2003 Review of the Draft Statement of Principles for the Regulation of Transmission Revenues

Submission to the ACCC for the electricity TNSPs from Network Economics Consulting Group

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Executive Summary

This paper responds to the Australian Competition and Consumer Commission's (ACCC) Discussion Paper on the Draft Principles for the Regulation of Transmission Revenues on behalf of the Electricity Transmission Network Service Providers (TNSPs). It focuses on section 8 of the paper, relating to the Weighted Average Cost of Capital (WACC).

WACC remains a contentious area of regulatory decision-making. In the past the ACCC has made a number of statements that regulated rates of return in Australia compare favourably to those provided by overseas regulators. Our analysis shows that in the case of electricity transmission, this is not the case if factors such as market risk and different values of the risk free rate are taken into account.

The decision of many overseas investors to exit the Australian infrastructure sector has highlighted the importance of regulatory cost of capital determinations to the continuing challenge of attracting investment to this sector in highly competitive global investment markets. If WACC allowances are provided to regulated businesses in Australia that are lower than returns that can be earned elsewhere for an equivalent risk, investment will not be forthcoming with the impact ultimately borne by consumers through congestion and lower service quality.

We believe that a number of proposed positions in the Discussion Paper will understate the required returns to investors, and therefore will not provide appropriate incentives for efficient investment.

We believe the ACCC is wrong to base the maturity of the risk free rate in the cost of debt and equity in the WACC on the length of the regulatory period.

In addition to the potential incompatibility of the approach with efficient debt management, the ACCC's proposed approach ignores the reality that recontracting risk can only be removed if the ACCC were to credibly commit to providing the regulated firm its actual cost of debt. However, such an approach would be counter to the ACCC's proposed benchmarking method to estimate debt margins and cannot be delivered in an ex ante regulatory environment where debt may need to be raised over the course of a regulatory period.

In the case of equity, we see no rationale for aligning bond maturity with the regulatory period. In both cases, the appropriate approach is to base the bond maturity on the life of the asset, with the longest-dated bond, namely the 10-year Commonwealth bond, providing the best available proxy.

We recognise the ACCC's attempts to address the imprecision of beta estimation by estimating beta as an upper confidence interval (without stating the level of confidence it would require) from a sample of listed comparators. However, we are concerned that this approach is flawed and will create significant regulatory uncertainty for a number of reasons. First, the beta estimates that the ACCC relies upon have poor statistical properties. Second, even if this problem could be overcome, the approach of pooling estimates is open to gaming and abuse by both regulated entities and the regulator alike. Finally, even if a mechanistic formula can be determined, the choice of the appropriate level of confidence to apply is inevitably ad hoc.

Given the inherent need for judgement in determining a beta, relying on such a mechanistic approach alone is dangerous and will introduce a false sense of confidence. Therefore, we recommend that the ACCC consider a number of alternative sources for beta, including international beta values and first principles.

We note that the ACCC has repeatedly justified its position on asset beta by reference to the fact that such a value generates an equity beta of 1 reflecting the average risk of the market as a whole. However, this statement is misleading as it does not take into account the average gearing of the market, which is significantly lower than the ACCC's assumed benchmark gearing for TNSPs. Indeed, our estimates suggest that an average asset beta of listed firms on the Australian Stock Exchange is around 0.64 – significantly higher than the benchmark allowances for TNSPs.

We believe the ACCC's approach to determining a benchmark credit rating unnecessarily penalises efficient electricity transmission businesses and violates principles of competitive neutrality. The ACCC should not react to a lack of suitable comparators by including the credit rating of Government owned electricity businesses, except where those ratings are determined on a stand-alone basis. In the absence of appropriate data on comparable companies, the ACCC should consider what an efficient credit rating for the firm in question would be, through considering a number of means such as cashflow modelling and seeking the advice of private rating agencies.

The ACCC's Statement of Regulatory Principles should make explicit reference to asymmetric risk. Given the ACCC has already accepted the validity of asymmetric risks in its GasNet decision and in its Draft Greenfield Guidelines, it is appropriate and consistent to include recognition of such risks in a revised Regulatory Principles document. As this is a "principles" document, we do not believe a particular approach should be prescribed. Instead TNSPs should be provided with the opportunity to make submissions in the format considered appropriate given the risks faced.

1 Introduction

The Network Economics Consulting Group is pleased to respond to the ACCC's Discussion paper on its Draft Statement of Principles for the Regulation of Transmission Revenues[1] on behalf of the following Australian Transmission Network Service Providers (TNSPs):

- ElectraNet;
- SPI PowerNet;
- TransEnd;
- TransGrid;
- EnergyAustralia; and
- Powerlink.

In this paper we focus on the key issues raised in relation to the Weighted Average Cost of Capital (WACC), including those raised by Professor Kevin Davis in his paper, which is included as an Attachment to the Discussion Paper.[2]

Despite the precedent of a large number of transmission and other decisions in Australia, WACC still remains a contentious part of the Australian environment. Contention and uncertainty manifest themselves in a forbidding environment for new investment, which is especially important given the capital-intensive nature of TNSPs.

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1 Australian Competition and Consumer Commission, "Discussion Paper: 2003 Review of the Draft Statement of Principles for the Regulation of Transmission Revenues".

2 Professor Kevin Davis, "Risk Free Interest Rate and Equity and Debt Beta Determination in the WACC", Report Prepared for the ACCC, 28 August 2003.

The likely withdrawal of overseas owners from the Australian infrastructure sector clearly illustrates this fact. Notwithstanding this development, it is critical that any Statement of Regulatory Principles provides the framework within which an efficient TNSP is motivated to undertake efficient investment, of which the key principles governing WACC is of pivotal importance.

The remainder of this paper is structured as follows:

- In section 2 we provide background to the submission by considering the ACCC's past decisions on TNSPs in an international context;
- In section 3 we respond to recent papers that draw conclusions on the relative level of returns to transmission and infrastructure providers;
- In section 4 we discuss the risk free rate;
- In section 5 we consider the beta and cost of equity;
- In section 6 we discuss the cost of debt;
- In section 7 we consider asymmetric risk;
- In section 8 we consider other issues raised in the Discussion Paper and
- In section 9 we set out our conclusions.

2 TNSP WACCs in international context

In this section we consider the WACC allowances provided by the ACCC for the electricity transmission providers in Australia in an international context. We believe this is important for a number of reasons:

- the ability for investors in Australian electricity transmission companies to receive ex-ante returns comparable to investments in similar infrastructure overseas is an important driver in attracting investment into Australian regulated businesses in the long run;
- an understanding of how the regulated environments in different countries impact on the necessary WACC allowance may be of relevance for the design of the Australian regulatory framework; and
- to consider whether particular adverse (or positive) events in other markets are relevant to the consideration of WACC in Australia, in particular whether there are lessons from which regulatory frameworks can be designed to provide greater certainty to investors and enhance social welfare.

In the remainder of this section we first set out the results of a comparative analysis of international electricity transmission decisions. Second, we draw implications from differences in regulated environments in the respective countries and activity in the respective sectors, before drawing conclusions.

The comparative analysis draws heavily on material included in NECG's submission to the Productivity Commission Review of the National Gas Code on international WACC comparisons,[3] which was written looking at all major utility sectors rather than the electricity transmission sector in particular. That submission also includes analysis on previous

[3] Network Economics Consulting Group, "International comparison of WACC decisions - Submission to the Productivity Commission Review of the Gas Access Regime", September 2003.

comparative WACC studies commissioned by the ACCC and sets out the comparative approach adopted in greater detail.

2.1 Key electricity transmission decisions

Our results compare Australian electricity transmission decisions with those in the UK, Ireland, Canada and the US. The comparators chosen relate to occasions where a regulator has explicitly determined a WACC to apply as part of a revenue determination.[4]

In the UK, Ofgem has made two decisions on electricity transmission: its December 1999 determination on Scottish Transmission; and its September 2000 determination on National Grid Company. Both these decisions used the WACC model and the Capital Asset Pricing Model (CAPM) to determine the cost of equity capital. In the former decision, Ofgem provided the same WACC parameters as in its concurrent price determination for the Public Electricity Suppliers (distribution), which provided a pre-tax real WACC of 6.5%, based on an equity beta of 1.0 (equivalent to an asset beta of around 0.50 based on 50% gearing). In the NGC decision, Ofgem provided a pre-tax real WACC of 6.25%, with an equity beta of 1.0, but with 60% gearing.

In Ireland the Commission for Electricity Regulation has determined the WACC using the same approach as the UK, with the same pre-tax real WACC of 6.5% applied to electricity transmission and distribution. This included an asset beta of 0.40 derived from "the 5 year averages of the [utility] comparators, and the wider set of integrated European utility companies".[5]

In the US the WACC is determined using a number of approaches, including risk premium analysis and discounted cash flow analysis. The Federal Energy Regulatory Commission

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4 For example, no WACC is provided for New Zealand, where the Commerce Commission has made statements about a WACC that may apply to the electricity businesses but has not explicitly applied determined one for Transpower.

5 Commission for Electricity Regulation, "Determination of Distribution Allowed Revenues" CER/01/128 28 September 2001, p19.

(FERC) provides electricity transmission companies incentives to engage in behaviour considered to be conducive to wider market benefits through provisions of increments on the return on equity. Where transmission operators are able to demonstrate that they lack market power and meet specific independence standards, the following increments are available:[6]

- 50 basis point addition to the return on equity (ROE) for transfer of operational control of assets to a Commission-approved Regional Transmission Operator (RTO);
- 150 basis point addition to the book value return of facilities for Independent Transmission Companies (ITCs) that participate in RTOs and meet independence criteria; and
- a generic 100 basis point addition to the ROE for investment in new transmission facilities that are deemed pursuant to the RTO planning process.

Partly as a result of these increments, resulting return on equity allowances for electricity transmission companies are in some cases significantly higher than the state based distribution decisions. For example, FERC recently authorised International Transmission Company to transfer jurisdictional transmission facilities to ITC Holdings, concluding that ITC Holdings is independent, with FERC approving the companies' proposed 13.88% rate of return on equity.[7]

The approach to WACC in Canada bears a number of similarities to the US. Where the WACC model is used, decisions are typically provided in the vanilla form of the WACC. Similarly, the CAPM is not always relied upon to determine the appropriate cost of equity capital in the WACC. However, in the New Brunswick Board of Commissioners of Public

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6 FERC, Proposed Pricing Policy for Efficient Operation and Expansion of Transmission Grid. FERC has proposed a deadline of December 31, 2004, to qualify for these incentives.

7 FERC, Order Authorising Disposition of Jurisdictional Facilities, Accepting for filing proposed agreements, requiring compliance filing, and accepting in part and rejecting in part proposed transmission rates, February 20, 2003.

Utilities decision on the New Brunswick Power Corporation, the CAPM was a key methodology considered.

2.2 Analysis of WACC decisions

In our analysis we have considered electricity transmission decisions where the regulator has explicitly determined a WACC. In the case of US decisions, which typically determine a cost of equity capital only, we have estimated a WACC by assuming a constant debt margin over the prevailing government bond rate.[8]

We have compared WACC decisions using the following variables:

- the margin of the vanilla WACC over the risk free rate; and
- the asset beta of the decision.

In doing so, we have standardised the decisions to a common bond rate (the 10-year Government bond). In addition, we have looked at the impact of adjusting for differences in market risk by standardising around a 6% market risk premium. The assumptions adopted are set out in detail in Appendix 1.

Key results

Our analysis suggests that Australian electricity transmission decisions made by the ACCC since January 2000 do not compare favourably with decisions of overseas regulators when considered on a comparable basis.

Table 1 summarises the results for electricity transmission companies studied.

8 Note this approach has only been adopted where a gearing figure has been determined. In these cases a constant debt margin of 150 basis points above the 10-year bond rate has been assumed.

Table 1: Summary of electricity transmission decisions

Country	Regulator	Decision	Date	Vanilla WACC margin	Increase applied to MRP to give 6% MRP	Revised vanilla WACC margin (MRP=6%)	Asset beta (debt beta = 0)
Australia	ACCC	Transgrid	Jan-00	2.91%	-	2.91%	0.39
Australia	ACCC	SMHEA	Feb-01	2.78%	-	2.78%	0.40
Australia	ACCC	Powerlink	Nov-01	2.95%	-	2.95%	0.40
Australia	ACCC	SPI Powernet	Dec-02	2.64%	-	2.64%	0.40
Australia	ACCC	ElectraNet	Dec-02	2.70%	-	2.70%	0.40
UK	Ofgem	Scot transmission	Dec-99	2.69%	2.50%	3.94%	0.50
UK	Ofgem	NGC	Sep-00	2.42%	2.50%	3.42%	0.40
Ireland	CER	ESB	Sep-01	2.91%	0.60%	3.15%	0.40
Canada	NB	New Brunswick trans	Mar-03	3.41%	1.00%	3.78%	0.38
US	FERC	ITC Holdings	Feb-03	6.04%	-	6.04%	0.90

Note that WACC margin and asset beta for ITC Holdings is based on cost of equity of 12.88%. A debt margin of 150 basis points is assumed to calculate a vanilla WACC margin.

These decisions show a concentration of decisions providing an asset beta of around 0.40. While the sample of non-Australian countries is small, the adjusted results show the ACCC's decisions to be less generous than those in the UK and Ireland, while the transmission decision in New Brunswick provides the lowest estimated asset beta, but a relatively high vanilla WACC margin partly due to the allowable cost of debt being over 2.3% above the 10-year bond at the time of the decision.

However, current proceedings of FERC and recent decisions indicate a presumption for return on equity allowances that are significantly higher than overseas decisions – and higher than those that have applied to date by US jurisdictional regulators. To illustrate this point, in Figures 1 and 2, we have also included data on distribution companies included in our report to the Productivity Commission – as set out in Table 2.

Table 2: US electricity distribution decisions included in sample

Regulator	Decision	Date	Vanilla WACC margin	Increase applied to MRP to give 6% MRP	Revised vanilla WACC margin (MRP=6%)	Asset beta (debt beta = 0)
Utah	Pacificorp	May-00	2.59%	-	2.59%	0.37
Mass	Fitchbury	Oct-01	4.51%	-	4.51%	0.43
CPUC	SGD&E	Nov-02	4.73%	-	4.73%	0.56
CPUC	PG&E	Nov-02	5.19%	-	5.19%	0.57
CPUC	Sierra	Nov-02	4.74%	-	4.74%	0.48
CPUC	SCE	Nov-02	5.69%	-	5.69%	0.60
Colorado	Public Service Co	May-03	5.51%	-	5.51%	0.62
Colorado	Aquila	Jun-03	5.75%	-	5.75%	0.59

These distribution decisions are of relevance in setting a lower bound to transmission decisions as FERC indicated that no business will be financially disadvantaged through transfer of regulatory responsibility from jurisdictions to FERC.

Figure 1: Electricity transmission — unadjusted vanilla WACC margin and asset beta

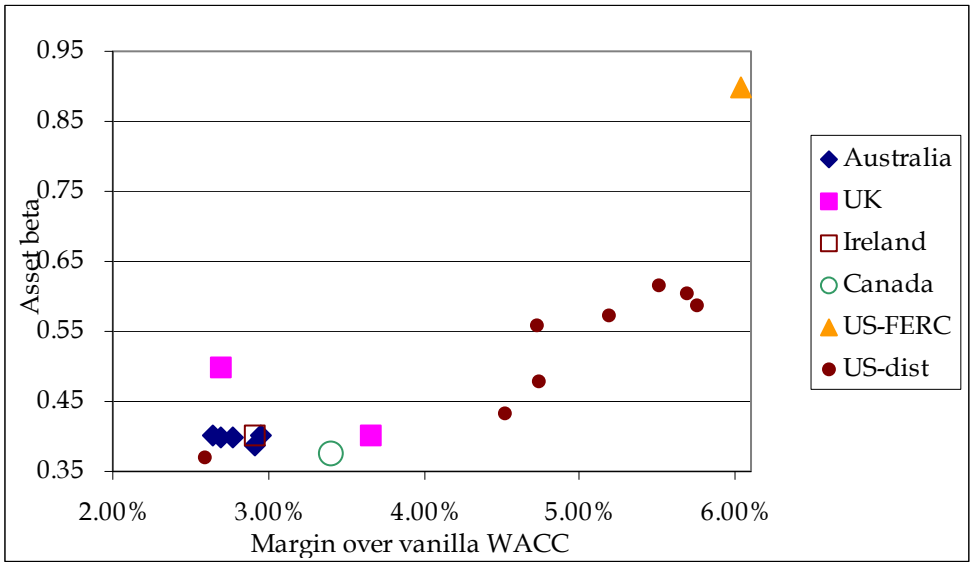
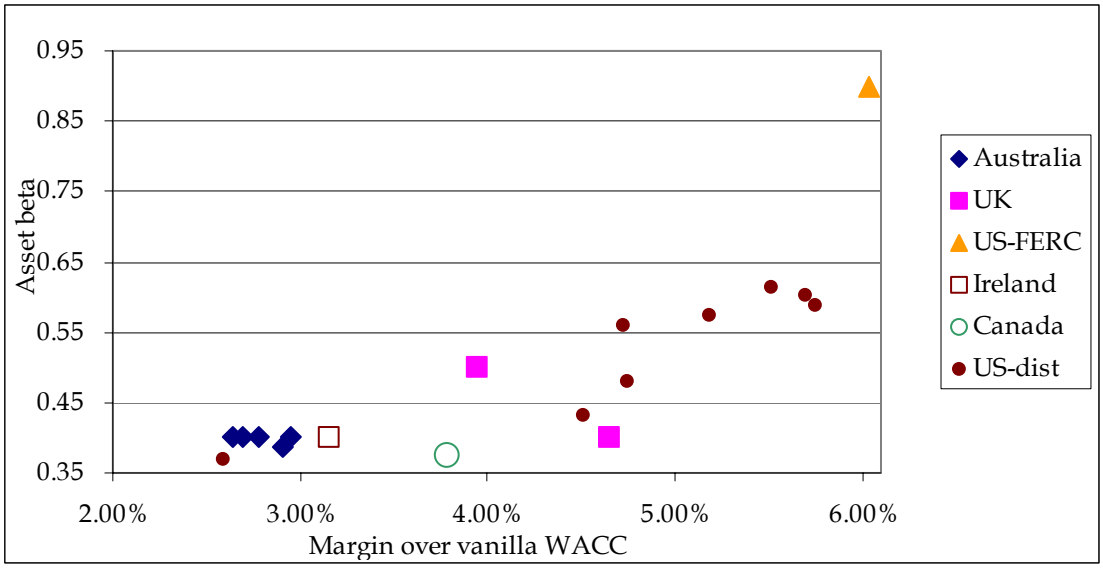


Figure 2: Electricity transmission — adjusted vanilla WACC margin and asset beta



2.3 Regulatory context to results

For implications to be drawn on the climate facing investors in electricity transmission businesses, the results need to be considered in relation to the regulatory environment in which the relevant investment is to take place. Some of the key factors to be considered are:

- expectational factors – such as treatment of asset valuation, relative degree of certainty over future WACC allowances and expectations of being able to earn above the WACC; and
- outcomes – including evidence of regulatory risk and whether WACC allowances have been contributing factors.

2.3.1 Expectational factors

Treatment of asset valuation

In Australia, there is a much greater reliance on asset valuation methodologies that involve optimisation than in the other countries. This is also the case under the National Electricity Code, where the ACCC is able to fully optimise the asset base of each business at subsequent regulatory reviews – an issue that is a key focus of the ACCC's Discussion Paper. By

contrast, in the US and Canada, the primary asset valuation methodology is depreciated historic costs, while in the UK, the methodology used for regulated businesses, including the regulated transmission providers National Grid and Scottish Transmission is a rolled forward initial market value.

The degree of discretion given to Australian regulators in using optimisation methodologies, such as the depreciated optimised replacement cost (DORC) and optimised deprival value (ODV) has created significant uncertainty, particularly in the gas sector. To date, electricity transmission providers have been protected by the requirement for the ACCC to accept jurisdictional asset values. However, as noted by the ACCC's Discussion Paper, a move to regulator re-optimisation of the asset base will create a "*high level of uncertainty for the TNSPs and there is a strong possibility it could deter new investment*." (page v)

By contrast, a relatively high degree of protection for investors has been built into the regulatory frameworks in more developed regulatory regimes. For example, in the UK the decision of Ofgem and other regulators to adopt an initial market valuation approach (plus uplift) to asset valuation in the first regulatory decisions, while not aligning prices to their full economic value, ensured that the price paid by investors who bought equity at the time of the float would be reflected in the initial asset valuation. Subsequent decisions in the UK have typically rolled such assets forward without optimisation of existing assets.

For US network businesses, avoidance of the impact of optimisation risk has been a key plank of electricity restructuring, with electricity network businesses not only subject to limited (if any) stranding on their system assets, but protected against stranding risk on generation assets. As part of deregulation many US utilities have been required to divest ownership of generation assets and terminate long-term contracts with small independent generators (qualifying facilities). In many cases the economic value of such assets was significantly below the depreciated historic cost, particularly where the utility had invested in nuclear energy or had entered into long run contracts with (marginal) renewable energy suppliers. Competition Transition Charges introduced in several states provided the utility with the equivalent of an accelerated depreciation provision, providing significant protection

to the utilities. For example in California it has been estimated that under the Competition Transition Charge, utilities received payments of around $28 billion over 4 years.[9]

Relative degree of certainty over the WACC

As the WACC is an imprecise measure, it is inevitable that there is an element of uncertainty in WACC allowances. However, some countries have introduced measures to minimise this uncertainty. For example, a number of Canadian energy regulators adopt formulaic approaches to the risk free rate and the return on equity, which limit changes over time, while in the US there has been remarkable consistency in the cost of equity capital allowances provided by energy regulators over time, despite wide variations in the required returns if different methodologies are applied. This in part is likely to reflect lesser reliance on current estimates of bond yields at the time of the regulatory decision due to the adoption of methodologies other than the CAPM for estimating the cost of equity capital.

Uncertainty over WACC parameters is prevalent in other countries whose approach to WACC is similar to Australia's. For example, in the UK there is little consensus on the appropriate value of the MRP and regulators adopt a range for the risk free rate. Although regulators in Australia have reached broad consensus on the MRP, the extent of uncertainty in Australia is arguably at least as high because:

- the methodological approach to the risk free rate has not been resolved in Australia. By contrast, uncertainty in the UK refers to the actual value of the long term bond, which includes averaging that minimises rate shock; and
- regulatory statements imply current WACC's in Australia are as high as they are likely to go - the threat of movement in relation to WACC is asymmetric in that regulators have been flagging shifts in only the downward direction, through proposals on MRP, gamma and beta.

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9 California ISO, Comprehensive Market Redesign, Cost Impact Analysis, November 3, 2000, p4.

Expectation of earning above the WACC

In the transmission sector, we do not believe there is significant difference between countries in relation to the extent to which a firm could earn above its WACC.

Consistent with the approach in Australia, transmission providers in the UK and Ireland are regulated under revenue caps. Transmission providers in Canada and the US are typically regulated under a rate of return approach, where returns in an ex-post basis are capped at the WACC. In some cases, use of earnings sharing mechanisms and other forms of performance-based ratemaking are permitting returns above the WACC to be earned over a longer period. In the case of the US transmission operators, the explicit incentives available to join RTOs provides financial incentives to earn more than the current WACC for some businesses.

2.3.2 Outcomes

The impact of WACC allowances on investment and observed service performance is complex. If the WACC is higher than the firm's opportunity cost of capital, firms will have incentives to bring investment forward (ie before it is socially optimal to make the investment) or to substitute capital for other inputs. Under cost of service regulation firms may have incentives to respond to excessive WACC allowances by over-investing or gold-plating assets, often referred to as the Averch-Johnson effect.

Where the WACC is set too low, companies may not be able to respond by delaying or reducing investment because of service obligations contained in operating licences. When this is the case, the impact of a low WACC may initially be seen through declining equity values (and increased gearing) rather than lower standards of service. In addition, the impact is likely to be that socially desirable but discretionary investment (such as regulated interconnectors) is simply not pursued.

The impact of WACC on investment is also complicated as the counterfactual (for example, a world with greater investment) cannot easily be verified, except in cases where the regulator has explicitly turned down proposed investment. In addition, it is often difficult to disentangle the impact of WACC on investment from the wider impact of regulatory uncertainty and risk.

The role of cost of capital allowances and broader incentives for investment have been cited in various regulatory developments. This section considers the recent decisions of overseas

investors to consider Australian investments, and recent electricity blackouts in the US, Canada, and Europe.

International nature of investment in Australian infrastructure

Overseas investors have driven a large proportion of investment in Australian energy infrastructure in recent years. Overseas investment has been a key driver of growth at all levels of supply, including electricity generation, transmission, distribution and retail and gas production, transmission, distribution and retail.

However, a number of overseas investors in Australian infrastructure assets, particularly those from the US, are currently considering overseas investment portfolios. This is seen in the electricity generation sector with AES Transpower selling the Ecogen assets and CMS and NRG seeking to offload their share in Loy Yang. Similarly, Duke Energy has publicly foreshadowed its exit from the Australian market, while Epic Energy is currently considering offloading its gas transmission assets.

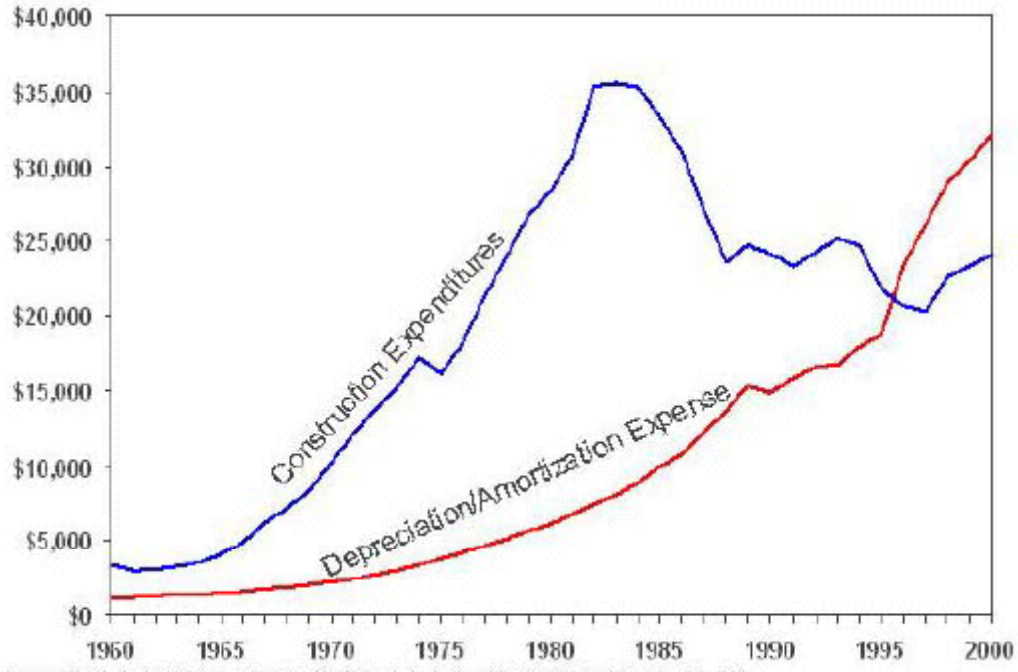
This changing investment climate puts greater focus on providing the required incentives for existing operators and attracting new investment, from domestic as well as international investors.

Electricity blackouts in the US, Canada and Europe

There have been a number of high profile electricity blackouts in August 2003 in the US and Canada (affecting 50 million customers), the UK (affecting 250,000 customers in London) and Italy.

Irrespective of the identified causes of the US and Canadian blackouts, there is evidence of insufficient investment in the US transmission network. The state of under-investment can be seen in Figure 3, which sets out the difference between construction expenditure and depreciation of investor owned electricity utilities in the US between 1960 and 2000 and highlights significant changes in capital expenditure and depreciation following the early 1980's.

Figure 3: Capital expenditure and depreciation – investor owned utilities 1980-2000



Source: EPRI, Electricity Sector Framework for the Future, Volume 1, Achieving the 21st Century Transformation, August 2003, p17.

The need for investment (and greater co-operation) has been highlighted in many places. For example, the Edison Electric Institute notes:

> To maintain transmission capacity .. relative to summer peak demand would require utilities to construct 54,000 GW-miles… during this decade,… [at an estimated cost of] $56 billion… The deficit in past transmission investment poses large challenges to transmission planners. Not only must they plan for incremental

> needs, they must also plan to make up for transmission investments that did not occur during the 1990s.[10]

Some commentators have also noted the link between the lack of investment and uncertainty over returns. Frank Wolak, Chairman of the Market Monitoring Committee at the California Independent System Operator, notes:

> the transmission network needed for a wholesale market should be much larger,
>
> The utilities said, 'if we don't know what kind of returns we'll be getting or whether we get to keep our assets, then don't build it.' So leading up to restructuring, they didn't build transmission.[11]

The most compelling lesson from the US is that the long-term costs of under-investment, whether caused by insufficient allowed return, other regulatory barriers to investment, or both, are likely to emerge slowly. However, when they do emerge they are likely to be very costly, and to take a long time to rectify.[12]

The recent blackout in a large proportion of London is likely to indicate that the sector has similar issues. The fact that these occurred in a network with a single transmission network suggests focus may shift to the regulated rates of return earned by the transmission owner, National Grid. Similar issues have also arisen in Italy, implying that these problems are not isolated issues.

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10 Eric Hirst and Brendan Kirby, Transmission Planning for a Restructuring US Electricity Industry, Edison Electric Institute, June 2001.

11 N. Banerjee and D. Firestone, New Kind of Electricity Market Strains Old Wires Beyond Limit, New York Times, 24 August, 2003.

12 The events suggest that the first manifestation of insufficient investment is that the risk of low probability catastrophic events increases.

2.4 Conclusions

Our results show that WACC allowances to the Australian TNSPs are not generous in international terms, and certainly not excessively so. This conclusion is still valid if these decisions are seen in relation to approaches to asset valuation and the overall level of uncertainty in the WACC in Australia and overseas.

Currently Australian infrastructure providers face a significant challenge in attracting investment, particularly given the decision of many overseas investors to exit the Australian infrastructure sector. Notwithstanding this development, even if Australian rates were comparable with overseas rates, the evidence in some key sectors such as the US electricity transmission sector supports the view that comparability is not a sufficient condition for ensuring appropriate levels of investment.

If WACC allowances are provided to regulated businesses in Australia that are lower than a firm's cost of capital, the impact will ultimately be borne by consumers through inadequate investment and lower service quality. While, in the short run, reductions in service quality may not be evident, because of obligations to maintain network reliability for example, over time investors will be increasingly unwilling to finance otherwise efficient investments. The impact of under-investment is most likely to be seen in an increase in the risk of low probability catastrophic events, which are the most economically harmful form of service degradation in that they leave no opportunity for customers to adapt.

3 Other reports on comparative returns

Notwithstanding the conclusions reached in the previous section, some recent reports have suggested that there is no evidence that regulated returns in Australia compare unfavourably to those overseas, and that the level of the returns provided has not deterred investors. In this section we wish to respond to two of these reports:

- Reports written by Pareto Associates, which undertook an international review of WACC allowances, with particular focus on Australia and the UK; and
- A submission by the Allen Consulting Group on behalf of BHP-Billiton, which argued that the prices investors are willing to pay for infrastructure assets provides evidence that regulatory rates of return are not hindering investment.

3.1 Report by Pareto Associates

In recent decisions in the gas sector, the ACCC has received submissions in relation to, and made statements on, a comparative WACC report written by Pareto Associates.[13]

The Pareto report submitted to the ACCC concentrates on comparing recent energy decisions in Australia with decisions in the UK, with particular focus on Ofwat's 1999 decision on the UK Water & Sewerage businesses. A key conclusion of the report is that Australian regulators (incorrectly) judge that the cost of equity and debt is higher in Australia than in the UK. Pareto notes:

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[13] Pareto Associates, "The Weighted Average Cost of Capital for Gas Transmission Services – Benchmarking Regulated Australian and UK "Vanilla" WACC components. Comment on WACC proposals by GasNet Australia", June 2002. Pareto has also made a similar submission to the Victorian Essential Services Commission, with the analysis expanded to include US companies – Pareto Associates, "Victorian Gas Distribution Access Arrangement 2003-07, Customer Energy Coalition Comment on Essential Services Commission Draft Decision", August 2002. This section considers analysis in both these papers.

> The judgement of Australian regulators is that equity is more costly than in the UK, and substantially different for different utilities. We were not able to identify evidence that supports the need for this disparity. It is our view that financial markets would be expected to see regulated utilities in (generally) consistent terms regardless of geographical location.

While the Commission has made reference to material submitted by Pareto, we note that to date, the Commission has not explicitly endorsed the conclusions of this report. For example, in its GasNet decision its notes:

> For example, it has carefully considered the views presented by Pareto Associates, which suggest that the Commission should be more guided by recent overseas regulatory decisions. While the Commission has taken these decisions into consideration (a summary of US and UK WACC outcomes is included in Table 5.4 below), it is cognisant of the difficulties inherent in adjusting for differences in financial market conditions and institutional arrangements between countries.[14]

In its MSP decision, the Commission notes:

> The Commission has reviewed the Pareto report's comparison between the market risk premium adopted by Australian (6 - 6.5 per cent) and UK regulators (3 - 4 per cent). However, in the absence of any adjustment for differences in financial market conditions and institutional arrangements between countries the Commission hesitates to draw any firm conclusion from this information.[15]

While we note the ACCC's caution in using this data, we believe that the level of rigour of the analysis is such that it should be rejected out of hand, and not be relied upon for policy-making purposes.

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14 Australian Competition and Consumer Commission, Final Decision: GasNet Australia access arrangement revisions for the Principal Transmission System, November 2002, p116.

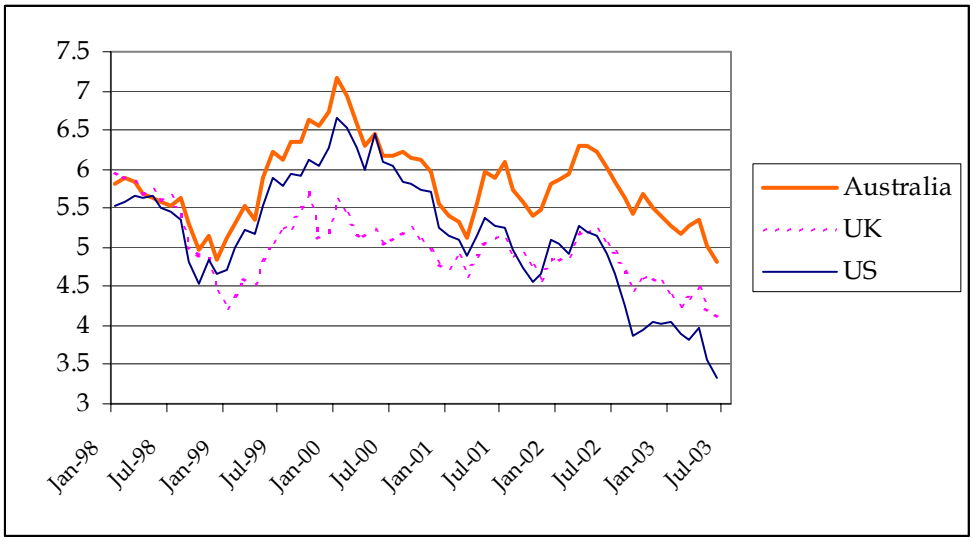
15 Australian Competition and Consumer Commission, Final Decision: East Australian Pipeline Limited, Access arrangement for the Moomba to Sydney Pipeline System, October 2003, p125.

The Pareto report contains a number of basic deficiencies.

Failure to adjust for different bond rates across countries

Pareto has not adjusted its analysis for the difference in bond rates between countries, despite looking at absolute returns on debt and equity, and the absolute value of the vanilla WACC. This is a key flaw, given the divergence in the risk free rate between Australia, UK and the US – as seen in Figure 4:

Figure 4: Yield on nominal Government bonds with 10-year maturity — Australia, US, UK 1998–2003



Assumption of common market risk across countries

Pareto has also made no attempt to correct for market risk. By contrast, statements in the report allude to a belief that the premium for market risk should be the same in Australia as in the UK. For example Pareto states:

> OFGEM and Ofwat judge that regulated monopolies face no greater risk than the share market as a whole. UK regulators have also accepted advice that market risk premia (or equity risk premia) and investor expectations have decreased relative to rates determined by analysis of past trends. We see no fundamental reason why the Australian economy should be different to the UK in these respects.[16]

And:

> It is clear that the major cause of the differences between estimates for the cost of equity between the UK and Australian regulatory judgements is that Australian regulators have accepted higher values for the market risk premium than do UK regulators; and higher – and much more varied - values of equity beta. This appears to be related to the relative paucity of independently collated data that has existed over a sufficiently long period that can be used as a reliable source for informing judgements on parameters for the CAPM.[17]

We believe the view that the MRP in Australia should be similar to that in the UK has no validity whatsoever. The market risk premium varies between countries in line with differences in market composition, country risk, taxation and estimation time horizon. Given the greater level of diversity of the UK (and the US) economy, we would expect the ex-ante MRP to be lower in the UK (and US) than Australia. This is consistent with evidence on cross-country comparisons of MRP.[18]

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16 Pareto Associates, "The Weighted Average Cost of Capital for Gas Transmission Services – Benchmarking Regulated Australian and UK "Vanilla" WACC components. Comment on WACC proposals by GasNet Australia", June 2002 p9.

17 Ibid, p27.

18 See pages 54-65 of NECG's submission to the Productivity Commission Review of the Gas Access Regime.

Failure to account for gearing in looking at cost of equity capital

The approach taken by Pareto to compare decisions is misleading, particularly because of the treatment of different levels of gearing. First, in comparing cost of equity capital, it does not adjust for gearing – which is a key determinant in the cost of equity. Second, Pareto fails to adjust the cost of equity (or debt) in its estimate of a "vanilla WACC" where it reports results using 60% gearing. This is likely to systematically bias downwards the results of decisions that were determined using gearing below 60%.

Other errors

The report also contains a number of data errors. For example, Pareto has mistaken the "vanilla WACC" with the post-tax nominal WACC, which adjusts the cost of debt for taxation. As a result, Pareto makes a number of false statements:

> Ofwat uses the "Vanilla" version of the Capital Asset Pricing Model (CAPM) to estimate real, post-tax weighted average cost of capital (WACC). This version of CAPM (now preferred by the ACCC) avoids the need for complex treatment of tax within CAPM.[19] [emphasis added]

This mistake is evident in its reporting of the results. For example it compares the post-tax real WACC applied by Ofwat with the vanilla WACC (adjusted for inflation) provided by the ACCC in various decisions.

Conclusions

We have not attempted to correct Pareto's results for these errors, as to do so appropriately would result in us recreating the methodology we outlined in section 2. Given the methodology adopted and the large number of errors in the analysis we do not believe the report adds to the understanding of cross-country differences in rates of return, nor can it be used as a guide for regulatory debate.

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19 Ibid, page iv.

3.2 Allen Consulting Group submission to Productivity Commission

In its submission to the Productivity Commission on behalf of BHP-Billiton,[20] the Allen Consulting Group (ACG) argued that the willingness of firms to pay multiples in excess of the regulatory asset value is evidence that regulated rates of return are not too low. In its submission it reports the ratio of market value to regulatory asset values for a number of infrastructure assets that have been subject to trade sales or are traded on the ASX. It states:

> The conclusion reached is that no empirical support can be found for the view that the stance of regulators provides a threat to new investment in these activities, that regulators are 'too ambitious' when setting regulated charges, or that regulators consistently adopt forecasts that are biased towards the interests of the customers. Indeed, the more plausible conclusion that can be drawn from this analysis, is that the regulators systematically err in favour of providing regulated entities with a return that exceeds the cost of capital associated with the regulated activities.[21]

We believe this analysis is misleading and doesn't support the conclusions drawn.

The use of q ratios (market value to regulatory asset value) as undertaken by ACG is at best only peripherally related to revenue adequacy. The analysis largely relates to the sale of combined distributor/retailers, with the value assigned to the distribution business determined by subtracting a benchmark allowance for the cost of retail activities and assuming the residual is the valuation of the network business. However, there is inherent circularity in this approach as we see no reason why subtracting the regulated asset value from the sale price and assigning the residual to retail activities is not equally applicable.

ACG make a number of other omissions.

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20 The Allen Consulting Group, "Review of the Gas Code: Commentary on Economic Issues", August, 2003. This is reproduced as an appendix to BHP-Billiton report, "Initial Submission to the Productivity Commission Review of National of Gas Code", September 2003 – available at http://www.pc.gov.au/inquiry/gas/subs/sub026.pdf.

21 Ibid, p5.

ACG calculated its q ratios via an average for the business as a whole. However, the critical consideration for the purposes of assessing the adequacy of the WACC for investment is whether the WACC is sufficient *at the margin* (ie where investment incentives are affected). Therefore, a q factor of more than 1 does not necessarily mean that the conditions for future investments are favourable as implied by the ACG analysis. In addition, for risky investments one would expect a q factor greater than 1 to the extent that a survivor bias is present.

A significant concern is that firm specific or project specific q ratios cannot be assessed against a base level of unity but rather must be assessed against the average for the market as a whole at any given point in time.

Some empirical results for the Australian economy shows the q-ratio oscillating between 0.5 and 1.7 between 1966 and 1990. The most recent estimate found of the Australian economy Tobin's-q was around 1.3, for 1990-91. In previous asset booms such as during the 1980's the economy wide Tobin's-q was estimated to have increased from below 1 to a maximum of 1.5 and a similar trend may be expected to have occurred during the 1990's.

Moreover, there is a range of other issues that do not appear to have been considered by ACG in their analysis, including:

- favourable tariff rulings to underpin sale processes – whilst ACG acknowledge that the tariff structure in place at the time of these rulings was a factor driving the premia that were paid for the assets, there is no attempt to quantify it. Moreover, during the sale process for the Victorian electricity distributors, the then Regulator General indicated that a glide path would apply to the removal of monopoly returns. Similarly, even through the Victorian gas distribution businesses were sold with a regulated gas distribution tariff in place, it is understood that there were substantial excess returns in the retail tariffs that were then available;
- significant unregulated assets held by businesses – for example, in the case of GasNet, unregulated assets, including metering equipment and an LNG facility were included in the sale;
- other assets of the regulated business not considered – for example, it is understood that GasNet had very substantial tax losses that would have been valuable to any purchaser (in essence forming an unregulated asset);

- significant tax benefits were available in the various privatisation processes;
- ACG make no allowance for the efficiency benefits that the owners of the regulated businesses might have expected to extract from the businesses;
- ACG make no allowance for strategic values that the purchasers of the businesses saw in making the acquisitions. For example, the acquisition could have provided a vehicle for future growth of the businesses, such as offering opportunities in telecommunications from the customer contact and from the use of the poles;
- intangible assets valuations being excluded from the analysis.

4 Risk free rate

The approach to the risk free rate adopted by the ACCC is contentious and has been subject to significant debate over recent years. NECG has extensively critiqued analysis commissioned by the ACCC from Associate Professor Martin Lally, and other arguments raised by the ACCC to justify its current position of basing the bond maturity in the risk free rate on the length of the regulatory period.

In this section we do not propose to revisit this earlier material on the risk free rate, and refer the ACCC to our earlier submissions.[22] Instead, we wish to focus on two key issues:

- international precedent towards the risk free rate; and
- the most recent report commissioned by the ACCC – a paper by Professor Kevin Davis, which includes discussion on the appropriate risk free rate.

4.1 International comparison of approach to risk free rate

The ACCC is isolated domestically and internationally in its approach to the bond maturity in the risk free rate.

In Australia, all jurisdictional regulators have consistently adopted the 10-year Commonwealth bond as the risk free rate without exception since, amongst other things, it is the longest dated liquid bond. This has been further justified on the grounds that it corresponds to the practice of investors in long-term assets in unregulated environments. For example the Office of the Regulator General noted:

> In other relevant jurisdictions, there is recognition that amortisation of relevant assets must be over their full economic life which implies that investors must have an expectation that they will be compensated for making long term investments before they commit to the investment. Therefore, even though regulators may

[22] For example, see NECG's submissions to the ACCC in relation to ElectraNet's revenue reset application.

> review investment returns at regular intervals, it would be a mistake to believe investors' planning horizons only extend to the next review. Models of expected returns and any regulation of those returns must reflect and take account of the investors' planning horizons. The reapplication of the prevailing long-term rate every five years is sufficient to achieve this, as the owners of the project make their investment decision based on the life of the project, using the appropriate discount rate determined with reference to the prevailing yield curve.[23]

An overview of international approaches to the risk free rate is set out in Table 3:

[23] Office of the Regulator General, Weighted Average Cost of Capital for Revenue Determination: Gas Distribution, Staff Paper Number 1, May 1998, p.14.

Table 3: Position on risk free rate – international regulators

Country	Regulator	Bond maturity
Canada	CRTC	10 years
Canada	National Energy Board	10-30 years
Canada	British Colombia Utilities Commission	10-30 years
Canada	Canadian Transportation Agency	Range of short and long term bonds
Canada	Alberta Energy & Utilities Board	10 years
Canada	New Brunswick Board Commissioners	10 years
France	Autorite de Regulation des Telecommunications (ART)	10 years
Ireland	Commission for Energy Regulation	10 years (German nominal bond)
Ireland	Commission for Aviation Regulation	10 years (German nominal bond)
Netherlands	Dte	10 years
New Zealand	Commerce Commission	Regulatory Period
UK	Ofgem	Current yield on gilts of maturity 5-20 years
UK	Ofwat	Current yield of gilts of maturity 5-20 years
UK	Civil Aviation Authority	Longer term yields – historic and current data
UK	Office of the Rail Regulator	Historic yield on long dated gilts
UK	Competition Commission	Historic yield on long dated gilts
UK	Oftel	Yield on 4-5 years

Source: Regulatory documents. The US is not included given the risk free rate is not explicitly determined in most regulatory proceedings.

These examples show the isolation of the ACCC. Of the regulators listed above, only two have a policy, which results in a risk free rate determined consistent with the length of the regulatory period. Neither case provides support for the ACCC position:

- Oftel has typically based bond maturity in the WACC through looking at the yield on short and longer dated gilts. In its 2001 decision on mobiles it based the risk free rate on the yield to maturity of gilts of 4-5 years. While this position was not questioned by the businesses, it should be noted that at the time the yield curve for UK gilts was downward, not upward, sloping, and the average asset life of a mobile network is significantly less than an electricity transmission network; and

- the New Zealand Commerce Commission has recently based its position on the views of Associate Professor Martin Lally, who has been quoted extensively by the ACCC to justify its position.

4.2 Analysis undertaken by Professor Kevin Davis

In his report for the ACCC, Professor Kevin Davis (Davis) assesses the appropriate bond maturity for the risk free rate and the appropriate averaging period. Other issues raised in this report in relation to the equity and debt beta are discussed in later sections of this report.

4.2.1 The Choice of Maturity for the Risk Free Rate

The majority of Davis' report is devoted to the choice of maturity for the risk free rate. Davis recommends that the maturity of the risk free rate should be equal to the length of the regulatory determination period. What is notable and appreciated is that Davis acknowledges at least some of the major assumptions that are required to reach his conclusion. Within this section, Davis addresses a number of issues, and we will discuss them in turn.

Davis makes a fundamental assumption (p5) that "… long term interest rates will, on average, exceed short term interest rates for reasons other than expectations of future increases in interest rates." This is a reasonable assumption as theory and empirical evidence support that the term structure of interest rates is affected by a liquidity preference of lenders and a "preferred habitat" of borrowers. Interest rate theory says that providers of debt capital have a preference for liquidity, so they prefer to lend for short periods. Borrowers that have a preference for borrowing long-term must then pay a rate that reflects expectations of future interest rates plus an additional premium to induce lenders to commit funds to longer maturities. This is what Davis identifies as the term premium.

We agree with that there is evidence of a term premium in the term structure of interest rates. Relevant to the estimation of cost of capital over periods of many years however, the importance of factors other than expectations of future interest rates tends to diminish if not disappear for maturities beyond one year. [24]

The CAPM and the risk free rate

Davis looks at the maturity of the risk free rate in the CAPM. He uses the construct of a tracking portfolio. Although the construct is different, the basic analysis is the same as the analysis used by Associate Professor Martin Lally in his paper for the ACCC. Davis shows, using the assumptions imbedded in his analysis[25], that using a maturity for the risk free rate which exceeds the regulatory period provides excess returns for the regulated entity.

Davis is clear in recognising that a fundamental issue is the interest rate risk faced by the regulated entity (a risk which must be distinguished from recontracting risk which we address below). We agree with Davis that if the focus is on interest rate risk and that risk is assumed to be aligned with the regulatory period (which is unlikely be the case in practice), then the regulated entity should structure its debt so that the interest rate is reset at the beginning of each regulatory period. However, there are strong practical reasons why this is unlikely to be the case:

- debt markets are both imperfect and incomplete, so regulated businesses cannot in practice hedge their entire debt portfolio in the manner assumed by Davis. To do so would expose regulated businesses to gaming by lenders by virtue of the concentrated and non-discretionary borrowing that would be required under such a regime;

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24 For example, see G. Alexander, W. Sharpe and J. Bailey, "Fundamentals of Investments" (3rd ed), Prentice Hall: Upper Saddle River, New Jersey, pp 500-508.

25 Among other things, Davis' analysis assumes that there is no operating cost risk, no transactions costs and that the risk free interest rate has no systematic risk. So the risk of realising the expected value of an asset at the end of a regulatory period is not priced out.

- interest rate risk must still arise to the extent that regulated businesses are forced to raise significant debt during a regulatory period – which will normally be the case for any regulated business engaged in a substantial capital expenditure program;
- commercially efficient debt management may well involve the diversification of debt across the yield curve and allow scope for refinancing to be timed to market cycles.

In essence, Davis' approach seems more suited to an environment where a regulated business is perfectly compensated for debt costs *ex post* – an environment which by its very nature is totally incompatible with *forward looking* incentive regulation. Moreover, this does not imply it should structure its equity in a similar manner – a point we consider later.

However, the analysis is incomplete at this point as there are other issues that the regulated entity must address in optimally structuring its debt. There are two fundamental issues in determining the appropriate maturity for the risk free rate – interest rate risk and recontracting risk. Davis acknowledges recontracting risk later in his report, and we will discuss it following a discussion of the relationship between the risk free rate and the MRP.

The risk free rate and the MRP

Davis states that a critical ingredient in the determination of the required rate of return is the expected return on the market portfolio, and that the required return is a forward-looking concept. This is not controversial.

Davis then notes that in practice the difference between the expected market return and the risk free rate, that is the MRP, is used in estimating the cost of equity capital. From this he states, "Motivating this approach is the assumption that historical estimates of the MRP can be used as a proxy for the current expected value." We do not agree with this statement. The approach to estimating the cost of equity that he explicates requires an estimate of the

forward-looking MRP but does not require any particular approach to making that estimation.[26]

Davis continues by noting the historical estimates of MRP are calculated using some maturity of the government bonds used to represent the risk free rate and that the 10-year government bond is normally used. He then states, "The assertion often made is that if these estimates of the MRP are to be used in the CAPM, consistency requires use of the same maturity risk free rate." To counter the "assertion" that consistency is required within the CAPM, Davis cites five arguments.

1 Historical data provides a benchmark but should not be accepted uncritically.

2 Historical MRP can be measured as arithmetic or geometric averages, and the comparison of a risk free return and a market return should be done contemporaneously.

3 MRP can vary over time.

4 Historical MRP estimates are derived primarily from before dividend imputation, and there is no guarantee that the tax change did not impact MRP.

5 The market for government securities has changed markedly over the past twenty years.

We agree with all of Davis' points in so far as they apply to estimating MRP. However, none of them are relevant to the issue of whether there should be consistency in applying the CAPM. For example, it is certainly true that historical data should not be accepted uncritically and that the introduction of dividend imputation may have impacted MRP – though as yet there is no evidence to support this.[27] We accept that historical MRP is

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26 For example, Bowman adopts a benchmarking approach (R. Bowman "Estimating the Market Risk Premium," *JASSA*, Spring 2001, pp.10–14).

27 For example, the QCA notes "There is no conclusive empirical evidence to support the notion that dividend imputation has had a systematic effect on the market risk premium in

deficient in that it is primarily based on market data over a period when markets in Australia were highly regulated. But this does not address the issue of consistency in measuring the risk free rate in the CAPM.

Davis says that the strongest argument is his last one. Because the markets have changed, interest rates are now more volatile, and he estimates that 10-year government bonds now have systematic risk such that the beta may be as high as 0.35. He then concludes "It would be inappropriate to apply an estimate of the MRP derived from comparison of market returns and those on a (then) zero beta asset to the rate of return on an asset which is now a non zero beta asset." But again, even if this is correct, it is only an argument against using historical estimates of MRP as a forward-looking MRP. It has nothing to do with the importance of consistency in measuring the risk free rate in the CAPM.

It is simple algebra to show that consistency is required. With a modification to allow the possibility of inconsistency, the CAPM for a company that has a beta of one is:

$$E(R_e) = R_f(1) + 1 * [E(R_m) - R_f(2)]$$

$$= E(R_m) + [R_f(1) - R_f(2)].$$

Since the company has the same beta as the market, it must be that

$$E(R_e) = E(R_m).$$

But this can only be the case if:

$$R_f(1) - R_f(2) = 0,$$

which of course requires that:

$$R_f(1) = R_f(2).$$

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recent years". [QCA Working Paper 4, Issues in the Estimation of Queensland Rail's Below Rail Coal Network Expected Rate of Return, December 2000, p29.]

Therefore, the risk free rate applied to estimating the market risk premium must be the same risk free rate as used in determining the base risk free rate. If R_f is not the same in both places, then a firm with a beta of one would not have the same expected return as the market. More pointedly, if R_f is not the same in both instances, the model being used is not the CAPM.

Davis seems to accept this. He does not explicitly state that he believes inconsistent measurement of the risk free rate is acceptable. Also, in a number of other places in his report he acknowledges the need for consistency. For example, on page 4, in determining equation (3) he says, "It is necessary to make a choice of maturity of r_f for use in the CAPM equation." In addition, in page 6 Davis uses a tracking portfolio where he goes from the CAPM to equation (5): $R_a = R_f * (1-\beta_a) + -\beta_a * R_m$. To do this, he has to assume that the risk free rates are identical. Davis' tracking portfolio analysis, which is fundamental to his case that the maturity of the risk free rate should be equal to the regulatory horizon, requires that the risk free is defined consistently within the CAPM.

The above analysis, as well as common sense, shows that the measurement of the risk free rate in the CAPM must be consistent.

Corporate debt maturity / re-pricing characteristics

We agree with Davis that it is necessary to separately consider the appropriate maturity of the risk free rate for use in the CAPM (i.e., estimating the cost of equity) and in estimating the cost of debt.

If it was agreed that the debt issued by a regulated entity was optimally structured and the cost of that debt was observable, we would use the observable cost as the estimate of the cost of debt capital in the WACC.[28] However, this is virtually never the case. The regulated entity is often a part of a larger corporation. The issued debt may not be structured optimally because of incomplete debt markets available to the entity. The cost of the issued

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[28] Actually there is a cost to issue the debt. The regulated entity will need to recover these costs either as an allowable cost or by adding an increment to the cost of debt. We will ignore this additional cost to the debt issuer for purposes of this discussion.

debt may not be observable. Therefore, it is normal to estimate cost of debt capital as equal to the risk free rate plus a debt margin or debt risk premium. In doing this, it has also been usual to assume that the debt has a fixed interest rate over the maturity of the debt.

Davis acknowledges (p13) that "the interest rate risk characteristics of a debt instrument need not be related to its maturity. … If it is desired to avoid interest rate exposure, it is necessary to structure the repricing period for debt so that exposure from this source is offset by exposure from operating activities."

The importance of this point, upon which we agree with Davis, is that the maturity of the debt and the resetting of interest rates on the debt are two separable issues.

Again Davis captures important points when he says (p15):

> For a company investing in a long term asset, which is expected to be held to the end of its economic life, there may be some attraction in issuing debt with a long maturity. This could reflect transaction costs of repeated debt issuance or desire to lock in a particular credit spread on debt for the life of the asset. Locking in the credit spread could be desired to protect against market wide movements in credit risk premia, or concerns about issuer specific credit risk.

A company that has invested in a long-lived asset and intends to finance that asset with debt over its life (i.e., maintaining a constant leverage ratio) should use a maturity of its debt that approximates the maturity of its assets. The primary incentive to do so is to avoid recontracting risk. If a company contracts for a shorter period than the life of the asset, there is the risk that when the short-term borrowing matures, the company will not be able to obtain new financing at the same terms and conditions.

Although we agree with Davis on the incentives to obtain long-term maturities, he goes on to consider possible implications of regulation. He says that the recontracting risk is removed if the allowed debt margin at the beginning of each regulatory period is based on the then current credit rating of the company. We agree, but there is clearly no assurance that the ACCC will follow this estimation procedure. In fact, there are numerous regulatory situations where the ACCC has resorted to benchmarking in estimating a WACC parameter. Indeed, the Discussion Paper sets out the ACCC's preference for a benchmarking approach to determining a credit rating in the cost of debt. In addition, the ACCC has routinely "refined" its approach to the estimation of the cost of capital between regulatory reviews – a point in evidence by the very process to which the TNSPs are currently responding. If the

debt margin is estimated using benchmarking, Davis' condition is not met and the company will bear the adverse cost of recontracting.

This is clearly a risk for regulated entities. They are concerned about the downside risk of borrowing short-term - that they may not be able to achieve refinancing at the terms and conditions that are available to them at the time an asset is acquired. They can eliminate that risk by appropriate long-term borrowing. Therefore, unless the regulator credibly commits to allowing actual debt margin to be used at each redetermination of the cost of debt through the full life of the assets, it is prudent for the regulated entities to borrow long-term.

Our Conclusion

We begin consideration of the issues discussed by Davis with the premise that the WACC should be based upon structures that are optimal for the regulated entity. With respect to debt financing this means the entity should take steps to mitigate the interest rate risk and recontracting risk that it faces.

Interest rate risk is addressed by contracting to reset interest rates consistent with the impact of interest rate changes on the entity's net revenues. Generally, this period will be not longer than the regulatory period.

Recontracting risk is addressed by borrowing with a maturity that approximates the life of the entity's assets and that includes regularly scheduled principal payments.

A key area of differences in conclusions between Davis and ourselves is his assumption that the ACCC will always use the entity's actual debt margin.

In many, but not all regulatory environments, the ACCC sets WACC so that the entity's net revenues are responsive to that setting. If the ACCC will then credibly commit to using actual debt margins (or debt margins appropriate to an entity's actual credit circumstances and leverage) for the full life of the asssets, then we agree with Davis that the maturity of the risk free rate for debt could be the regulatory period. However, as the ACCC cannot commit to this in practice, the most appropriate policy is to set the maturity of the risk free rate to best approximate the life of the assets employed.

4.2.2 The Averaging Period for Calculation of the Risk Free Rate

Davis makes three main points with respect to the averaging period for calculating the risk free rate:

1 Rate on the day is theoretically correct.

2 Averaging can reduce the impact of daily movements in market rates.

3 It may be impractical for an entity to arrange its entire debt on one specific day, so for calculating the cost of debt averaging should be over a period approximating the period that the entity would require to put its debt in place.

We agree that the rate "on the day" is theoretically correct. As to the second point, we agree but believe that this only justifies averaging if there is specific concern about market volatility. In general, we do not believe such concern is warranted. We also agree with his third point that a regulated entity may not be able to put its entire debt in place on a single day. Where we may differ is in the application of his third point. Davis says that averaging over a period of 10 to 40 days may be appropriate to reduce the basis risk faced by an entity. Accepting Davis' point that there is a practical problem of putting an entity's entire debt structure in place on a single day, the appropriate averaging period would then be expected to vary across firms where the more debt involved, the longer should be the averaging period.

We believe that the ACCC's proposal, to let the regulated firm propose the averaging period at the time of its revenue application is a reasonable approach, given a pre-determined time period is unlikely to be optimal for all businesses. Adopting a consistent approach can minimise the potential for regulatory gaming.

4.2.3 Issues not Addressed by Davis

Davis does not address the issue of the appropriate maturity for the risk free rate in estimating the cost of equity. In our view, the maturity should be determined by the investment horizon of equity investors. Although equity investors often have short-term expected holding periods, the investment horizon is long-term. This is because the value of the company at any point in time is always very long-term (in the limit, perpetual).

Therefore, even if I intend to sell my shares in a year, my horizon for the company must be long-term as that will determine the price at which I will be able to sell my shares in one year. Although there will be a very wide range of expected holding periods across investors, in principle they should have a common investment horizon.

In our view, the investment horizon of a company could be considered infinite (i.e., a perpetuity). However, more practically, the investment horizon for most infrastructure providers with long-lived assets is the life of the assets employed. We recommend using the life of the entity's assets as the maturity of the risk free rate used in estimating the cost of equity.

Davis has some discussion of duration, but it is not oriented to resolving practical measurement issues when a long maturity is used for the risk free rate. In our view, debt should have a profile similar to the assets that it finances, as the WACC estimation process assumes a constant leverage. The value of an asset declines over its life, and similarly the amount of debt should decline over the life. Generally, that implies a duration of the asset and associated debt of half the life of the asset. When we use a government bonds as a proxy for the risk free asset, the bond will have no interim principal payments. The duration of the bond roughly approximates the life of the bond.

Therefore, in estimating the cost of debt it is appropriate to use a government bond with a maturity of half the life of the assets employed by the entity. However, for estimating the cost of equity, the maturity of the government bonds should be equal to the life of the assets employed.

5 Cost of equity and beta

In its Discussion Paper, the ACCC notes that its "initial view is to move towards benchmarking an equity beta from current market evidence and incorporating an upper confidence interval" (page 81). As part of the process to reach this position, the ACCC has looked at a range of material, which we consider in this section:

- advice commissioned from Professor Kevin Davis;
- a view of the appropriate level of beta for regulated businesses against the market as a whole; and
- current beta values.

5.1 Report of Professor Kevin Davis

In his report to the ACCC, Davis was asked to consider the suitability of various procedures for determining equity betas for use in calculation of the WACC. In relation to equity beta Davis makes a number of comments in relation to the approach to estimating equity beta and the de-levering and re-levering approach.

5.1.1 Estimating Equity Betas

Davis discusses the use of comparable companies in estimating the betas for regulated entities. He notes the limited availability of comparable companies in Australia and concludes that such information is relevant but is not sufficient to justify being the sole input for reliable beta estimation. He then notes that an alternative is to use beta data from other countries, as more data is available if the international markets are used. Although there are potential problems with using international data, he comments that there is no obvious alternative. He states:

> In practice, this is often not feasible, and betas are calculated for comparator firms operating in other countries and using the market portfolio of that country. It is then assumed that the systematic risk characteristics observed in that country are similar to those, which would apply here. Although this approach, and assumptions involved, can be debated, there is no obvious preferable alternative,

> unless there is a significant portfolio of comparator stocks trading in the local market.[29]

We agree with the comments that Davis makes in this section but believe four additional points should be made on this issue.

First, Davis says there are few comparable companies available in Australia, and we agree. However, the availability of comparable companies is related to the definition of what constitutes a comparable company. The looser the definition, the more companies will be available. Thus, an important issue is how to identify comparable companies. What standards should be applied? We will return to this issue in our third point.

Second, with respect to using beta information on comparable companies from other countries, a recent paper by Bowman and Graves provides support for the reasonableness of such an approach. [30]

Third, if comparable company analysis is not sufficient for estimating beta, it becomes important to specify what additional information is relevant. In our opinion, all estimations of beta should include consideration of basic first principles that should characterise an estimate of beta. In general and for regulated companies, we consider the firm's operating leverage, its income elasticity, the terms of any contractual arrangements and the nature of the regulatory regime under which it operates are all relevant factors to a first principles analysis. Other factors may be important depending upon the company and its business. In addition to providing information on the estimation of a company's beta, first principles are useful in setting relevant parameters for selecting appropriate comparable companies.

Fourth, another issue has arisen recently in Australia with the estimation of equity betas using security returns. It is common to use equity betas calculated and reported by the

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29 Davis, p19.

30 R. Bowman and L. Graves, "A Test of the Usefulness of Comparable Company Analysis in Australia", working paper, University of Auckland.

AGSM. For a number of Australian regulated companies, the equity betas are very low.[31] Similarly, the explanatory power of the statistical procedure used to estimate the betas is very low.

It is a statistical property of beta estimation that if the R-squared goes to zero, the beta will follow. This can be shown below from Sharpe's CAPM:

$$\beta = Cov(R_i, R_m)/var(R_m)$$

where $Cov(R_i, R_m)$ is the covariance of stock i with the market, and $var(R_m)$ is the market variance. Statistically we know:

$$Corr(R_i, R_m) = Cov(R_i, R_m)/(sd_i*sd_m)$$

Where $Corr(R_i, R_m)$ is the correlation between stock i and the market. Therefore, beta can also be represented as follows, where sd is the standard deviation of the stock and the market respectively:

$$\beta = [Corr(R_i, R_m) * (sd_i/sd_m)] / var(R_m)$$

As R-squared represents the fraction of the squared error that is explained by the model, as the correlation tends to zero then so will beta.[32]

Therefore, significant caution is required in interpreting very low beta values.

5.1.2 Leverage Formulas

When using comparable company analysis to estimate a company's equity beta, it is necessary to first de-lever the equity betas of comparable companies and then re-lever the

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31 Indeed, they have been trending down over recent years, despite no obvious reason why systematic risk should be decreasing.

32 This is not to exclude the possibility of a low beta with a high R-squared.

asset betas with the regulated company's leverage to obtain the comparable company estimate of its equity beta. Davis states that there is no formula that is correct in all circumstances, but that the results using different formulas is often immaterial provided the formula is used consistently for both the de-levering and the re-levering. Davis then concludes that the Monkhouse formula for de-levering and re-levering betas under dividend imputation is as suitable as any other available formula. He also notes that when the process is applied to betas for a company in a different, non-imputation tax system, the Monkhouse formula needs to ignore franking credits (i.e., assume $\gamma = 0$).

We agree that the most important issue is the consistent application of a formula, at least when the process is being applied to Australian companies. We do note though that the standard formula used for the process internationally is not obtained when the Monkhouse formula is used and franking credits are ignored.[33]

5.2 Beta for a regulated business against the beta of market as a whole

The ACCC has made a number of statements that an equity beta for a regulated business should not be above 1. In the discussion paper, the ACCC notes:

> The Commission has generally computed an equity beta of one for TNSPs. An equity beta of one implies that the firm has the same level of systematic risk as the market average. Intuitively an equity beta of less than one may be more appropriate for regulated TNSPs in Australia given the level of market risk, which they face. These firms are regulated entities with a guaranteed revenue stream and a demand for their essential services that is inelastic.[34] [emphasis added]

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33 The standard formula used internationally, when debt is considered to be risky, is that found in T. Conine, "Corporate Debt and Corporate Taxes: An Extension," The Journal of Finance, 1980, vol 35(4), pp 1033-1037.

34 ACCC, Discussion Paper, 2003 Review of the Draft Statement of Principles for the Regulation of Transmission Revenues, page x.

In its ElectraNet decision, the ACCC notes:

> The Commission notes that an equity beta estimate of 1.0 was adopted for the draft decision. This suggests that the TNSP experiences the same volatility as the market in general. However, this is not consistent with the frequently held views that gas and electricity transmission businesses are less risky and have more stable earnings than the market average. Greater stability suggests that the equity beta should be less than 1.0.[35] [emphasis added]

These quotes are misleading. An equity beta of one implies that the firm's equity share has the same systematic risk as the market as a whole – not that the firm itself has the same level of systematic risk. This is only true where the gearing of the firm is the same as the gearing of the market as a whole. Therefore, in making such comparative statements, what is of relevance is the asset beta of the market and the firm, not the equity beta.

If the gearing of the Australian market is considered, the asset beta of a TNSP is significantly lower than the average asset beta of the market. Our best estimate of the average asset beta for a firm listed on the All Ordinaries Index (value weighted) is 0.64 – significantly higher than the asset beta provided for TNSPs.

In estimating this value we have made the following calculations.

First, we obtained from Bloomberg data on the equity beta of all 487 firms currently included in the ASX All Ordinaries Index, the weightings of these firms in the All Ordinaries Index (summing to one) and gearing data.

Second, firms that did not have a beta – for example, if they had not been on the All Ordinaries Index for sufficient length of time to have a beta – were excluded. Only a handful of firms were excluded, reflecting the fact that the beta values were calculated using two

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35 Australian Competition and Consumer Commission, Decision: South Australian Transmission Network Revenue Cap 2003-2007/08, December 2002, page 36.

years of weekly data.[36] The relative weighting of other firms in the All Ordinaries Index was adjusted upwards to reflect this.

With these adjustments, we estimated that the average equity beta of the All Ordinaries Index was 0.982 for unadjusted equity betas and 0.988 for adjusted equity betas – that is, with the Blume adjustment applied.

Gearing data was available through Bloomberg for all but 37 of the listed firms, which accounted for 2.9% of the total index. The weighted average gearing of the firms with data was 36.7%. The average asset beta was calculated using the ACCC's version of the Monkhouse approach using two methods:

- first, and most simply, the weighted average gearing of the market of 36.7% was applied to an equity beta of 1.0 to give an average asset beta of 0.64;
- second, the asset beta of all firms with gearing data was calculated. These were weighted by each firms respective share on the All Ordinaries Index – and adjusting for the 2.9% data omission, producing a value of 0.69 for asset betas derived using both the raw and adjusted (Blume) equity beta values.

Estimating an average asset beta using both these methods suggests that the ACCC is considering the underlying systematic risk of TNSP assets as significantly lower than firms listed on the ASX. This is a result of the higher gearing assumed for TNSPs to that applying to listed firms. Put another way, the ACCC's own characterisation of the systematic risk of TNSPs suggests that the asset beta should be in the range of 0.60 to 0.70 rather than the value of 0.40 the ACCC has consistently adopted.

36 Note that this is the Bloomberg default value.

5.3 Relevance of current beta values

In its Discussion Paper (pages 78-79), the ACCC calculates betas values using AGSM data (Table 5.1), and for a sample group of companies estimates a mean, standard deviation and various confidence intervals (Table 5.2). The ACCC further notes that this approach forms the basis of its preferred approach to beta in the future.

We believe such an approach is flawed and will create significant regulatory uncertainty for a number of reasons.

First, the beta estimates that the ACCC relies upon have poor statistical properties. Tables 4a to 4c set out the standard errors, t-statistics and R-squared values for the core sample comparators included in the Discussion Paper.

Table 4a: AGSM data on equity betas – December 2002

Company	Raw equity beta	Standard error	T-stat (raw beta)	R-squared
Alinta Gas	0.15	0.39	0.38	0.01
Australian Gas Light	0.08	0.32	0.25	0.00
Australian Pipeline Trust	0.24	0.27	0.89	0.03
Envestra	0.33	0.28	1.18	0.03
United Energy	0.25	0.48	0.52	0.01

Table 4b: AGSM data on equity betas – September 2002

Company	Raw equity beta	Standard error	T-stat (raw beta)	R-squared
Alinta Gas	0.13	0.40	0.33	0.01
Australian Gas Light	0.09	0.31	0.29	0.00
Australian Pipeline Trust	0.25	0.27	0.93	0.03
Envestra	0.31	0.27	1.15	0.03
United Energy	0.18	0.47	0.38	0.00

Table 4c: AGSM data on equity betas – June 2002

Company	Raw equity beta	Standard error	T-stat (raw beta)	R-squared
Alinta Gas	0.10	0.95	0.11	0.00
Australian Gas Light	0.36	0.66	0.55	0.03
Australian Pipeline Trust	0.44	0.58	0.76	0.10
Envestra	0.59	0.54	1.09	0.09
United Energy	0.25	0.89	0.28	0.01

The t-statistic here is a measure of the statistical significance of the relationship between the returns to the equity of the company and the returns to the equity market (i.e., the equity beta). In general, a t-statistic of less than 2 suggests that the beta estimate has such a high level of variability that considerable caution is required in drawing statistical inferences from these values. It is noted that none of the values listed by the ACCC have a t-statistic equal to or greater than 2, the highest being only 1.18.[37]

Similarly, in considering the data included by the ACCC for the purpose of setting a forward looking beta values, it is important to note the R-squared values for the regressions used to generate the beta values. The R-squared measures the percent of the volatility of the returns to the equity of the company that is explained by the returns to the equity market. In general, statistical relationships exhibiting an R-squared value of less than 0.20 should be treated with extreme caution. Yet the R-squared values are either zero or close to zero in almost all cases.

[37] Although none of the beta estimates area even close to significance, it is interesting that in all three time periods the highest t-statistic is also the highest beta estimate.

The importance of these considerations is that in pooling the estimates for the purpose of determining a composite average and confidence interval, the ACCC is unlikely to be pooling independent observations – and will be pooling observations that have a number of common deficiencies. None of these estimates are statistically significant. In addition, as noted earlier, it is a statistical property that if R-squared tends to zero then beta will follow. Therefore, we have serious concerns on the applicability of these estimates.

Our second concern is that even if this problem could be overcome, the approach of pooling estimates is open to gaming and abuse by both regulated entities and the regulator alike. For example, inclusion of a few firms with a high beta could result in a high confidence interval, while by contrast if a low beta is sought, a large number of firms with a low beta can be included in a sample. Given the limited number of listed comparators, debate will inevitably focus on the comparability of firms to the regulated business in question.

Third, we expect a strong relationship between regulatory decisions and beta values, further compromising the independence of the estimates. For example, if a regulator were to set prices too low – or at an extreme case based on marginal cost - the subsequent reduced volatility in free cash flows will result in a very low beta value. However, the resulting cost of capital will not be sufficient to attract capital investment.

Finally, even if a mechanistic formula can be determined, the choice of the appropriate level of confidence to apply is inevitably ad hoc. The ACCC has not indicated the level of confidence it considers appropriate to the determination of the beta estimate. Given the inherent need for judgement in determining a beta, relying on such a mechanistic approach is dangerous and will introduce a false sense of confidence. Therefore while considering such information may have value – providing problems with data quality can be overcome – such a mechanistic approach to beta should not be introduced given the inherent limitations of the Australian market for listed comparators of regulated infrastructure businesses

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38 For similar reasons, we believe there is merit in also applying the Blume adjustment to statistically significant beta estimates.

Such an approach is inconsistent with the views of Davis noted earlier, who suggested the need to consider international comparators, and the ACCC's discussion paper, where it notes:

> Having said this, the Commission notes it would be inappropriate to solely rely on market based betas due to concerns about the reliability and sample size of the current data.[39]

International beta estimate

As noted, we agree with Davis that international data on beta values can provide useful information in determining a beta value for an Australian regulated firm.

We have undertaken an up-to-date international review of beta allowances for transmission providers. This approach was implemented by using data obtained from Bloomberg, which calculates and publishes beta and financial analysis data on all publicly listed companies.

Bloomberg's database for listed companies worldwide includes only a handful of explicitly listed transmission entities, but over 100 companies that are classified as integrated, which covers firms that also have generation, distribution and retailing functions. The beta values from the electricity transmission and electricity-integrated categories in Bloomberg have been considered to calculate an average beta applicable for electricity transmission organisations.

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[39] ACCC, Discussion Paper, 2003 Review of the Draft Statement of Principles for the Regulation of Transmission Revenues, p81.

The estimates were based on monthly observations where possible as beta calculated over longer intervals helps to overcome the infrequency of trading problem.[40] Companies that did not have a beta – either because they are not traded or infrequently traded – were removed. In addition companies with negative betas, with no data on gearing or with implausibly high values (close to 100% debt) were excluded given their outlier status.

This sample was further limited to those companies whose beta values had a t-statistic of 2 or above. This resulted in a sample of 33 companies in Table 5. Raw betas were adjusted in accordance with the standard Blume adjustment.[41] De-levering was undertaken using the Hamada formula and using gearing data from Bloomberg.[42]

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40 Equity betas were calculated using monthly data for a 60 month period. Where it was not possible to obtain 60 monthly observations, the differencing interval was shortened. For example if only one and a half years of data was available, weekly observations were used so that the beta could be calculated over at least 60 observations.

41 International studies supporting the use of adjusted betas include Sharpe, W.F., Alexander, G.J. and Bailey, J.V. (1995), *Investments*, 5th edition, Englewood Cliffs, Prentice Hall, Blume, M.E. (1971), 'On the Assessment of Risk', *Journal of Finance*, March pp. 1-10; and Blume, M.E. (1975), 'Betas and their Regression Tendencies', *Journal of Finance*, June, pp. 785-795.

42 The simple version of the Hamada formula (without tax and assuming riskless debt) calculates the asset beta as Ba = Be*(E/V) , where Ba is the asset beta, Be the equity beta and E/V the share of equity in assets employed. Use of the Hamada approach avoids the need to consider tax rates and dividend imputation. The results are robust and consistent with other approaches, such as Monkhouse.

Table 5: Beta estimates of international businesses primarily involved in electricity transmission – November 2003 (debt beta = 0)

Country	Company	Raw equity beta	T stat	D/E ratio	Unadjusted asset beta	Adjusted asset beta
Predominately Transmission-only entities						
Malaysia	Tenaga Nasional Berhad	1.31	11.91	96%	0.67	0.61
Pakistan	Karachi Electric Supply Corp	1.50	10.71	73%	0.87	0.77
Brazil	CTEEP	1.09	7.27	16%	0.94	0.91
Argentina	Transener S.A	0.60	4.62	376%	0.13	0.15
Spain	Red Electrica de Espana	0.68	2.62	144%	0.28	0.32
UK	National Grid Transco PLC	0.44	2.59	122%	0.20	0.28
Colombia	Interconexion Electrica S.A.	0.26	2.36	223%	0.08	0.16
Integrated electricity businesses						
Turkey	Aksu Enerji ve Ticaret A.S.	0.80	16.00	0%	0.80	0.87
China	Guangxi Guiguan Electric Power Co	1.03	12.88	3%	1.00	0.99
China	Sichuan Minjiang Hydropower Co	1.36	10.46	25%	1.09	0.99
China	Sichuan Mingxing Electric Power Co	0.98	9.80	6%	0.92	0.93
Italy	Enel S.p.A.	0.54	9.00	43%	0.38	0.48
Portugal	EDP - Electricidade de Portugal	0.87	7.25	144%	0.36	0.37
Russia	RAO Unified Energy System	1.21	6.72	32%	0.92	0.87
Brazil	Companhia Energetica do Ceara	0.80	6.67	138%	0.34	0.37
India	Tata Power Company Limited	1.20	5.45	122%	0.54	0.51
Spain	Hidroelectrica del Cantabrico	0.41	5.13	28%	0.32	0.48
Chile	Enersis S.A.	1.02	4.86	285%	0.27	0.27
Malaysia	Sarawak Enterprise Corp Berhad	1.02	4.43	27%	0.81	0.80
Brazil	Light Servicos de Eletricidade S.A.	0.84	4.00	426%	0.16	0.17
Spain	Union Fenosa, S.A	0.60	3.75	156%	0.23	0.29
Russia	Samaraenergo	1.24	3.65	33%	0.93	0.87
Russia	Sverdlovenergo	0.63	3.00	113%	0.30	0.35
US	PNM Resources Inc.	0.69	2.88	104%	0.34	0.39
Russia	Krasnoyarskenergo	1.66	2.86	12%	1.48	1.28
US	Cleco Corporation	0.55	2.62	138%	0.23	0.29
Chile	Edelnor S.A.	1.09	2.48	1150%	0.09	0.08
Average (transmission companies)		0.84	0.89	150%	0.45	0.46
Average (integrated)		0.93	0.95	149%	0.57	0.58
Average (all companies)		0.90	0.94	149%	0.54	0.55

The average asset betas based on this process for transmission businesses is 0.46 if the Blume adjustment is provided and 0.45 if unadjusted betas are considered. If integrated firms are included in the sample, the average rises to 0.55 and 0.54 respectively. These values are both higher than allowances currently provided by the ACCC, and significantly above the values proposed in the Discussion Paper.

The estimates of asset beta (unadjusted) have a confidence interval at the 95% level of 0.45±0.27 if the transmission-only providers are considered and 0.54±0.14 if all firms in the sample are considered. If a 99% confidence interval is used the respective upper bound confidence intervals on the asset beta are 0.81 and 0.73 respectively.

6 Cost of debt

In the discussion paper and in the supporting paper by Kevin Davis, two key issues are raised in relation to debt: the determination of a credit rating for the regulated firm; and the treatment of the debt beta.

6.1 Approach to credit rating

We believe the ACCC's approach to determining a benchmark credit rating unnecessarily penalises efficient electricity transmission businesses and violates principles of competitive neutrality.[43] The ACCC supports use of a benchmark credit rating as follows:

> The Commission considers it is appropriate to abstract from the actual cost of debt facing a TNSP, as the actual cost of debt may not reflect efficient financing. Therefore the cost of debt should be determined through reference to a benchmark credit rating and an associated debt margin. Adopting a benchmark credit rating for the TNSP is also more appropriate given that the creditworthiness of the entity is in part under managerial control and the use of a benchmark is consistent with other assumptions.[44]

The ACCC then lists the credit rating of the following companies to support its view that a benchmark credit rating for an electricity transmission company should be "A".

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43 Note that it also results in contracting risk, as noted in the section on the risk free rate.

44 ACCC, Discussion Paper, 2003 Review of the Draft Statement of Principles for the Regulation of Transmission Revenues, p82.

Table 6: Credit ratings listed by ACCC

Company	Rating	Type of business	Rating basis
Ergon Energy	AA+	Electricity distribution and retail	Reflects Govt ownership
Country Energy	AA	Electricity distribution and retail	Reflects Govt ownership
EnergyAustralia	AA	Electricity distribution and retail	Reflects Govt ownership
Integral Energy	AA	Electricity distribution and retail	Reflects Govt ownership
SPI Powernet	A+	Electricity transmission	Parent entity (SPI)
Citipower trust	A-	Electricity distribution	Parent entity (CKI)
ETSA Utilities	A-	Electricity distribution	Parent entity (CKI)
Powercor Australia	A-	Electricity distribution	Parent entity (CKI)
United Energy	A-	Electricity (and gas) distribution	Entity
ElectraNet SA	BBB+	Electricity transmission	Entity

As can be seen, the list includes only two electricity transmission businesses, of which only one, namely ElectraNet SA, has a stand-alone credit rating of its own right.

To make up for the lack of consistent comparators, the ACCC expanded its sample of companies to include electricity distribution and retail companies. In addition, the rationale for inclusion the credit rating of overseas businesses CKI and SPI as an input into determining the credit rating for a stand-alone electricity transmission provider is not stated – except that in the case of SPI it considers Government ownership as relevant. In its SPI decision, the ACCC noted:

> Further, given that SPI PowerNet's owner Singapore Power is a government entity, the Commission considers that it is appropriate to include government entities in its sample in determining the average credit rating.[45]

[45] Australian Competition and Consumer Commission, Decision: Victorian Transmission Network Revenue Caps 2003-2008, December 2002, p19.

Unless the inclusion of the credit rating of State Government owned entities is based on a purely stand alone basis, it violates all principles of competitive neutrality – principles the ACCC accepts in determining the value of other parameters in the WACC, such as gamma.

We support the adoption of a credit rating consistent with an efficiently operating business, but the ACCC should not react to a lack of suitable comparators by including the credit rating of other firms of little or no relevance to the business in question. By doing so, the ACCC risks systematically the benchmark credit rating, and consequently biasing the required debt margin.

In the absence of appropriate data on comparable companies, the ACCC should consider what an efficient credit rating for the firm in question would be, through considering a number of means such as cashflow modelling and seeking the advice of private rating agencies. In undertaking any cash flow modelling, it is critical that the parameters that are applied are consistent with those adopted by the Commission for the purposes of its consideration (e.g., benchmark gearing levels).

6.2 Davis comments on the beta of debt and the cost of debt

In his paper, Davis recommends a small non-zero value (in the range of 0.10 to 0.20) for the debt beta. He states that he has done some preliminary estimates to support his values. He also notes that the effect on WACC of different values of debt beta will generally be negligible.

Debt beta is a measure of the systematic risk of the entity's debt. If the debt is not risk free, then a portion of the risk will almost certainly be systematic. However, it is just as certain that a portion of the risk of the debt will not be systematic. The difficulty is in estimating the extent of the risk that should be reflected in the debt beta.

We agree with Davis that the debt beta should be greater than zero. Therefore, zero can be regarded as an absolute lower bound on debt beta. We also believe that estimating the debt beta using the debt margin and the structure of the CAPM (i.e., $(r_d - r_f) / MRP$) will over-estimate the debt beta but can be regarded as an absolute upper bound on an appropriate value.

A figure around the mid-point of these upper and lower bounds may be justified. However, of critical importance is for the process of de-levering and re-levering to be undertaken consistently, such that it does systematically over- or under-state the estimated equitybeta.

7 Asymmetric risk

The Discussion Paper makes little reference to asymmetric risk, except in the context of whether it warrants an adjustment to the beta. Even this brief discussion appears confused. For example, the ACCC notes that regulatory 'error' may favour the business. However, if by regulatory 'error' the ACCC refers to calculation errors in making a determination, such an error should not be asymmetric, as there appears little reason for there to be a bias in the making of such errors. Leaving this aside, we believe it is important that the Statement of Regulatory Principles explicitly recognises that asymmetric risk exists.

It is well known that the CAPM approach used by the ACCC to determine a cost of equity capital assumes the diversifiability of some unavoidable risks. If these are risks that investors in a security cannot avoid by diversification, investors can be expected to require a return for bearing that risk.

The assumptions of the CAPM imply that the returns are normally distributed. However, there are many risks, and hence returns, that are asymmetric. Risks are asymmetric when the possible outcomes in one direction are different than the possible outcomes in the opposite direction. Asymmetric risks are very common but are not necessarily a problem when using the CAPM to estimate the cost of equity capital if the risks can be insured against or diversified. The very nature of the regulatory process involves imposing an asymmetry in the range of possible outcomes – a fact that should alone justify the explicit recognition of the need for consideration of this issue in regulatory exercises.

Regulated infrastructure companies face a range of risks that are asymmetric including:

- assets becoming stranded as customers change consumption patterns and competitors change strategies;
- regulatory bodies adjusting policies or regulatory frameworks; and
- the occurrence of extreme events, with the regulated firm in all likelihood bearing the costs when they are negative but not commensurately benefiting when the gains are positive.

These risks can have a number of characteristics that differentiate them from other risks faced by the company and from most asymmetric risks that are confronted by other types of businesses. First, the risks are unavoidable and asymmetrical, with the possible negative

outcomes significantly larger than the possible positive outcomes. Therefore, these risks cannot be diversified away by the company. Second, insurance against these risks is not commercially available. Third, these risks cannot be diversified away by investors in the company as the counter-parties to the risks are not public companies in which investors can invest. The principal economic counter-parties in each of the cases are consumers. That is, consumers will benefit from lower charges for the service. Finally, these risks are not accommodated in the CAPM.

Because these risks are assumed not to exist in the CAPM, estimations of the cost of equity capital using the CAPM will not include any reward for facing these risks. Yet it is clear that investors will require such recognition if they are to invest in infrastructure companies. Clearly when such risks do exist, the CAPM is inadequate and some form of modification or supplementation is required. To do otherwise would create an environment where the expected return on any investment would systematically be negative – which would be clearly inconsistent with an environment conducive to encouraging socially desirable new investment. In general, the CAPM is not amenable to modifications for these risks, so regulatory returns must be supplemented.

In this submission, we do not wish to outline the ways by which regulatory returns can be supplemented – except to state that the business should be provided with the opportunity of demonstrating that these risks exist and quantifying the impact.

Given the ACCC has already accepted the validity of asymmetric risks in its GasNet decision and in its Draft Greenfield Guidelines, it is appropriate and consistent to include recognition of such risks in a revised Regulatory Principles document. As this is a "principles" document, we do not believe a particular approach should be prescribed. Instead TNSPs should be provided with the opportunity to make submissions in the format considered appropriate given the risks faced.

8 Other issues

In this section we wish to briefly respond to other issues raised in the ACCC's discussion paper.

8.1 Market risk premium

In the Discussion Paper the ACCC supports adoption of a value of 6.0% for the market risk premium.

While we note that this value is consistent with regulatory precedent in Australia, longer-term historical data and benchmarking approaches to MRP suggest that a MRP of 7% is more appropriate.[46]

The historical range for the MRP favoured by finance professionals has been 6.0 to 8.0% and this range represents the collective wisdom of over 100 years of market evidence in Australia. While a number of arguments have been produced to suggest that a figure at the low end of this range may be appropriate, each of these arguments are not supported theoretically nor are they supported by empirical evidence.

As a result, there is not a strong case for using a figure at the low end of the range. The regulatory consequences of setting too low a MRP/WACC in the form of insufficient investment are greater than those of setting too high a WACC (short run super-normal profits), a point noted by the Productivity Commission.

> The possible disincentives for investment in essential infrastructure services are the main concern. In essence, third party access over the longer term is only possible if there is investment to make these services available on a continuing basis. Such investment may be threatened if inappropriate provision of access, or regulated terms and conditions of access, lead to insufficient returns for facility owners.

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46 The appropriate value of the MRP has been covered extensively in recent submissions to the ACCC on behalf of ElectraNet and other TNSPs. Therefore, we refer the ACCC to our past submissions in relation to this point.

> While the denial or monopoly pricing of access also impose costs on the community (see above), they do not threaten the continued availability of the essential services concerned. Thus, over the longer term, the costs of inappropriate intervention in this area are likely to be greater than the costs of not intervening when action is warranted. The substantial information and other difficulties that confront regulators in establishing access terms and conditions, make this asymmetry in the benefits and costs of access regulation even more important in a policy context.[47]

This suggests that there is a strong public interest argument in favour of a higher MRP than has been customary in Australian regulatory decision making in recent years. Given that any estimate of MRP is a matter of judgement, the asymmetric consequences of regulatory intervention favour choosing a rate that is tilted to overestimating the MRP rather than under estimating it. Accordingly, we believe that the appropriate range for a forward-looking MRP to be between 6% and 8%.

8.2 Gamma

In the Discussion Paper, the ACCC states that it proposes to retain its current value of 0.50 for gamma given the uncertainty associated with estimating its value.

There is considerable uncertainty associated with the value of gamma, and we agree with the ACCC that this uncertainty is unlikely to be definitively resolved in the near term. A gamma in the range of 0.30 to 0.50 is well established in Australian regulatory decision-making, with the ACCC's value at the upper end.

We do not believe there is a basis for any increase in gamma above 0.50. A value of zero is consistent with the marginal shareholder being an international investor, which may be a realistic assumption, at least for larger infrastructure providers.

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47 Productivity Commisssion, "Review of the National Access Regime. Position Paper", March 2001, pp xviii-xix.

However, we note that given the uncertainty associated with the value of gamma, and that this uncertainty is unlikely to be definitively resolved in the near term, a value within the range of 0.30 to 0.50, consistent with regulatory precedent, can be justified.

8.3 Debt and equity issuance cost

In the Discussion Paper, the ACCC notes that it proposes to consider the costs of debt and equity issuance as part of the cashflows.

We support this proposal so long as the costs incurred in issuing outstanding debt and equity are recognised in this process. Some relevant considerations are considered below.

8.3.1 Debt issuance costs

In recent decisions, the ACCC has accepted the validity of including allowance for the transaction costs of raising debt finance. In doing so, it has recognised bank fees and dealer swap margins as legitimate debt-raising costs. The Victorian Essential Services Commission also accepted the validity of including an allowance for non-margin establishment costs in the cost of debt in its Victorian Gas Decision.

The allowances provided by the ACCC to date have been in the range of 10.5 to 12.5 basis points on the cost of debt. In our view, the total cost of issuing debt significantly exceeds the amounts granted to date.

US data suggest that a premium for debt issuance equivalent to up to 50 basis points on the cost of debt capital may be appropriate. Debt can be issued either directly by private placement or through a public issue. The issuance costs of a direct placement are considerably lower than a public issue (as considered by the ACCC). However, the interest rates paid on private placements are usually higher than those on a public issue. So there is a trade-off when issuing debt by private placement – issuance costs are lower but interest rates are higher. Brealey and Myers state:

> "a typical differential [between the interest rate on public and private issues] is on the order of 50 basis points". [48]

Hays, Joehnk and Melicher[49] conducted an empirical study of the difference in rates between public and private debt issues and found that the yield to maturity on private placements was 0.46% higher than on similar public issues.

Because both these citations are about differences in rates of return rather than the quantum of issuance costs, the differences are quite large. Even if issuance costs of private placements were nil, which of course they are not, it would indicate issuance costs for private debt issues of about 0.50%

If private placements have such a higher interest rate, it raises the question of why anyone would issue debt this way? The major reasons are that private placements of debt have advantages in the debt contracts that can be used, and they can be done much faster. Private placement debt can be very flexible and can be tailored to the specific needs of the issuer and lender. By contrast, the debt contracts for public debt are quite standardised and allow almost no ongoing adjustments to the contract.

In our view, the empirical evidence that is available is consistent with a total debt issuance cost, stated as a rate of return, would be in the order of up to 0.50%. The impact in the cash flows would depend on the regulated asset base and gearing assumptions.

8.3.2 Equity raising costs

To raise equity financing, a company will incur costs to prepare financial information and documentation required for an equity issue, whether an initial public offering or a subsequent offering. To a substantial extent, the internal costs that a company must bear will be included in its O&M as salaries and related expenses. However, a company will also necessarily incur substantial external costs that would not be included in O&M. These costs

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48 Ibid, p401.

49 Hays, Joehnk and Melicher, "Determinants of Risk Premiums in the Public and Private Bond Market," Journal of Financial Research, Fall 1979, pp143-152.

include legal and accountancy expenses, and the expenses of engaging an investment bank to organise, manage, underwrite and execute the offering.

There are two alternatives for an amortization period of the equity raising costs: life of the assets or in perpetuity. When a company, particularly an infrastructure company, raises finance, both in the form of debt and equity, there is an orientation towards the life of the assets. The alternative is to consider that equity is perpetual, and there is no necessary reason why the corporation cannot and will not continue far beyond the original life of its assets.

In its Draft Decision on GasNet, ACCC decided upon using the life of the assets as the amortisation period. In its Final Decision, ACCC reversed this decision and amortised the equity raising as a cost in perpetuity.

For many infrastructure investments, we believe that the life of the assets orientation is fundamental to the formation of the business and should be the period of amortisation. Electricity transmission businesses are likely to fall in this category.

In determining the annual allowance for GasNet, the ACCC assumed the costs were to be treated as a perpetuity and then used the real vanilla WACC to estimate the perpetuity. We do not accept that this approach is correct. The costs involved are equity costs and they are to be related to the equity value of the business. In our opinion, the appropriate rate to use for the calculation is the cost of equity capital. Moreover, since the equity has been raised to finance assets, the period over which equity raising costs should be amortised is the average life of the assets rather than perpetuity.

9 Conclusions

WACC remains a contentious area of regulatory decision-making. Currently Australian infrastructure providers face a significant challenge in attracting investment, particularly given the decision of many overseas investors to exit the Australian infrastructure sector. If WACC allowances are provided to regulated businesses in Australia that are lower than a firm's cost of capital, the impact will ultimately be borne by consumers through inadequate investment and lower service quality.

We believe that a number of proposed positions raised in the Discussion Paper expose the businesses to significant, and in some cases increasing, regulatory risk, which can only increase the challenge in attracting investment. These include the continuation of the approach to the bond maturity in the risk free rate, the approach to the setting of beta and the approach to determining a benchmark credit rating as part of the cost of debt.

Experience from overseas, especially in relation to recent blackouts in the US and Europe, suggests that even if Australian rates were comparable with those provided overseas, there may still be significant risk in attracting investment.

If WACC allowances are provided to regulated businesses in Australia that are lower than a firm's cost of capital, the impact will ultimately be borne by consumers through inadequate investment and lower service quality. While, in the short run, reductions in service quality may not be evident, because of obligations to maintain network reliability for example, over time investors will be increasingly unwilling to finance otherwise efficient investments. The impact of under-investment will be seen in an increase in the risk of low probability catastrophic events, which are the most economically harmful form of service degradation in that they leave no opportunity for customers to adapt.

Appendix 1: Methodology for international WACC comparison

In comparing regulatory decisions across countries, we have considered the following features of the WACC allowances:

- the margin of the vanilla WACC over the risk free rate; and
- the asset beta.

Margin of the vanilla WACC

The margin of the vanilla WACC above the risk free rate is represented by the following expression:

Margin = (debt margin) * (D/V) + (equity margin)*(E/V),

where the debt margin is the difference between the cost of debt capital and the risk free rate,[50] and the equity margin is the difference between the cost of equity capital and the risk free rate. In a CAPM framework the equity margin is equivalent to the equity beta multiplied by the market risk premium.

Adopting this measure in a comparative analysis has a number of advantages:

- WACC decisions are primarily expressed in the vanilla form in the US and Canada, with this specification adopted by the ACCC;
- the margin can be applied to decisions where the risk free rate used is specified in nominal or real terms;
- in other countries that typically do not apply a vanilla WACC, such as the UK and Ireland, an equivalent vanilla WACC can be readily determined from the final decisions given that tax is consistently applied at the statutory rates; and

50 Where the cost of debt is inclusive of issuance costs.

- there is readily available data on the risk free rate in countries where regulators do not explicitly include the rate as part of its WACC determination (US).

As the margin of the vanilla WACC is likely to be influenced by the market risk premium, we have also considered the impact of explicitly adjusting the vanilla WACC margin in regulatory decisions to account for differences in market risk between Australia and the country in question.[51]

Asset beta

While the asset beta is a key input factor in the vanilla WACC margin, we have also explicitly considered the asset beta in our comparisons, as it is a key decision-specific variable affecting a regulatory allowance.

We believe that adjustment to the asset beta to reflect different markets is not required for the purpose of an exercise of this kind.

Typically, reported beta values are obtained by regressing the business returns on a domestic market index – for example, the beta value of a US business is typically estimated by reference to the US market. Such a beta value for the US business need not be the same if that business return was regressed on the Australian market, or if the firm were to operate in the Australian market. This is because of differences in market structure and – for a regulated business – differences in regulation across countries.

There is no generally accepted adjustment factor for comparing asset betas across countries.[52] However, for the purpose of this analysis we believe that assuming betas can be transferred

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51 Note that while there is a high degree of regulatory consistency on the appropriate value of the MRP in Australia, this is not the case in the UK where regulators adopt substantially different values.

52 One suggested approach to comparing Australian and US beta values is to adopt: $\beta_{i,OZ} = \beta_{US,OZ} * \beta_{i,US} + cov(R_i,e_{OZ,US}) / var(R_{OZ})$, where $\beta_{i,OZ}$ is the domestic beta of an Australian company; $\beta_{US,OZ}$ is the beta of the US index regressed against an Australian index; $\beta_{i,US\ is}$ the domestic beta of a US company; and $cov(R_i,e_{OZ,US}) / var(R_{OZ})$ measures the relationship between the return of company i and the return on the Australian market that is

across markets will not introduce any upward bias to the Australian results. If anything it may understate Australian beta values. To the extent that markets such as the US and UK are more diversified than Australia's, beta values in Australia for a comparable company may be higher, assuming the regulatory arrangements are similar.

Key assumptions

In comparing the implied margin and asset beta provided in all the electricity transmission decisions the following assumptions have been made:

Risk free rate

The analysis has been standardised around the 10-year Government bond in the country in question. This bond has been chosen given that the majority of international regulators consider bond maturity of at least 10 years in decisions where the CAPM is used. Where a regulator has explicitly adopted a 10-year risk free rate – this value has been used for comparative purposes.[53]

In the US and Canada, where the regulator has either not explicitly adopted a risk free rate (US), or specified a risk free rate of up to 30 years (Canada), the average of the daily observations of the relevant 10-year Government bond in the month of the regulator's decision has been adopted for comparative purposes.

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uncorrelated with the return on the US market. However, this approach provides an estimate of a foreign company's beta if it were listed in Australia. It does not estimate its beta if it was operating in Australia.

53 In the case of the UK decision in the UK we have adopted the risk free rate figures determined by Ofgem. Given use of bond rates between 5 and 20 years by Ofgem in determining the risk free rate, we do not believe such a practice will introduce any bias to the results. In addition, given the widespread adoption of a real risk free rate by regulators, adopting the regulators (real) risk free rate avoids the need to make assumptions on the appropriate inflation rate where a real rate is derived from nominal bonds.

In decisions by the ACCC that use a bond rate of less than 10 years, we have adopted the equivalent 10-year bond over the averaging period adopted by the regulator for the shorter length bond.[54] The differences between the two bond rates, which are translated directly into the vanilla WACC margin, are shown in Table 7.

Table 7: Adjustments to risk free rate where bond maturity adopted less than 10 years – ACCC electricity transmission decisions

Decision	Date	Bond maturity adopted by regulator	Bond rate in decision	Estimate of comparable 10-year bond	Impact on WACC margin
Transgrid/EA	Jan-00	10-year	6.81%	6.81%	NA
Snowy Mountains Hydro	Feb-01	5-year	5.19%	5.40%	-0.21%
Powerlink	Nov-01	5-year	5.65%	5.81%	-0.16%
ElectraNet	Dec-02	5-year	5.17%	5.59%	-0.42%
SPI Powernet	Dec-02	5-year	5.12%	5.59%	-0.47%
Transend (draft)	Sep-03	5-year	5.43%	5.53%	-0.10%

Asset beta

The approach to the asset beta depends on whether or not the decision employs the CAPM framework.

In decisions using the CAPM framework (Australia, UK, Ireland) we have derived a comparable asset beta by setting the debt beta at zero and solving for the asset beta based on the equity beta provided in the decision. In doing so, we have used the levering approach adopted by the regulator in their decision.

[54] In some cases it has not been possible to precisely recreate the figures adopted by the ACCC, given that the final date of the averaging period used in decisions is not always specified. For example, we have not been able to recreate the ACCCs bond rate calculations for Transend.

Where the decision does not use the CAPM (Canada, US) we have undertaken the following steps:

Step 1: Estimate an equivalent equity beta based on the following relationship:

$$\beta e = (re - rfr)/MRP.$$

Step 2: Convert the equity beta to an asset beta. For simplicity we have applied the following relationship:[55]

$$\beta a = \beta e * (E/V).$$

Consistent with the approach to the risk free rate, we have adopted the equivalent 10-year bond rate at the time of the decision for the risk free rate.

We have estimated a proxy value for the MRP in Canada and the US by considering regulatory statements on MRP, which have typically been made in the context of using the CAPM as a cross-check on other approaches to estimating the cost of equity capital. In our submission to the Productivity Commission Review of the Gas Access Regime we estimated that these statements were consistent with a value for the MRP in Canada of 5.0% and of 6.0% in the US.[56] There is clearly inconsistency with these values as it appears implausible that the ex-ante US MRP will be similar to that in Australia, but significantly higher than both Canada and the UK – where regulators have typically adopted a MRP of the order of 3.5% to 4.0%. For the purpose of estimating equivalent asset betas, using a MRP in the US that is too high will understate the relevant asset beta.

Explicitly adjusting the vanilla WACC margin for market risk

The market risk premium (MRP) varies between countries. As differences in the assessment of market risk can materially influence the allowance provided in a regulated decision, there is a need to account for these differences in any comparative analysis.

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55 Note that the results are not sensitive to adopting this assumption.

56 Ibid, pp52-54.

However, a key problem that arises in estimating the MRP is that it is an expectation and therefore is not directly observable. As a result the choice of an appropriate rate is inevitably ad hoc, regardless of whether historical material is relied upon or forward looking estimates made. Given the imprecise nature of any estimates, there is no single correct approach to accounting for differences in market risk between countries.

There are a number of alternative approaches available to estimate differences in MRPs between countries. These include:

- use of historical estimates of MRP based on a comparable methodology and timeframe;
- development of a composite world market index, with differences in market risk estimated from regressing a particular market index on the world index;
- consideration of regulatory statements; and
- first principles.

These methods are considered in detail in NECG's submission to the Productivity Commission.

All estimates of MRP differences have limitations, and therefore any adjustments require an element of judgement, particularly where applied to estimate differences in forward looking MRPs. For simplicity, and given the limitations of the various approaches, we have chosen to adjust for market risk by considering the vanilla WACC margin that would have applied in each of the countries had the regulator adopted the value for the MRP of 6% in its decision(s).

Adopting this adjustment does not mean that we support a value of 6% for the Australian MRP — on the contrary, the historical evidence supports a value closer to 7% (mid point of the historical range of 6.0 to 8.0%), while consideration of benchmarking the Australian MRP against the US market also supports a value close to 7%.[57] Applying a uniform 6% value for

[57] For example, Bowman estimated the Australian MRP at 7.8% by benchmarking the Australian MRP against the US market [R. Bowman "Estimating the Market Risk Premium,"

the MRP is equivalent to making the following adjustments for market risk between the countries considered in this section and Australia.

Table 8: Adjustments applied to MRP

Country	Range corresponding to actual MRP values adopted in regulatory decisions	Increment on MRP required to give MRP of 6%
Canada	5.0%	+1.0%
Ireland	5.4%	+0.6%
UK	3.5%	+2.5%
US	6.0	Nil

NECG imputed values are shown for Canada and the US.

For each decision, the impact on the vanilla WACC margin from assuming an MRP of 6% is as follows:

Vanilla WACC increment = (6% - MRP_d) * equity beta * (E/V),

where MRP_d is the MRP actually provided by the regulator in its decision.

JASSA, Spring 2001, pp.10–14.] Professor Bowman has since revised his benchmarked estimate of the market risk premium in Australia to 7%.