KPMG

United Energy Distribution

The Weighted Average Cost of Capital

2006 Electricity Distribution Price Review

October 2004
This report contains 40 pages
UE04-WACC1013-MAR

Contents

1 Estimating the weighted average cost of capital

1.1 WACC formulation

The WACC formulation that the ESC prefers is a real vanilla WACC[1] which is defined by the following formula:

$$\textit{Real vanilla WACC} = \textit{Real } K_e \textit{ x } E/V + \textit{Real } K_d \textit{ x } D/V$$

The use of a real vanilla WACC formulation requires the calculation of the benchmark cost of tax as a separate cash flow item.

CAPM concepts have been applied in estimating the parameter values in the above formula:

- Real K_e represents the real required return on equity and is estimated as the sum of the real risk free rate of return (RR_f) and a risk premium that reflects the return on a well-diversified portfolio of risky assets over the risk free rate (known as the market risk premium) scaled by the "beta" (β_e) of the asset:

$$\mathbf{K_e = RR_f + \beta_e * Market\ Risk\ Premium}$$

- Real K_d is the real required return on debt and is estimated as the sum of the real risk free rate of return (RR_f) and a debt margin.

- E/V and D/V represent the weights attached to equity and debt capital in the context of the optimum capital structure of the business.

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:

- 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[2];

- 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;

[1] We note that regulators have often described this WACC definition as a real after-tax WACC. We consider that this terminology gives rise to confusion given what financial markets conventionally regard as an "after-tax WACC". For the purposes of this submission, we have used the phrase "real vanilla WACC" to describe the WACC estimated in this submission.

[2] 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.

- 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.

1.2 Summary of parameter values adopted

Table 1 below lists the values adopted for each parameter of the WACC formula, and provides a brief statement of the basis of the estimated value.

Table 1: Summary of parameters used to estimate the WACC

Parameter	Value	Basis
Real risk-free rate	2.8%	This estimate is based on the 20 day average ended 30 September 2004.
Market Risk Premium	6% - 8%	The long term historical average for Australia has been used as the basis for estimating the MRP because it is demonstrably more statistically robust than the other approaches available.
Equity Beta	1.00	The choice of an equity beta of 1.0 reflects consideration of the following factors: • the challenges of beta estimation in general and the guidance from a theory that is not strongly supported by empirical evidence; • the challenges of beta estimation derived from 'empirical' analysis, given the limited information available and the high measurement errors associated with these estimates; • the high degree of volatility observed in current empirical estimates; • the collective outcomes of recent regulatory decisions in Australia in relation to gas and electricity distribution; and • the fact that the equity beta is used to set a rate of return that will apply for a period of five years.
Gearing	60% debt to total market value	This estimate is consistent with available market evidence and regulatory precedents in Australia.
Debt margin	151bp – 171bp	This value represents the mid point of the range of the cost that would currently be incurred by an efficiently-financed BBB to BBB+ rated, 60% geared gas distribution business. The margin includes an

Parameter	Value	Basis
		allowance for debt establishment costs.
The value of imputation credits	0% - 50%	This is based on independent empirical evidence of the value of imputation tax credits to the marginal investor in large companies in Australia with substantial foreign investment.
Treatment of diversifiable risks	Expected value cash-flows estimated	It is assumed that diversifiable risks are treated in the expected cash flows, where possible.

The above point estimates for the underlying parameters results in:

- a real cost of equity in the range of 8.8% to 10.8%;
- a real cost of debt in the range of 4.3% to 4.5%; and
- a real vanilla WACC in the range of **6.1% to 7.0%.**

2 Real risk-free rate of return

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.

2.1 Choice of proxy for the risk free asset

The real risk free rate has been estimated by reference to the yield on an Index Linked Government Bond with a term to maturity corresponding with the nominal 10 year government bond which financial markets regard as the benchmark security. The current benchmark 10 year nominal government bond is the April 2015 government bond.

There is currently no equivalent Index Linked Government Bond maturing in April 2015. Accordingly, we have estimated the real risk free rate by interpolating between the August 2010 and August 2015 Index Linked Government Bond yields.

2.2 Period of averaging for risk free rate

Consistent with the ESC's practice, a 20 day period of averaging has been adopted when measuring the risk free rate of return. We understand that 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.

2.3 Inflation

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

2.4 Conclusion

For the purposes of estimating an appropriate WACC, a real risk free rate of **2.79%** has been adopted. This rate reflects the yield on an Index Linked Government Bond with a term to maturity corresponding with the April 2015 benchmark 10 year nominal government bond. Given that there is currently no Indexed Linked bond maturing in April 2015, 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 30 September 2004.

For the purpose of estimating the expected inflation rate, a nominal risk free rate of **5.42%** has been adopted. This rate reflects the yield on 10 year Commonwealth Government bonds, as currently represented by the benchmark April 2015 Commonwealth Government Bond,

averaged over the 20 days to 30 September 2004. The real risk free rate of 2.79% and the nominal risk free rate of 5.42% together imply an expected inflation rate of around **2.56%.**

3 Market risk premium

3.1 Introduction

We recommend that the market risk premium ("MRP") be estimated by reference to long term historical averages. In its previous determinations, the ESC has acknowledged that despite some weaknesses, this approach remains the most commonly advocated approach for estimating the expected MRP[3]. In addition, we consider that the ESC should rely upon Australian data on the MRP rather than data on other markets (e.g. the USA) given the structural and other differences between equity markets. The evidence that we have reviewed suggests that the appropriate range for the Australian 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 ex-ante approaches (e.g. dividend growth model). However, we place a much lower level of confidence on such estimates – and therefore a much lower degree of weight on the estimates produced by other methodologies - given our concern that they are likely to introduce even greater estimation error than the historical estimates.

Furthermore, the credibility of attempts to predict the forward looking MRP using ex-ante approaches can be questioned given the fact that economic theory has failed to explain why predicted MRPs (based on what economic theory or fundamentals suggests the MRP should be) consistently understate the actual measured MRP. This phenomenon has been dubbed the 'equity premium puzzle' in financial economics literature. As the founders of the puzzle have noted:

> *"The puzzle cannot be dismissed lightly, since much of our economic intuition is based on the very class of models that falls short so dramatically when confronted with financial data. It underscores the failure of paradigms central to financial and economic modelling to capture the characteristics that appear to make stocks comparatively so risky."*[4]

Furthermore:

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

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

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

[3] ESC, 2003 Victorian gas access arrangements determination, page 322.
[4] Mehra, R., and E. Prescott, The Equity Premium in Retrospect, Forthcoming in the Handbook of Economics of finance, Edited by G.M. Constantinides, M. Harris and R. Stulz, North Holland, Amsterdam.

on the appropriate value for the MRP. His paper, which strongly supported the adoption of an MRP estimate of **no lower than 6% to 7%**[5]. Gray's paper also discussed the problems associated with alternative approaches for estimating the MRP.

The evidence on the MRP has been presented and reviewed in numerous regulatory decisions since the ESC's first Gas Access Decision in 1998. A summary of this evidence and surrounding discussion is set out in Sections 3.2 and 3.3 below.

3.2 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%[6]. Table 2 below sets out the measured historical MRP in Australia reported in various studies and research.

Table 2: 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[7]	1974-1998	4.8
Geometric average	1974-1998	2.8
Arithmetic average, incl October 1987[8]	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[9]	1882 – 2001	7.2
Officer[10]:		

[5] 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
[6] 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.
[7] 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
[8] 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.
[9] Refer ABN AMRO (1999) Op cit
[10] 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.

Source	Period	Risk premium (%)
Arithmetic mean	1946-1991	6.0 to 6.5
Hathaway (1996)[11]		
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)[12]		
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*

In interpreting the evidence presented above, it is worth noting that the MRP estimates show some degree of variation but has remained largely within the 6% to 8% range. Whilst this might appear to be a relatively wide range, we do not find the variance disconcerting since we expect that the actual MRP will vary from one point in time to another. When averaged over long time frames however, we expect that such variation will be smoothed out.

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[13]. In its final determination on the 2003 Victorian gas access arrangements, the ESC estimated that the inclusion of the average value of franking credits since 1987 would add 0.2 percentage points onto the long term average. However, in the minutes to the Trinity Best Practice Committee Meeting which discussed the results of the Jardine Fleming Capital Markets Survey 2001[14] (as referred to in Professor Gray's paper which forms Attachment A of a response by TXU to the ESC's Position Paper on the 2003 Victorian gas access arrangements review), Professor Robert Officer estimated that historic estimates of the MRP could be biased downwards by as much as 1%:

[11] Refer ABN AMRO (1999), Op cit
[12] Dimson, Marsh and Staunton, "Twelve Centuries of Capital Market Returns", Business Strategy Review, 2000, Vol 11 Issue 2
[13] In its final determination on the 2003 Victorian gas access arrangements, the ESC noted that the inclusion of the average value of franking credits since 1987 is estimated to add 0.2 percentage points onto the long term average (refer page 324 of the 2003 determination).
[14] Jardine Fleming Capital Partners Limited, The Equity Risk Premium – An Australian Perspective, Trinity Best Practice Committee, September 2001.

> *"…the historic ERP from 1988 is biased downwards. Therefore, if you assume that franking credits represent about 20% of total stock returns, the historic ERP could be biased downward by as much as 1%."*[15]

The empirical study by Dimson, Marsh and Staunton (2000) referred to in Table 2 provides an Australian series from 1900 to 2000[16] 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 (2000)[17]. 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."*

The Welch paper is discussed in the paper written by Gray (2001) which forms Attachment A to a submission by TXU to the ESC's Position Paper.

The data presented below, and discussed in Gray's paper, reinforces our view 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.

We also recommend taking a longer view of the MRP as the former leads to a lower standard error of the estimated MRP. Table 3 below shows that over the period 1883 – 2000, the average Australian MRP (as previously estimated by Professor Stephen Gray) is 7.3% with a standard

[15] This increment of 1% estimated by Officer is also consistent with the increment that Mercer Investment Consulting advised that it would apply to the equity premium to account for imputation credits. Refer page 330 of the ESC's 2003 Review of Gas Access Arrangements, Final Determination.
[16] The source data is not independent of other Australian studies eg AGSM, Officer
[17] Ivo Welch (2000), "Views of Financial Economists on the Equity Risk Premium and Other Issues", Journal of Business, 17 pp501 - 537

error of 1.56%, whereas the estimate from 1971 – 2000 is 4.8% but is much less reliable with a standard error of 4.4%. As Gray points out, the 4.8% average obtained for more recent decades (i.e. 1971-2000) is not statistically different from the longer term historical average.

Table 3: 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, we are not convinced that the ESC 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 ESC should adopt a conservative approach that is consistent with the long term Australian empirical evidence.

3.3 Views of Australian academics

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."*[18]

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%"*[19]

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

> *"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."*[20]

Finally, Brealey, Myers et al recommend an MRP of 8% for Australia.[21]

[18] Hathaway, N. "Market Risk Premium", MBS seminar entitled Cost of Capital: Imputation Credits and other issues.
[19] 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.
[20] Gray, S (2001), Issues in Cost of Capital Estimation, downloadable at http://www.esc.vic.gov.au/PDF/2001/SubUQBS_GasPosPapOct01.pdf.

3.4 Other regulatory decisions in Australia

With the exception of the NSW regulator, IPART, regulators around Australia have consistently adopted a point estimate of 6% for the MRP. In IPART's recent NSW Electricity Distribution Pricing 2004/05 to 2008/09 decision, the NSW regulator adopted a range of 5% to 6% for the MRP.

We question the credibility of IPART's choice of values for the MRP. In particular, it is difficult to escape the impression that the Tribunal has been selective in the basis for its decisions and its choice of values for the MRP and the value of imputation credits. For example, the Tribunal has justified its choice of an MRP range of 5% to 6% on the basis that "*...there is insufficient evidence to change the market risk premium range from that used in the 1999 determination*."[22] If the weight of available evidence (as presented in Table A7.23 of IPART's draft determination) is a principle to be consistently applied in considering individual parameter values, the application of this principle should have led IPART to retain a value for gamma in the range of 30% to 50% (not a point estimate of 50%), particularly given the Tribunal's own admission that the reliability of the study by Chu & Partington (2001) – which was the only study quoted in the draft determination in support of a value for gamma that is closer to 1 - was questionable[23].

In addition, IPART's final determination concluded that its own review of historical studies of the Australian MRP found that *"...several of these studies did estimate the MRP to be around 6 per cent*" and that "*...to reflect the findings of all the studies, an MRP derived from historical studies would be between 4.8% and 8.1 per cent, implying a midpoint of 6.5 per cent."*[24] It is difficult to understand how the Tribunal could have concluded that the appropriate value for the MRP should lie between 5% to 6% on the basis on these statements.

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

3.5 Conclusion

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%.**

---

[21] Brealey, R, Myers, S, Partington, G, Robinson, D (2000), Principles of Corporate Finance, 1st Australian Edition, McGraw-Hill, Australia, p. 166.
[22] Draft Determination, page 223.
[23] IPART draft determination, page 236.
[24] IPART final determination, page 223. We note that in the final determination, IPART introduced two new pieces of evidence (by Brown & Clarke (1993) and Walker & Partington (1999)) both of which were not considered in the draft determination, but which – interestingly and conveniently – contributed to the Tribunal not changing its views from the draft determination.

4 Equity beta

4.1 Introduction

Under the CAPM, the total risk of an asset can be divided into two parts: systematic risk and unsystematic risk. Systematic risk is a function of broad macroeconomic factors that affect the prices of all assets. Unsystematic risk[25] is a function of the characteristics associated with a particular asset as opposed to the overall market.

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

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

4.2 Estimation method

4.2.1 Equity beta

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 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.

- In theory, the market portfolio under the CAPM should be a market value weighted index of the entire universe of investable assets – not just equity. However, in practice no such index exists. As a result, it is necessary to adopt a proxy for the market portfolio. An overall market index is the most common choice for a proxy, however, even so, many market indices exist and each one will produce a different measure of the equity beta for a stock.

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

- 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 (1999) and ABN Amro (1999) 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[26].

- 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 4.3.3.

[26] 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.

For all of the above reasons, estimates of beta 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 that can be appropriately applied to determine the required rate of return for investors in electricity distribution assets. Our estimate of the appropriate beta for our electricity 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:[27]

> *"[The] rate of return should reflect discretion and judgment based on realistic, commercial experience and understanding."*[28]

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."*

In forming its view on an appropriate beta for estimating WACC, we have considered evidence from recent regulatory decisions as well as market evidence on betas for Australian comparable businesses. This information is discussed in Section 4.3

4.2.2 Debt beta

The debt beta (β_d) can, in theory, be estimated by "reverse-engineering" the CAPM. That is:

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

Therefore:

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

In practice, it is not uncommon for a zero value to be ascribed to the debt beta. We note, however, that the ESC's approach (as indicated in the 2003 GAAR Final Decision) is to estimate a debt beta using a variation of the above formula:

$$\beta d = \{\text{Debt margin}^{29} - \text{Default premium} - \text{Debt raising costs}\} / \text{MRP}$$

The rationale for this approach is essentially that it is the expected return on debt (which is equal to the cost of debt less default risk) that drives the debt beta. In the formula, the component of the debt margin that represents a default premium was established using the statistics for debt of 10 year maturity as presented in Elton, Gruber, Agrawal and Mann (2001)[30] which are reproduced in ***Table 4*** below. We do not disagree with the view that the debt beta for

[27] Working Paper 4, p. 41, in the context of recognising adjusted rather than raw betas.
[28] Draft Decision, Chapter 15, page 194.
[29] Debt margin is inclusive of debt raising costs.
[30] Refer Elton, E., M. Gruber, D. Agrawal, C. Mann, "Explaining the rate spread on corporate bonds", Journal of Finance, vol LVI No. 1.

network businesses can be expected to be low or negligible. What we believe is required is consistency in the way in which the debt beta is applied. It is our view that provided the same value for the debt beta is used in de-levering observed equity betas of proxy companies and in re-levering the resulting asset beta to obtain an equity beta at the target gearing level, the resulting equity beta estimate will not be distorted[31]. It is, however, difficult to ensure that this consistency is observed where asset betas are not derived from market evidence (e.g. if asset betas are drawn from regulatory precedents rather than from the de-levering process).

Given the uncertainty associated with measuring the debt beta value, we recommend adopting a range bounded by zero at the low end and a value determined in accordance with the methodology proposed by the ESC at the high end.

Application of Elton et al (2001) data

Our reading of Elton et al (2001) suggests that the ESC may have incorrectly interpreted the results of that study. On page 273 of Elton et al (2001), the authors suggest that the default risk premiums they arrive at (which are shown in Table VI of their study) should be translated into a percentage of the total corporate credit spread (at the same credit rating and maturity) - not as an absolute number as the ESC has assumed[32]:

> *"...for 10 year A-rated industrials, expected loss from default accounts for only 17.8 percent of the spread...for 10 year A-rated bonds, taxes accounted for 36.1 percent of the difference compared to the 17.8 percent accounted for by expected loss...in the case of 10-year corporates, 46.17 percent of the difference is unexplained by taxes of expected default."*[33]

We have undertaken the calculation suggested by Elton et al (2001) and the results are presented in the table below.

Table 4: Estimated default premia (Industrial sector) – recalculated results

Maturity (years)	Estimated default premia (%) [1]		Measured spread from Treasury (%) [2]		Estimated default premia as a % of the measured spread from Treasury	
	A	BBB	A	BBB	A	BBB
2	0.053	0.145	0.621	1.167	8.53%	12.4%
3	0.063	0.181	0.680	1.205	9.26%	15.02%
4	0.074	0.217	0.715	1.210	10.35%	17.93%
5	0.084	0.252	0.738	1.205	11.38%	20.9%
6	0.095	0.286	0.753	1.199	12.62%	23.97%
7	0.106	0.319	0.764	1.193	13.87%	26.74%
8	0.117	0.351	0.773	1.188	15.13%	29.55%

[31] The distortion does not occur since all other things being equal, a higher (lower) debt beta value that is applied in the de-levering process will result in a higher (lower) unlevered asset beta value, and the application of the same debt beta value in the re-levering process will result in a lower (higher) re-levered equity beta.
[32] Elton et al, op cit, page 273.
[33] Ibid, page 273.

Maturity (years)	Estimated default premia (%) [1]		Measured spread from Treasury (%) [2]		Estimated default premia as a % of the measured spread from Treasury	
9	0.128	0.380	0.779	1.184	16.43%	32.09%
10	0.140	0.409	0.785	1.180	17.83%	34.66%

Source: Elton et al (2001)

Notes:

1. These figures are taken from Table VI of Elton et al (2001)

2. These figures are taken from Table 1 Panel A (Industrial sector) of Elton et al (2001)

The recalculated results shown in the table above suggests that for 10 year corporate bonds, the estimated default premium accounts for around 17.8% of the measured spread from Treasury for A rated industrials (and is therefore consistent with the statements made by Elton et al (2001) as quoted above) and around 34.7% of the measured spread from Treasury for BBB rated industrials. Applying the latter proportion to the ESC's allowed debt margin of 1.7% indicates that the estimated default margin should be 0.59%. If this margin were to be deducted from the allowed debt margin of 1.7%, the resulting debt beta would have been 0.185 (rather than the 0.23 assumed at the high end of the range in the 2003 GAAR, Final Decision).

Based on the approach outlined above, the calculated debt beta for the benchmark electricity distributor would lie in the range of 0.0 to 0.13. The high end of this range has been estimated assuming a debt margin of 1.61% (i.e. midpoint of the debt margin assumed in Section 6 less 25 basis points for debt raising costs), less a margin of 56 basis points for the default premium for a BBB credit rating (i.e. 34.7% of 1.61%), and an MRP of 6.0%.

Whilst the calculated range for the debt beta is between zero and 0.13, we note that:

- it is common market practice to adopt a debt beta of zero in cost of capital estimates; and
- in the event that the equity beta adopted has not been derived through a de-levering / re-levering process (as described below), but rather from regulatory precedents, it will not be necessary to calculate a debt beta.

4.3 Equity beta estimates

4.3.1 De-levering / re-levering equity betas

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.

As the ESC is aware, there are various "de-levering formulas" available to achieve this. The formula preferred by the ESC is known as the Monkhouse formula:

$$\beta e = \beta a + (\beta a - \beta d) \{1 - Te[kd / (1+Kd)]\} D/E$$

where Te is defined as: Imputation credits payout ratio x imputation credits utilisation rate x Statutory corporate tax rate.

4.3.2 Analysis of recent regulatory decisions

Table 5 and Table 6 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 5: 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
Queensland Gas Distribution (2001)	0.98	0.55	0.26	Monkhouse
AGLGN (2000)	0.90 – 1.15	0.40 – 0.50	0.06	
Average	**1.03**	**0.51**	**0.16**	

Table 6: Beta values at recent electricity network regulatory reviews

Electricity decision	Equity beta	Asset beta	Debt beta	De-levering formula
NSW electricity distribution (2004)	0.78 – 1.11	0.35 – 0.45	0.00-0.06	Monkhouse
Transend (2003)	1.00	n.a.	0.00	N.a.
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**	

4.3.3 Market evidence

AGSM data

As noted above, it is conventional practice to estimate an appropriate beta having regard to recent empirical evidence on the betas of comparable publicly listed companies. We understand that this is the approach that is preferred by the ESC and that was utilised in the 2001 EDPD.

However, in its 2003 GAAR Final Decision, the ESC was of the view that it was appropriate to place considerable weight on the equity beta allowed in other Australian regulatory decisions. This decision was taken because:

- whilst overseas proxy betas were considered, the ESC acknowledged that the relationship between the foreign company comparable and its home index may not be the same as the relationship between an Australian company comparable and its home index. Consequently, little weight was attached to such evidence;

- the ESC was highly concerned about the limited amount of Australian capital market evidence that was available at the time. The Australian proxy group consisted of five firms – AGL, Envestra, United Energy, AlintaGas and Australian Pipeline Trust – but the beta estimates for AlintaGas was based on only 20 observations whilst the beta estimate for the Australian Pipeline Trust was based on only 23 observations; and

- the limited data that was available on Australian company betas (re-levered to reflect a 60% gearing level) implied an equity beta estimate of 0.55, which if adopted, would be substantially lower than that used in other regulatory decisions, including previous decisions of the Commission, and could result in adverse long term consequences for investment.

In estimating an equity beta for AGLE for the 2006 EDPR, we have similar concerns to the ESC:

- with the exit of United Energy as a publicly listed entity, but the inclusion of GasNet as a publicly listed entity, the Australian proxy group still comprises only five companies; and

- as at December 2003, the AGSM beta for GasNet was based on only 24 observations.

A further problem is that the beta estimates of these companies display a high degree of variation. Table 7 below, for example, sets out the betas of these companies five Australian publicly listed comparable companies[34] 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 7: AGSM equity betas

		Equity beta estimates measured over the 48 months ended					
Company	**Code**	**Sep 2002**	**Dec 2002**	**Mar 2003**	**June 2003**	**Sep 2003**	**Dec 2003**

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

Company	Code	Equity beta estimates measured over the 48 months ended					
		Sep 2002	Dec 2002	Mar 2003	June 2003	Sep 2003	Dec 2003
Australian Gas Light	AGL	0.09 (-0.21 to 0.40)	0.08 (-0.24 to 0.40)	0.06 (-0.24 to 0.36)	-0.01 (-0.31 to – 0.29)	-0.07 (-0.36 to 0.22)	-0.06 (-0.35 to 0.23)
United Energy	UEL	0.18 (-0.29 to 0.65)	0.25 (-0.23 to 0.73)	0.08 (-0.37 to 0.53)	-0.03 (-0.51 to 0.45)	n.a.	n.a.
Alinta	ALN	0.13 (-0.27 to 0.53)	0.15 (-0.23 to 0.54)	0.20 (-0.14 to 0.54)	0.29 (-0.06 to 0.65)	0.33 (0.01 to 0.66)	0.37 (0.06 to 0.68)
GasNet	GAS	n.a.	n.a.	n.a.	n.a.	n.a.	0.05 (-0.21 to 0.31)
Envestra	ENV	0.31 0.04 to 0.57)	0.33 (0.05 to 0.60)	0.34 (0.10 to 0.58)	0.39 (0.13 to 0.64)	0.28 (0.03 to 0.53)	0.30 (0.05 to 0.54)
Australian Pipeline Trust	APT	0.94 (0.28 to 1.61)	0.79 (0.08 to 1.50)	0.77 (0.16 to 1.37)	0.39 (0.15 to 0.62)	0.35 (0.11 to 0.59)	0.36 (0.12 to 0.59)

Source: AGSM Risk Measurement Service, September 2002, December 2002, March 2003, June 2003, September 2003, and December 2003.

Notes:

a. Betas quoted for APT up to and including March 2003 are thin-trading adjusted betas. This was indicated as being appropriate under the AGSM calculations. Betas for APT are based on less than 48 months of data in all quarters.

(b) GasNet beta estimate for December 2003 is based on only 24 observations.

(c) Alinta equity betas are based on less than 48 months of data and therefore, should be interpreted with some caution.

Under these circumstances, we consider that whilst in principle, it is appropriate to reflect recent market evidence in beta estimates, there are problems with relying solely upon such evidence for the purpose of estimating beta at the current time. The rate of return adopted by the ESC is used as an input for setting revenues for the next five years and it is incumbent upon the ESC to ensure that the value adopted is commercially sound and reflects a sustainable return. To the extent that current market data reflects transitory factors which do not reflect a permanent shift in betas, setting a beta based on such information may result in inadequate returns. Such an approach would reflect one that errs on the side of consumers rather than investors, thus going against the recommendations of the Productivity Commission.

The Allens Report

We are aware of a July 2002 report commissioned by the ACCC and prepared by the Allen Consulting Group[35] ("Allens") which provided evidence that the appropriate equity beta for regulated gas networks, based upon the prevailing 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%, was around 0.70.

[35] The Allen Consulting Group, Report for the Australian Competition and Consumer Commission: Empirical Evidence on Proxy Beta Values for Regulated Gas Transmission Activities, Final Report, July 2002.

However, Allens themselves were concerned about two specific data limitations in their analysis:

- first, the primary source of information was derived from listed Australian entities that comprises of 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…"*[36]*;* 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.

Importantly, Allens state 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."*[37]

4.4 Conclusion

Having regard to the market evidence on betas that we have reviewed and our concerns as to the limited number of proxy companies and the stability or robustness of the data, we consider that it remains appropriate for the ESC to place greater weight upon the betas adopted in regulatory decisions of comparable businesses, in deciding the appropriate value for the equity beta under current circumstances.

On this basis, we propose an equity beta of **1.00** for the purpose of estimating an appropriate WACC. This approach is consistent with the approach that the ESC has adopted in the 2001 EDPD and the final determination on the 2003 Victorian gas access arrangements.

[36] Ibid, page 42.
[37] Ibid, page 42.

5 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 8 below.

Table 8: Gearing values adopted in recent gas and electricity determinations

Decision	Regulator	Gearing (D/V)
NSW electricity distributors (2004)	IPART	60%
Transend (2003)	ACCC	60%
Moomba Sydney (2003)	ACCC	60%
DBNGP (2003)	ERA	60%
NT Gas (2002)	ACCC	60%
GasNet (2002)	ACCC	60%
Victorian Gas Distributors (2002)	ESC	60%
SPI PowerNet (2002)	ACCC	60%
ElectraNet (2002)	ACCC	60%
Powerlink (2001)	QCA	60%

As shown in Table 9 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 observed market data.

Table 9: Observed gearing (defined as year end debt to total enterprise value) levels of comparable companies

Company	2001	2002	2003	Average
Australian Gas Light	46%	40%	29%	**38%**
Australian Pipeline Trust	54%	56%	51%	**54%**
Alinta	39%	32%	36%	**36%**
GasNet	67%	66%	64%	**65%**
Envestra Limited	81%	78%	72%	**77%**
Average	**57%**	**54%**	**50%**	**54%**

Source: Bloomberg

On the basis of the above evidence, we have adopted a benchmark capital structure of **60%** for the purpose of estimating an appropriate WACC.

6 Debt margin

The debt margin for its electricity distribution business will reflect the following:

- the credit worthiness of our electricity distribution, which is indicated by the credit rating of the business. This rating in turn depends upon the financial ratios that flow from the business' projected cash flows (given the benchmark regulatory assumptions made);
- supply / demand conditions in the relevant debt markets at the time that the debt is being (or assumed to be) raised; and
- debt raising / establishment costs.

Credit rating assumption

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).[38]

We have referred to the generic average 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 estimates of the pricing of bonds with a BBB or BBB+ credit rating, and from this, determine the implied margin at various dates.

The data we have examined suggests that the debt margin for BBB+ rated bonds averaged over the 20 days to 30 September 2004 was **101 basis points**, and for BBB rated bonds, **111 basis points**.

In adopting these debt margin estimates from CBA Spectrum, we are aware that there is currently some debate regarding the possibility that the data on yields supplied by CBA Spectrum may be understated relative to their observed yields. This observation was made by NERA in a report prepared for ActewAGL as part of the ICRC's electricity distribution review.[39] NERA stated in its report that:

> *"One source of market data that Australian regulators, such as the ACCC, IPART and ESCOSA, have recently relied on is CBA Spectrum data. On the 25th of February 2004, CBA Spectrum was reporting estimated debt margins of 101bp for 10 year maturity BBB+ bonds. However, CBA Spectrum's database only includes three BBB+ bonds. Moreover, two out of these three bonds have maturity dates of less than 3 years with only one having a maturity date of 9 years. The reported margins on these bonds as at 25 February 2004 and their year of maturity is summarised in the table below."*[40]

CBA Spectrum's database of BBB+ bonds

	Maturity	Spread relative to	"CBA Spectrum" estimate of the

[38] 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.
[39] ActewAGL Supplementary Submission, Estimating the debt margin for ActewAGL, A Report for ActewAGL prepared by NERA, February 2004.
[40] Ibid, page 4.

		equivalent maturity government bond	'fair' debt margin for given maturity
BBB+ bonds			
BritAmerTob	2006	1.11%	0.82%
Qantas	2007	1.01%	0.87%
Snowy Hydro	2013	1.37%	1.00%
Source: ActewAGL Supplementary Submission, Estimating the debt margin for ActewAGL, A Report for ActewAGL prepared by NERA, February 2004.			

NERA goes on to state that:

- *"...for BBB+ bonds, CBA Spectrum is on average 27 basis points below the actual observations of debt margins on BBB+ rated debt. For the only observation of long dated debt (Snowy Hydro), CBA Spectrum is 37 basis points below the equivalent actual observation."*[41]*;* and

- *"The explanation for this lies in the fact that CBA Spectrum simultaneously estimates the 'fair' relationship between debt margins and maturity for all 10 investment credit ratings from Government to BBB. In doing so, CBA Spectrum constrains these estimated curves to follow similar shapes to one another and never to cross (eg. 'fair' debt margin on a BBB+ bond must always be below that on a BBB bond). This effectively means that the estimates of 'fair' debt margins for BBB+ bonds, for which there are only three observations and for which there are even fewer long dated observations, are largely driven by observations for higher rated bonds..."*[42]

Notwithstanding NERA's observations, we note that as at the date of this report, CBA Spectrum has not responded to NERA's observations on this matter. As such, we consider that it would be premature at this stage to make any uninformed adjustments to the data for the purpose of this report. Should further evidence emerge on this issue subsequent to this report, we reserve the right to re-assess the appropriate debt margin.

Supply / demand conditions in the relevant debt markets

The ESC's benchmark cost of debt is determined by adding a debt margin over the real risk free rate of return. As the real risk free rate of return is proxied by yields in the index-linked bond market, the ESC's benchmark cost of debt implicitly assumes that an efficiently financed distributor will finance its operations by raising long term debt in the index-linked bond market.

This benchmark assumption is adopted by the ESC notwithstanding that there is widespread market evidence suggesting that most corporations typically raise nominal rather than index-linked debt:

- the debt margin that the ESC adds to the real risk free rate of return to determine the benchmark cost of debt, is determined from observations on actual borrowing costs of similarly rated debt, where – as the 2001 electricity distribution price determination noted – "*...most of these transactions were for borrowing in nominal (rather than index-linked) terms*"[43];

[41] Ibid, page 4.
[42] Ibid, page 5.
[43] Refer ESC, EDPD 2001-2005, Volume 1, Statement of Reasons, page 293.

- from the ESC's own analysis in the 2001 EDPD, of the Australian company proxies used in its analysis of beta, *"…only Envestra has partly hedged against these risks [imposed by nominal financing] (which it has done by issuing index-linked bonds), and these bonds only account for a relatively small share of its total borrowing's"*[44]; and

- Australia's index-linked debt market is widely regarded as being relatively small and illiquid, particularly at the A-/BBB+ rating level. For example, the Reserve Bank of Australia has previously noted that:

  "The indexed bond market is small relative to the overall bond market (indexed bonds make up 6 per cent of all bonds outstanding)….At present, the Commonwealth government accounts for 50 per cent of indexed bonds, the states a further 21 per cent and non-government issuers 29 per cent."[45]

  In the 2001 EDPR, Westpac Bank expressed the view that the index-linked market may not be able to absorb a substantial debt issuance over a short period of time without adversely affecting credit spreads:

  "…as one of Australia's leading intermediaries in the area of index-linked funding, we would argue strongly that the current capacity within the index-linked market is well short of meeting the funding requirements of the entire electricity distribution business. Westpac currently estimate that the market capacity for index-linked debt issued by Victorian distributors is approximately $600m… Moreover, it is unreasonable to assume that this capacity could be filled in a short time without any adverse impact on credit spreads or the underlying real risk free rate…Westpac's estimate of the incremental costs associated with index-linked funding is of the order of ***25-35 basis points****."*[46] *[emphasis added].*

  We also note that the ESC has previously conceded that the index-linked market is relatively immature:

  "The Office is aware that the index-linked market is immature at this point in time. Given this, it would be unreasonable to assume that the distributors could source all of their finance in this manner."[47]

As a further complication, we understand that credit spreads can also be further affected, depending upon the assumption as to the order of debt issuance. For example, United Energy has previously provided further analysis from Westpac that suggests that as a late issuer, United Energy may incur additional costs of up to 20 basis points in the indexed bond market and up to 25 basis points in the nominal plus inflation swap market.[48] This analysis assumed that United Energy had an A- credit rating. Similar analysis undertaken for Powercor (which at the time had a BBB credit rating) indicated that additional costs of up to 30 basis points could potentially be incurred in the indexed bond market.

[44] Ibid, page 27.
[45] Refer RBA article which provides an explanation of how this would work at http://www.rba.gov.au/PublicationsAndResearch/StatementsOnMonetaryPolicy/Boxes/2001/2001_08_c_box.pdf
[46] Refer Westpac letter, dated 19 July 2000 at http://www.esc.vic.gov.au/docs/electric/21westpac.pdf
[47] ESC, 2001 EDPR – Draft Decision, May 2000, page 170
[48] Figures quoted in this statement are exclusive of debt raising fees and assume United Energy has an A- credit rating. Higher costs would be incurred for weaker credit ratings. Refer submission by United Energy to the ESC: Response on CPI Linked Funding, 17 August 2000 at http://www.esc.vic.gov.au/PDF/2000/58uecda.pdf .

Given the way in which the ESC has chosen to define and set the benchmark cost of debt, we believe that it is necessary to consider whether the benchmark cost of debt will systematically understate the borrowing costs that the electricity distributors would in fact incur. If there is, in fact, insufficient capacity for the index-linked bond market to absorb the debt issuance by the Victorian electricity distributors, the distributors would effectively have to bear the cost of expanded credit spreads in the index-linked market, or be forced into alternative (and more expensive) financing arrangements which would include:

- raising long term fixed rate funding from the nominal debt market and entering into an "inflation swap" arrangement in order to achieve the same net cash flows as those resulting from borrowing from the index-linked bond market;[49]; or

- raising shorter term floating rate funds from the nominal debt market. We note that this view was expressed by the ESC in the 2001 electricity distribution price determination. However, short term financing is no less efficient a benchmark than long term fixed rate financing[50]. Furthermore, additional costs would need to be built in to take into account of more frequent re-financing and uncertainties associated with nominal interest rate movements.

In conclusion, given the fact that despite market evidence to the contrary, the ESC has chosen to adopt a benchmark financing assumption that an efficiently financed distributor would raise long term index-linked debt, we consider that it would be unreasonable for the ESC to deny an allowance for the costs potentially associated with financing its operations in accordance with a benchmark assumption that is unrepresentative of what is practically achievable in the market. It is not sufficient for the ESC to adopt an unrepresentative benchmark and to then deny the costs associated with its assumption on the basis that the assumption does not place a constraint upon the distributors' actual financing decisions.[51]

We therefore consider that the debt margin for our electricity distribution business should include an allowance of **25 to 35 basis points** to account for the expanded credit spreads that would likely be incurred based on the estimates provided by Westpac.

Debt establishment cost

We also consider that it is appropriate to build into the debt margin, a reasonable allowance for 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. We note that in the Australian Competition Tribunal decision on GasNet's appeal against the ACCC's decision on its transmission revenues, the Tribunal ordered that an allowance of **25 basis points** be provided.

Debt margin - conclusion

[49] Refer RBA article which provides an explanation of how this would work at http://www.rba.gov.au/PublicationsAndResearch/StatementsOnMonetaryPolicy/Boxes/2001/2001_08_c_box.pdf
[50] ESC, EDPD 2001-2005, page 284.
[51] For example, refer comments by the ESC on page 293 of the EDPD 2001-2005.

Adding these components together, we propose to adopt a debt margin in the range of **1.51% to 1.71% (midpoint 1.61%)**, given a gearing level of 60%.

Using the midpoint of the above debt margin range, we propose a real pre-tax cost of debt of **4.4%.**

7 Value of imputation credits

Under the ESC's approach setting the return on capital, which relies upon the real vanilla WACC as the rate of return that is applied to the regulatory asset value, the value attributed to imputation tax credits does not affect the calculation of the real vanilla WACC. Instead, the value attributed to imputation tax credits is one of the inputs that affect the calculation of the benchmark cost of tax.

7.1 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 CAPM formula modified to take into account of imputation credits, 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."*[52]

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") $\gamma = 1$, 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 $\gamma = 0$. 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.

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

7.2 Gamma estimates

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

7.2.1 Distribution rate

The ESC has previously adopted a distribution rate assumption of 82%.[53] This assumption was based upon the study by Hathaway & Officer (1996), which found that the value of franking credits distributed in each year averaged 82% of the value of credits created.

We are not aware of any other studies that provide data on the distribution rate of franking credits and therefore accept that it is reasonable to rely upon the estimate provided by Hathaway & Officer (1996).

7.2.2 Utilisation rate – empirical studies

The table below summarises the various estimates of the franking credit utilisation rate that have been derived from empirical studies.

Table 10: Empirical estimates of the value of imputation credits

Study	Methodology	Utilisation rate estimate
Brown & Clarke (1993)	Dividend drop-off	72%
Bruckner, Dews and White (1994)	Dividend drop-off	33.5% - 68.5%
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 (2004)	Inference from value of individual share futures and low exercise price options	0%
Chu & Partington (2001)	Rights issues	Close to 100%[54]
Twite & Wood (2002)	Inference from analysis of trading in derivatives	45%

[53] ESC, 2003 GAAR Final Decision, page 393.
[54] Whilst the results suggest imputation credits are close to fully valued, it should be noted that the standard error of the estimate is 97% which indicates substantial variation around the mean estimate.

Study	Methodology	Utilisation rate estimate
Sources:		
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, 2004, The value of imputation tax credits, Journal of Financial Economics, Vol. 73, Issue 1, July 2004;; 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.		

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

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.

- rights issues.

  Chu & Partington (2001) infers the value of imputation credits from the prices of traded securities. The methodology compares the prices of shares with different dividend entitlements consequent to rights issues – "old" shares are entitled to receive the dividend but the "new" shares are not, thereby facilitating investigation of the value of franking credits attached to dividends. The study found that the mean value of imputation credits was 150% implying that franking credits were almost fully valued, however, it should be

noted that the standard error is 97%, making the results somewhat inconclusive. That is, statistically speaking, the value of franking credits could be either worthless or fully valued.

- 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 (2004). 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 results of this study led the authors to conclude that:

  "We find that: (i) cash dividends are fully valued relative to futures payoffs, (ii) prior to the 45-day rule, imputation credits were valued at up to 50% of face value for high-yielding firms, and (iii) since the 45-day rule, imputation credits are effectively worthless to the marginal investor of ISFs and LEPOs."[55]

  Cannavan, Finn and Gray (2004) 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. This problem occurs because the cash dividend and the imputation credit variables are highly correlated, making it impossible to obtain a reliable measure of their individual regression coefficients.

In view of the methodological problems associated with dividend drop-off analysis, we recommend that considerably lesser weight be placed on the results of such studies in assessing the appropriate value of γ.

7.3 The ESC's position

The ESC has in its previous decisions adopted a point estimate of 50% for the value of imputation credits. In the 2001 EDPD, the ESC stated that this was value was supported by *"...estimates based upon aggregate taxation statistics, as well as evidence provided by dividend*

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

drop-off studies, and was consistent with the assumptions adopted by other Australian regulators."[56]

7.3.1 Form of CAPM

The ESC has previously noted that it has applied the domestic version of the CAPM which implicitly assumes that world equity markets are segregated. However, in estimating the value of γ, the ESC has assumed that foreign investors are present in the Australian market. The ESC noted that in theory, it is inconsistent to adopt a value for imputation credits that assumes the presence of foreign investors if a domestic CAPM is adopted.

This argument was 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."*[57]

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. 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%[58] 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[59].

The arguments put forward by Lally were extensively analysed by Professor Stephen Gray and included in a submission by TXU to the ESC during the 2003 gas access arrangement review[60].

---

[56] ESC, Sep 2000, 2001 EDPD, page 313.
[57] ORG, Final Decision, Electricity distribution price determination 2001-2005, Volume 1, Statement of Purpose and Reasons, page 134.
[58] 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%.
[59] 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.
[60] S. Gray, Issues in Cost of Capital Estimation, 19 October 2001, op cit.

Gray acknowledges that in theory, it may be more appropriate to use an international CAPM. Existing empirical research also suggests that the performance of International CAPM ("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 suggested 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 estimated 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 would not produce errors that are any greater than the error that might result from using a purely domestic CAPM.

We also note that in the 2001 EDPD, the ESC declined to utilise Lally's estimates (of beta, MRP and γ) on the basis that *"...the international CAPM proposed by Lally is not widely used in corporate finance or regulatory practice and has not been the subject of full consultation during the price review*"[61].

Furthermore, the ESC also clarified in the 2003 GAAR: Final Decision that:

- it has never suggested that foreign investment does not exist in Australia, since to do so is clearly inconsistent with what can be observed directly in the Australian market;

- its discussion of Lally's views was intended to highlight that *"...there are two versions of the CAPM, one of which assumes that the Australian capital market is separate from the rest of the world, and the second of which assumes that there is an integrated world capital market. Neither of these states are likely to be real..."*[62];

- it acknowledged that the problem was that *"...there is no version of the CAPM for a world between these extremes."*[63]*;*

- the Commission's previous comments that a move from a segregated capital market to an integrated one would be likely to imply a fall – and a substantial fall – in the cost of capital for Australian assets, were made to demonstrate the point that *"...if all factors were taken into account, an increasing degree of foreign participation in the Australian market (and increasing degree of Australian participation in foreign markets) should reduce the cost of capital, not increase it. That is, the distributors' comments that increased foreign participation should be reflected in the gamma assumption but in no other assumptions – implying a rise in the cost of capital – were not plausible."*[64]*;* and

[61] Ibid, page 317.
[62] Ibid, page 403.
[63] Ibid, page 403.
[64] Ibid, page 404.

- at no time in any of its decisions to date, has the Commission adopted an approach that would ensure absolute consistency with the underlying theoretical model. Rather it has *"... taken its best estimate of the equity premium and market value of franking credits.."*[65]. Nevertheless, the Commission does acknowledge that the inputs that it had used to estimate parameters such as the beta factor and the MRP were based on the segregated market assumption which was clearly inconsistent with the assumption on gamma.

7.3.2 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 " average Australian investor". The ESC has previously suggested that the average Australian investor benchmark is the only practical benchmark because 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 do not agree with the ESC's position on this matter:

- placing weight on Australian company data for beta estimates does not automatically suggest that the relevant investor is necessarily an Australian investor. Beta estimates are derived by examining the share prices movements of the relevant Australian stocks. As foreign investors exist in the Australian stockmarket, it does not automatically follow that beta estimates based on Australian company proxies reflect the view of an Australian investor. It would be more accurate to argue that beta estimates reflect the view of the "marginal investor" of the relevant Australian stocks examined by the ESC – as it is well known that share prices are set by the marginal investor - and that the relevant stocks are utility company stocks rather than the average stock listed on the Australian Stock Exchange ("ASX");

- the ESC's benchmark gearing assumption is based upon the gearing levels of comparable utility companies listed on the ASX (e.g. refer Table I.11 page 300 of the 2001 EDPD) – it does not reflect the gearing level of the average company listed on the ASX;

- as with beta estimates, it cannot be concluded that because the equity premium is based on Australian market data, it reflects the views of an Australian investor. It is a fact that foreign investors invest in Australian stocks and therefore, it could just as easily be argued that the returns reflected in the Australian stockmarket, from which the equity premium is derived, are those required by foreign investors. We consider that a more accurate statement is that the Australian equity premium reflects the premium required by the "marginal investor" in the Australian stockmarket; and

[65] Ibid, page 405.

- the debt margin reflects the cost of raising debt in the Australian debt market, but it does not automatically follow from this that the party raising debt is necessarily Australian in its identity.

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)."*[66]

Cannavan, Finn and Gray (2004) also support this view:

> *"Officer (1988) points out that since Australia is a small open economy, 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. Also, participants in world capital markets are free to invest anywhere, so they will only invest in a small open economy such as Australia if they receive a return that is fair by world standards. If imputation credits are worthless to these investors, they will only invest if they are provided a sufficient return by way of cash dividends and capital gains.*
>
> *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. This means that in a small open economy such as Australia, the company's cost of capital is not affected by the introduction of a dividend imputation system."*[67]

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 (2004), the authors state that:

[66] Officer, R.R., 1994, The cost of capital of a company under an imputation tax system, Accounting and Finance, May, pp. 1-17.
[67] Cannavan, Finn and Gray (2004), op cit, page 27.

> *"...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. Other than the evidence from national taxation statistics, empirical studies implicitly measure the franking credit utilisation rate 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 the utilisation rate that emerges from empirical studies that the ESC has used to support its choice of value for γ (other than from national taxation statistics) can only represent the utilisation rate to the marginal investor, not the "average Australian investor". In our opinion, it is therefore not possible for the ESC to maintain an "average Australian investor" assumption and draw support from available empirical evidence (as provided by the studies listed in Table 10) that measures the utilisation rate to the marginal investor in the Australian stockmarket, who is most likely a foreign investor.

The only benchmark investor assumption that leads to an internally consistent estimate of the cost of capital is to adopt a utilisation rate that reflects the value of imputation credits to the marginal investor[68].

7.4 Market practice

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[69]. Evidence drawn from expert reports on takeovers to support such practices was provided in recent analysis, which showed that of 122 reports reviewed only 48 (or 39%) provided support showing how they had arrived at the WACC used in their reports. Of these, 42 (or 88%) used the classical CAPM model and made no adjustment

[68] Marginal investor concepts are applied by regulators in estimating other WACC parameters (e.g. cost of debt and risk free rate).
[69] 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.

for dividend imputation. Only six reports made an adjustment to reflect dividend imputation[70]. 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."[71]

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.

7.5 Conclusion

Despite additional research in this area, a considerable degree of uncertainty continues to surround the estimation of the appropriate value for γ. We firmly believe that it is appropriate for the ESC to err on the side of conservatism by adopting a lower rather than higher value for γ.

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

[70] Lonergan, W., Autumn 2001, "The disappearing returns, why dividend imputation has not reduced the cost of capital", JASSA, page 13.
[71] Lonergan, W., Autumn 2001, op cit, page 14.

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.

To summarise the position on γ from recent developments, we consider that:

- there is no basis for regulators to argue for an increase in the value of γ above the existing upper bound of 50%;
- more recent research demonstrates that there is good reason to question the appropriateness of a value of γ of 50% since it relies upon evidence from studies that suffer from methodological flaws;
- more recent research demonstrates that a value of 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 (if one is to take a purely theoretical standpoint), 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 the existing empirical evidence provides support for a value for γ in the range of **0% to 50%**.