

Table 12: Observed gearing (defined as year end debt to total enterprise value) levels of comparable companies

Company	2000	2001	2002	2003	Average
Australian Gas Light	37%	46%	40%	29%	**38%**
Australian Pipeline Trust	56%	54%	56%	50%	**54%**
AlintaGas	45%	38%	32%		**38%**
GasNet		67%	66%		**67%**
Envestra Limited	82%	78%	78%	72%	**78%**
Average	**55%**	**57%**	**54%**	**50%**	**55%**

Source: Aspect Financial Ratio Analysis, Annual Ratio Analysis; KPMG analysis

On the basis of the above evidence, KPMG has adopted a benchmark capital structure of **60%** for the purpose of estimating an appropriate WACC for Alinta's gas distribution system. KPMG also understands that a 60% gearing level has been adopted as a fixed principle under clause 38(1)(c) of Alinta's Access Arrangements. As such, the ERA is obliged to adopt a 60% gearing level for the purposes of determining an appropriate WACC.

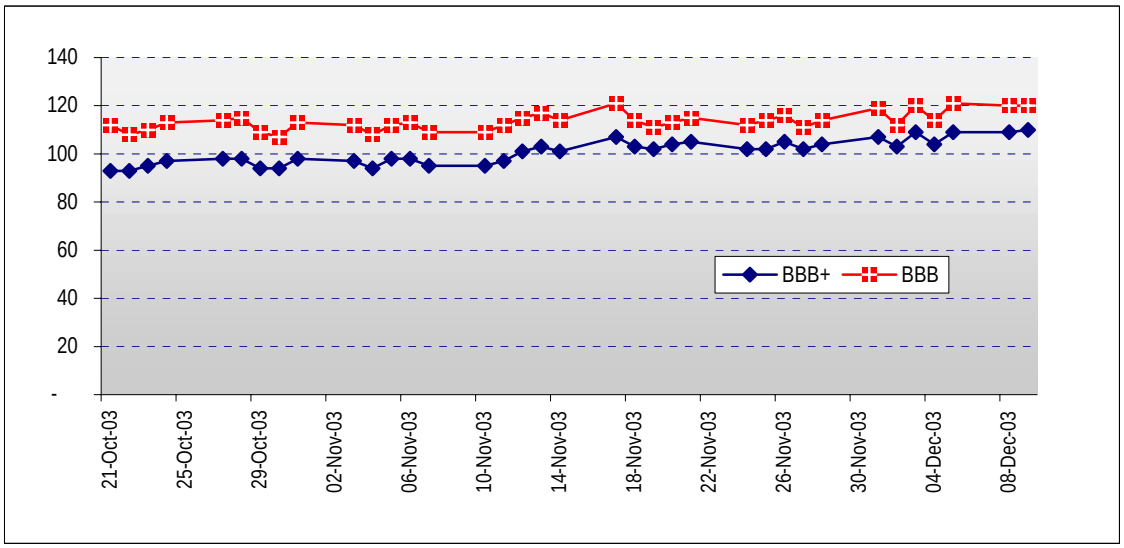
8 Debt margin

The cost of debt represents the cost of borrowing, which is based on the credit worthiness of the borrower. In estimating the debt margin, regulators have assumed that regulated businesses would seek to target an investment grade credit rating (i.e. BBB- or better) [55].

In estimating the debt margin for the purpose of estimating an appropriate WACC for Alinta's gas distribution system, KPMG has referred to the generic debt margin estimates for debt securities of 10 year maturity from CBA Spectrum, an online resource provided by the Commonwealth Bank. CBA Spectrum provides information on the pricing of various rated nominal bonds issued in the Australian capital market. For example, it is possible to obtain the pricing of bonds with a BBB or BBB+ credit rating, and from this, determine the implied margin at various dates.

The chart below illustrates the debt margin on BBB and BBB+ rated bonds based on data obtained from CBA Spectrum over the 20 days to 9 December 2003.

Figure 1: CBA Spectrum debt margins for BBB+ and BBB rated bonds



The data suggests that the debt margin for BBB+ rated bonds averaged over the 20 days to 9 December 2003 was **105 basis points**, and for BBB rated bonds, **116 basis points**.

Because many corporations seek to borrow from the nominal debt market and use CPI swaps to hedge the CPI component of the nominal cost of debt, it is appropriate to add in an

[55] The validity of this assumption is cross-checked in regulatory decisions by forecasting the projected cash flows implied by the decision, and computing various required financial ratios.

allowance for the cost of CPI swap hedging costs. An allowance of **20 to 50 basis points** has been estimated as being appropriate[56].

A second additional allowance relates to debt establishment costs. This represents the transaction costs associated with raising debt capital and is paid to the bank or financial institution arranging such debt. Such costs do vary with each transaction, however an indicative allowance is 10 to 20 basis points. We are aware that in the ACCC's recent regulatory decision on GasNet, an allowance of **12.5** was regarded as being appropriate for debt raising costs.

Adding these components together we consider that a debt margin in the range of **1.4% to 1.8%** is appropriate for Alinta's gas distribution system, given a gearing level of 60%. This estimate is consistent with debt margins adopted in recent regulatory decisions on gas networks as set out in Table 13 below.

Table 13: Debt margins adopted in comparable decisions

Decision	Regulator & Date	Debt margin
NT Gas	ACCC, Dec 2002	1.54%
GasNet	ACCC, Dec 2002	1.585%
Victorian Gas Distribution	ESC, Oct 2002	1.74%
Queensland Gas Distribution	QCA, Oct 2001	1.55%
Moomba-Adelaide Pipeline	ACCC, Sep 2001	1.2%

Sources:

ACCC Final decision, Access Arrangement proposed by NT Gas Pty Ltd for the Amadeus Basin to Darwin pipeline, 4 December 2002, page 83; ACCC, Final decision, GasNet Australia, Access Arrangements Revision for the Principal Transmission System, 13 November 2002, page 95; Essential Services Commission, Review of Gas Access Arrangements, Final Decision, October 2002, page 362; Queensland Competition Authority, Final Decision, Proposed Access Arrangements for Gas Distribution Networks: Allgas Energy Limited and Envestra Limited, October 2001, page 222; ACCC Final Decision, Access Arrangement proposed by Epic Energy South Australia Pty Ltd for the Moomba to Adelaide Pipeline System, 12 September 2001, page 40.

On the basis of the above, we thus consider that a debt margin in the range of **1.4% to 1.8%** to be the debt margin for the purpose of estimating an appropriate WACC.

The resulting pre-tax cost of debt would therefore fall within a range of **7.3% to 7.7%**.

[56] Refer page 125 of Citipower's submission to the ESC which is available at http://www.esc.vic.gov.au/apps/page/user/pdf/citicht4.pdf

9 Corporate tax rate

Under the conventional approach for determining WACC, the appropriate tax rate to assume is the cash or effective rate of company tax. This assumption recognises the fact that the existence of tax concessions such as accelerated tax depreciation may cause the actual tax payable by a company in a particular year (the "cash tax") to vary from the statutory corporate tax rate.

Whilst it is acknowledged that theory requires the use of a long run effective corporate tax rate, the difficulty of accurately estimating the effective tax rate over long time frames has generally been acknowledged by academics and practitioners.

For the purpose of revenue determination, we consider that the appropriate tax rate to adopt is the statutory corporate tax rate. Notwithstanding that differences between taxable profit and accounting profit will invariably result in the cash tax rate in any given year being more or less than the statutory corporate tax rate, when considered over the life of the assets, the cash tax rate is likely to approximate the corporate tax rate. Given that the underlying gas distribution assets owned by Alinta are long-lived assets, we consider that it is appropriate to adopt the current corporate tax rate of 30% in determining WACC. We note that IPART has recently adopted the statutory corporate tax rate as the applicable tax rate for the purpose of calculating a pre-tax real WACC in its current review of electricity distribution prices in NSW.

10 Value of imputation credits

10.1 Introduction

Under Australia's dividend imputation system, domestic equity investors receive a taxation credit (i.e. a franking credit) which is attached to any dividends paid out of after-tax company returns. This franking credit, which reflects the amount of tax that has been paid by the company on each dollar of dividend, may be used to offset the personal tax of the investor, and hence, represents additional cash flow to the investor after-company and personal tax. Without the franking rebate, shareholders would, in effect be paying personal tax on profits that had already been subject to company tax. In a sense, therefore, franking credits effectively represent personal tax collected or withheld at the company level.

In the modified CAPM formula, the value attributed by an investor to imputation credits is represented by "gamma" and denoted by γ. Officer, who effectively re-cast the textbook cost of capital formulation into one that accommodates an imputation tax system, describes the notion of γ in the following way:

> *"… γ is the proportion of tax collected from the company which gives rise to the tax credit associated with a franked dividend. This franking credit can be utilised as tax credit against the personal tax liabilities of the shareholder. γ can be interpreted as the value of a dollar of tax credit to the shareholder."*[57]

In a footnote to the above statement, Officer provides some additional explanation of γ:

> *"For example, if the shareholder can fully utilise the imputation tax credits then ("value") γ = 1, e.g. a superfund or an Australian resident personal taxpayer. On the other hand a tax exempt or an offshore taxpayer who cannot utilize or otherwise access the value in the tax credit will set γ = 0. Where there is a market for tax credits one could use the market price to estimate the value of γ for the marginal shareholder, i.e. the shareholder who implicitly sets the price of the shares and the price of γ and the company's cost of capital at the margin, but where there is only a covert market, estimates can only be made through dividend drop-off rates…"*

It is clear then that different investors will attach a different value to γ, depending on whether they can access the value of imputation tax credits. Most firms, particularly large firms, will have an investor base that typically comprises a mix of investors, some of whom would be able to access the value of credits, and some of whom would not.

[57] Officer, R. R., 1994, The Cost of Capital under an imputation tax system, Accounting and Finance, May, pp 1-17, page 4.

10.2 Gamma estimates

10.2.1 Empirical studies

The table below summarises the various estimates of γ 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 Australian market.

Table 14: Empirical estimates of the value of imputation credits

Study	Methodology	Estimated value of γ
Hathaway & Officer (1992)	Dividend drop-off	58% - 82%
Brown & Clarke (1993)	Dividend drop-off	72%
Bruckner, Dews and White (1994)	Dividend drop-off	33.5% - 68.5%
Hathaway & Officer (1999)	Analysis of tax statistics	48%
	Dividend drop-off	49% (large co.) 44% (all companies)
Walker & Partington (1999)	Dividend drop-off	88% or 96%
Cannavan, Finn & Gray (2001)	Inference from value of individual share futures and low exercise price options	0%
Chu & Partington (2001)		Close to 100%[58]
Twite & Wood (2002)	Inference from analysis of trading in derivatives	45%

Sources:
Hathaway, N. and R. R. Officer, 1992, The Value of Imputation Tax Credits, Unpublished manuscript, Graduate School of Management, University of Melbourne; Brown, P. and A. Clarke, 1993, The Ex-Dividend day behaviour of Australian share prices before and after dividend imputation, Australian Journal of Management, 18, 1, pp. 1-40; Bruckner, K. N. Dews and D. White, 1994, Capturing value from dividend imputation, McKinsey & Company; Hathaway, N. and R. R. Officer, 1999, The Value of Imputation Tax Credits, Unpublished manuscript, Graduate School of Management, University if Melbourne; Walker, S. and G. Partington, 1999, The Value of Dividends: Evidence from cum-dividend trading in the ex-dividend period, Accounting and Finance, vol 39, p293;Cannavan, D., F. Finn and S. Gray, 2002, The value of imputation tax credits, working paper, University of Queensland and Duke University; Chu, H. and G. Partington, 2001, The market value of dividends: Theory and evidence from a new method, working paper, University of Technology, Sydney, p39; Twite, G. and J. Wood, February 2002, The Pricing of Australian imputation tax credits: Evidence from individual share futures contracts, working paper.

[58] 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.

10.2.2 Other methodologies

As is evident from the above table, the existing empirical evidence on the likely value of γ is dominated by studies that employ a methodology known as dividend drop-off analysis. Under this methodology, the value of imputation credits 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.

In addition to dividend drop-off analysis, other methodologies that have been employed to estimate the value of imputation credits include:

- analysis of national taxation statistics.

  This technique was used by Hathaway & Officer (1998). The authors determined the ratio of franking credits distributed each year to the amount of company tax paid each year (i.e. the "access rate") and proportion of franking credits distributed by companies that are actually claimed or redeemed by investors (i.e. utilisation rate) to infer the value of imputation credits. The value of imputation credits is assessed from the product of the access rate and the utilisation rate.

- specially developed equilibrium pricing models.

  Wood (1997) estimates the value of imputation credits by treating Australia as segmented from world markets, using a specially developed equilibrium pricing model.

- comparison of differences in the pricing of certain derivative securities and their underlying shares.

  This is a recent methodology that has been employed by Cannavan, Finn and Gray (2001). They 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.

  The authors consider the methodology used in their study provides a better indication of the value of imputation credits for large companies, as compared with dividend drop-off analysis, since:

  - the analysis of value can be undertaken each time an ISF or LEPO trades within one minute of a trade in the underlying share, and hence accommodates a larger sample size that brings statistical benefits and enables calculation to be done on a company-by-company basis;

- the analysis is not confined to ex-dividend dates, when share price data is often confounded by the activities of short-term arbitrage traders; and

- many dividend drop-off studies suffer from a statistical problem known as multicollinearity which makes it difficult to separate the value of cash dividends from the value of the imputation credits. The authors allege that the important consequence of this work is that the results from many earlier studies on the value of imputation credits employing this technique are highly questionable. In particular, the authors state that:

  "…in contrast to conventional wisdom, for large companies with substantial foreign investment the market value of these tax credits is close to zero after recent changes to tax laws that effectively prevent their transfer."

10.3 Regulators' views

10.3.1 Basis of regulatory views

10.3.1.1 IPART

Up until recently, IPART - unlike its counterparts in other Australian jurisdictions - has adopted a range of 30% to 50% for the value for imputation credits. IPART has considered much of the evidence shown in Table 14 in the past, and concluded that in light of this evidence as well as considerations of foreign versus domestic ownership, a value for imputation credits between 30% and 50% is reasonable.

KPMG is aware that in its recent draft determination on the 2004 NSW electricity distribution price review, IPART has proposed to adopt a point estimate of 50% for imputation credits. We have examined IPART's justification for its decision and believe that the Tribunal has based its decision on erroneous evidence.

We note, in particular, that IPART's decision is based upon the evidence set out in Table A7.23 of the draft determination which is reproduced in Table 15 below.

Table 15: Extract from Table A7.23 of the Draft Determination

Study	Method	Period	Gamma
Cannavan, Finn & Gray	Futures and LEPOs	Futures: 1994-99 LEPOs: 1995-99	Nil
Brucker, Dews & White (1994)	Dividend drop-off	1987-1990	0.335
Twite & Wood (2002)	Derivatives prices	16/05/94 – 31/12/95	0.45
Hathaway & Officer (1999)	Aggregate taxation statistics	1989/90 – 1994/95	0.6
Hathaway & Officer (1999)	Dividend drop-off	1/1/85 – 30/06/95	0.63
Chu & Partington (2001)	Rights issues	01/91 – 12/99	Close to 1

However, our review of the studies quoted in Table 15 has indicated that the values of "gamma" attributed to the Hathaway & Officer (1999) study are incorrect. Based on our review, the correct value based on the aggregate taxation statistics methodology should be 0.48 and the correct value based on the dividend drop-off methodology should be 0.44[59].

KPMG considers that had the correct figures been taken into account, IPART would not have been justified in concluding that the evidence reviewed supported an increase to a point estimate of 50%, particularly given the concerns that IPART noted in relation to the study by Chu & Partington (2001).

10.3.1.2 Other regulators

Regulatory decisions issued by regulators other than IPART to date have taken a more aggressive approach to support a value for γ of 50%. Both the ESC and the ACCC have stressed in various decisions that a value of γ of 50% represents the minimum value that they consider should be attributed to imputation credits, given that previous empirical evidence provides more support for a value above 50% than below it.

10.3.2 The case for and against a higher value for gamma

The case for attributing a higher value for gamma is framed largely around the form of CAPM adopted – whether world equity markets are integrated or segregated - and thereby, the requirement for consistency with the identity of the underlying investor for the purposes of estimating a value for gamma. For example, it has been argued by regulators such as the ACCC and ESC, that it is inconsistent to adopt a value for imputation credits that assumes the presence of foreign investors if a domestic CAPM – which implies world equity markets are segregated - is adopted.

This argument is explained by the ESC, by reference to a submission by Dr Martin Lally, as follows:

> *"… a submission from Dr Lally argued that adopting an assumption for gamma as low as 0.5 implied an assumption that a large portion of the franking credits remain unutilised, which can only reflect an assumption that foreigners have a significant share in the Australian equity market. He commented that this is inconsistent with a domestic version of the CAPM that the Office has adopted, and that the comments received in relation to the treatment of foreign investors argue for the use of an international version of the CAPM."*[60]

The ESC went on to outline Lally's recommendation for the cost of capital to be first calculated assuming complete segregation of markets and then assuming complete integration of markets. To the extent that the results from the two approaches differ, then a value that reflects the strength of one's belief about these two models should be adopted.

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[59] Refer Hathaway & Officer (1999), page 3 and Table 2, page 18.

[60] ORG, Final Decision, Electricity distribution price determination 2001-2005, Volume 1, Statement of Purpose and Reasons, page 134.

Lally suggested that in moving from an assumption of complete segregation to complete integration, three changes would be required – gamma, the equity market risk premium and beta. The value of γ would move from around 80%[61] assuming complete segregation of markets to 0% assuming complete integration of markets. The equity market risk premium was likely to be lower but the direction of the change in beta is unclear. Lally suggested it was likely that the outcome could be a lower cost of capital, as was the case in a separate study that he had conducted in relation to New Zealand firms[62].

The arguments put forward by Lally have been extensively analysed by Professor Stephen Gray[63]. Gray acknowledges that in theory, it may be more appropriate to use an international CAPM. Existing empirical research also suggests that the performance of ICAPM models is superior to that of the domestic CAPM. However, due to the complexity of such models, the adoption of such a model would lead to significantly more debate amongst stakeholders about methodologies and interpretation since there are many versions of the international CAPM and some versions require a substantially greater number of inputs.

As a compromise position, Gray suggests that it may be possible to retain the use of a domestic CAPM notwithstanding it is theoretically incorrect, but to calculate an upper bound for the error that is induced by using the 'wrong model'. Using a model proposed by Karolyi and Stulz (2001), Gray estimates this error bound at 5%. This error bound is considered to be of the same order of magnitude as the error that would arise from imprecise estimation of parameters that would normally arise in applying the CAPM. In other words, use of an international CAPM will not produce errors that are any greater than the error that might result from using a purely domestic CAPM.

It is also worth noting that it remains common market practice to assume that imputation credits are not fully valued or not valued at all[64]. 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

[61] Dr Lally's submission (downloadable at http://www.esc.vic.gov.au/docs/electric/lally.pdf) initially referred to γ moving from 100% (assuming complete segregation) to 0% (assuming complete integration) however, the ORG reported in footnote 636 of the Electricity Distribution Price Determination that Lally's definition of γ needed to be modified to take into account the payout ratio of franking credits. Using Hathaway & Officer's estimate of 80% for the payout ratio, the ORG estimated a value of γ at 80%.

[62] Dr Lally argues that in adopting his preferred approach, the movement from an assumption of complete segregation to an assumption of complete integration leads to changes not only in the value of γ, but also to changes in beta and the market risk premium. In particular, he suggests that the value of γ would fall, the value of beta may fall, and the MRP would fall. The first of these effects would lead to a rise in the cost of capital, whereas the latter two may or would lead to a fall. Dr Lally's own research on New Zealand firms suggests that the net effect of these factors is to lower the cost of capital for these firms.

[63] S. Gray, Issues in Cost of Capital Estimation, 19 October 2001, op cit.

[64] 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.

made no adjustment for dividend imputation. Only six reports made an adjustment to reflect dividend imputation[65]. 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."[66]

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.

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.

10.3.3 The benchmark investor assumption

We note that there are problems with the definition of the benchmark investor that is used to support the views held by a number of regulators on the value of γ.

To date, the value of γ has been set on the basis that the actual tax residence of the owners of the regulated entity is irrelevant for revenue setting, and that the appropriate benchmark investor should be an "Australian" investor. The ESC has previously suggested that if the actual identity of the owner is used, consistency would require that the tax position, beta and gearing of the actual owner, amongst other things, be reflected in the value of γ. We consider such comments to be unwarranted since they effectively broaden the scope of γ to take into account any other tax concessions available to the investor, that have the effect of reducing or offsetting the corporate tax liability of the regulated business.

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

[66] Lonergan, W., Autumn 2001, op cit, page 14.

It is our view that such an argument is flawed, since even in a benchmark 'Australian investor' framework, it could be taken to the same extreme situation where effectively all tax concessions available to an individual investor represents a reduction in what Officer has described as the "pure" corporate tax.[67] We believe that the extension to the scope of γ that is implied by the above statements by the ESC and the ACCC reflects a fundamental misunderstanding of the concept. γ derives its value from the payment of corporate taxes (and hence, generation of imputation credits) by the firm, that will effectively be rebated to the investor. γ cannot possibly capture all other tax concessions available to an investor as there is no relationship between these other tax concessions and the corporate tax paid by the regulated business, as there is between the imputation credit rebate and corporate tax paid.

As for the argument that it would be necessary to take into account the beta and gearing that would be applicable to a foreign investor, we note that information on such parameters drawn from comparable overseas companies are already considered by regulators in assessing an appropriate value for such parameters. We have not previously seen, in their assessment, any adjustments made to adapt such data to an "Australian investor" perspective. In light of this, it is difficult to understand how the parameters would change if a foreign investor assumption were to be adopted.

In theory, the argument regarding the most appropriate benchmark investor assumption is somewhat irrelevant. This is because the CAPM measures the marginal cost of capital or the required rate of return from the perspective of the marginal investor. We have previously highlighted comments from Officer that the marginal investor is the one who implicitly sets the price of shares, the value of γ and the company's cost of capital at the margin.

The broader question of what value to attribute to γ therefore, should be defined as *what proportion of taxes paid at the corporate level is really a pre-collection of the personal tax of the **marginal** investor*. This definition can be simply stated in theory. However, in practice, determining the identity of the marginal investor can be difficult.

One view that has been expressed by Officer is that the marginal investor – the one who sets the price of Australian stocks - is the foreign investor. The argument is expressed in terms of whether Australia is a price-taker or price-maker in capital markets.

> *"In an open capital market, such as Australia, where the size of the market relative to offshore markets implies it is a price taker, we would not expect the cost of capital to change – the arguments to support this proposition have been made in Officer (1988)."*[68]

Cannavan, Finn and Gray (2001) also support this view:

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[67] Other than γ, the only other cost of capital parameter that could capture the tax concessions available to an investor is in the corporate tax rate. However, it is a well known valuation concept that the relevant cost of capital is that of the target business, not the investor. Hence, the only tax circumstances that are relevant for the corporate tax rate parameter, are those that pertain to the business.

[68] Officer, R.R., 1994, The cost of capital of a company under an imputation tax system, Accounting and Finance, May, pp. 1-17.

> *"As Officer (1988) points out, however, Australia is a small open economy so the cost of capital for Australian companies will be determined by supply and demand conditions in world capital markets. That is, large companies are unlikely to be financed solely by resident investors – at least some non-resident investment is likely to be required…*
>
> *In this case, resident investors will receive capital gains, cash dividends and imputation credits and non-resident investors will receive capital gains and cash dividends only. Since resident investors receive a higher return (via the imputation credits granted by the local tax system), they will the first to invest. The marginal investor will then be a non-resident, who will receive a return in the form of capital gains and cash dividends that just meets their required return…"*

The important consequence of the marginal investor being a non-resident / foreign investor is that the value of γ is likely to be closer to zero than the 50% that is currently being used in regulatory decisions. In Cannavan, Finn and Gray (2001), the authors state that:

> *"…prior to the introduction of the 45-day rule, imputation credits for the average company are valued at around 33 cents in the dollar by the representative investor. This is consistent with Wood's (1995) estimate of 32% from an analysis of listed warrants using a different empirical technique. This is consistent with the representative investor being a foreign investor who can extract some, but not all, value from imputation credits by transferring them to domestic tax-paying investors…*
>
> *… we cannot reject the hypothesis that imputation credits are worthless to the marginal investor after the introduction of the 45 day rule."*

The use of a marginal investor concept for attributing an appropriate value to γ is not only underscored by basic CAPM concepts, but is also dictated to a large extent by the empirical evidence that is available on the likely value of γ. Empirical studies implicitly measure the value of γ from the perspective of the marginal investor in the Australian market because:

- this basis of measurement is evident from the underlying data analysed in each study, which is share price data on Australian companies, all of whom would display a mix of investors on their share register; and
- it is accepted that share prices are set by the marginal investor.

As a result, the measure of γ that emerges from empirical studies of this nature can only represent the value of γ to the marginal investor. To the extent that Australia is a price-taker in world markets, the marginal investor will be a foreign investor.

Importantly, none of these studies focuses on companies that have purely Australian-resident shareholders. To support the view of some regulators that γ should reflect 'average Australian ownership', evidence of the value of γ using data from companies with shares held solely by Australian resident shareholders would be required. We are not aware of any

empirical studies on γ which utilise such data. It is therefore not possible for regulators to maintain a 'private Australian ownership' assumption and draw support from available empirical evidence (as provided by the studies listed in Table 14) that measures the value of γ to the marginal investor in the Australian stockmarket, who is most likely a foreign investor[69].

The only alternative that leads to an internally consistent estimate of the cost of capital is to adopt a value of γ that reflects the value of imputation credits to the marginal investor[70].

10.4 Conclusion

Despite additional research in this area, a considerable degree of uncertainty continues to surround the estimation of the appropriate value for γ. It would therefore seem appropriate for the ERA to err on the side of conservatism by adopting a lower rather than higher value for γ.

We do not support the views promulgated by regulators such as the ACCC, that imputation credits are fully valued by the average Australian investor. The value of γ needs to take into the value of distributed and undistributed franking credits. The fact that companies do not distribute 100% of their credits immediately as such credits are generated means that γ cannot be 100%. Undistributed franking credits are likely to have some value, however, this value would depend upon the timing of their distribution. The longer they are retained by the company, the lesser will be their present value to shareholders.

The "average Australian investor" concept that has formed the basis for regulators' assumptions on gamma is a poorly defined concept. Furthermore, it is difficult to support such concepts when the existing empirical evidence on the value of imputation credits reflects the value of imputation credits from the perspective of the marginal investor. This is necessarily the case since empirical studies utilise share price data as the basis for estimating the value of γ and share prices are set by the marginal investor.

The identity of the marginal investor is difficult to determine in practice. However, for many large companies, particularly those with a significant proportion of foreign investors, there is evidence to support the view that the marginal investor is a foreign investor, who is largely unable to extract any value from imputation tax credits. Accordingly, the most defensible value for γ is one that approaches zero, rather than 100%.

To summarise the position on γ from recent developments, KPMG considers that:

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[69] For example, the ACCC states in its final decision on the Moomba to Adelaide Access Arrangement (September 2001) that "*…the Commission's choice of gamma will be a matter of judgement based on available empirical evidence*". (page 42)

[70] Marginal investor concepts are applied by regulators in estimating other WACC parameters (e.g. cost of debt and risk free rate).

- 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 zero may be more valid assumption for γ than a value of 50%; and

- the use of a domestic CAPM is arguably inconsistent with the assumption underlying the valuation basis for γ, however, the potential errors from this inconsistency is not expected to be improved by adopting the alternative of an ICAPM model.

We expect that a more conclusive view on the value of gamma will only be formed over time, as more research is undertaken in this area. Until this occurs, we consider that it would be appropriate for the ERA to adopt a value for imputation credits within a range of **30% to 50%**.