INDEPENDENT REVIEW OF COMMERCE COMMISSION'S WACC PROPOSALS FOR TRANSPOWER

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5.08.2010

SUMMARY AND CONCLUSIONS

We have been asked by Transpower to:

- express an opinion as to the reasonableness and appropriateness of the Commerce Commission's proposals regarding the estimation of Transpower's WACC; and to
- set out an estimate of Transpower's WACC that accords with the overall purpose of Part 4 of the Commerce Act, which we would recommend for use in the development of Transpower's individual price-quality path by the Commission.

Our views in relation to these matters are detailed in this report, and are summarised below.

Based on our interpretation of the data available to us, our estimate of an appropriate post-tax WACC[1] for Transpower is 8.7% using the Commerce Commission's framework which includes a 75th percentile adjustment for measurement error. Our estimate of the WACC accords with the requirements of the overall purpose of Part 4 of the Commerce Act. The calculation is summarised in the table below. The summary table also includes our estimates of the WACC using the Commerce Commission's approach and, as might be calculated using the AER's methodology and parameter choices, but using NZ or Commerce Commission estimates in some cases e.g. for the risk free rate and tax rate.

Our estimate of the WACC for Transpower is 140 basis points higher than that proposed by the Commission, before allowing for a cost of debt that reflects a 10 year maturity instead of the 5 year maturity adopted by the Commission. In our view, the Commission's approach to estimating the market risk premium, the risk free rate and the allowance for the cost of debt leads to the derivation of a WACC which is inadequate in light of the overall purpose of Part 4 of the Commerce Act.

[1] This is the "classical" post tax WACC, which is the definition of the WACC adopted by the Commission.

	Commerce Commission	AER 'View'	Our View: NZ Formula	Comments
Parameter				
Leverage	40%	60%	60%	
Risk Free Rate	4.70%	5.48%	5.48%	5 year maturity adopted by the Commission. 10 year for our view
Debt Issuance costs	0.30%	0.09%*	0.30%	The AER number is a proxy
Debt Premium	2.66%	3.25%*	2.66%	Our view is not adjusted for 10 year risk profile
TAMRP	7.00%		9.53%	Added $R_f T$ to Aust. MRP reflecting current market volatility
MRP		6.50%	8%	
Beta of Assets	0.34	0.32	0.4	AER is implied from equity beta
Beta of Debt	0	Not clear	0.2	
Tax Rate	28.0%	28.0%	28.0%	
Calculations				
Beta of Equity	0.57	0.8	0.7	Relever beta of assets
Debt to Equity ratio	0.67	1.5	1.5	
Cost of Equity	7.4%	10.7%	10.6%	$R_f (1-t)$ + TAMRP * Beta equity
Cost of Debt	7.7%	8.8%	8.4%	
Vanilla WACC	7.5%	9.6%	9.3%	
75th Percentile Adjustment	0.7%	n/a	0.9%	Commerce Commission formula
Vanilla WACC @ 75th Percentile	8.2%	n/a	10.2%	
Tax adjusted cost of debt in WACC	6.6%	8.1%	7.9%	Tax adjusted cost of debt in WACC as per the Commission's WACC definition
75th Percentile Adjustment	0.7%	n/a	0.9%	As Above
Tax adjusted cost of debt in WACC @ 75th Percentile	7.3%	n/a	8.7%	

* Draft Decision for Victoria, June 2010. The AER includes debt issuances costs as a cash flow adjustment rather than a WACC adjustment however we have included an estimate for a WACC adjustment.

Particular comments for each of the parameter's estimates are as follows:

- Leverage of 60% is closer to our comparable analysis and is the level adopted by the AER for benchmark Transmission and Distribution companies;

- We are of the view that the yield on a 10 year government bond is the most appropriate rate for long term assets like Transpower. The proxy for the risk free rate should be the same as that used to estimate the TAMRP;

- We have not estimated a current debt premium or debt issuance costs for Transpower and have used the Commerce Commission estimate for current purposes. The premium should be updated to reflect the premium over 10 year government securities that prevail as close to the determination date as possible and reflect the premium on at least 10 year maturing debt. The AER column reflects the latest rate assessed by them for BBB^{+} rated corporate debt (early June 2010);

- The relevant TAMRP is that which will prevail over the regulatory period. Current market volatility and therefore the MRP is much higher than the long term average because of the GFC and other major market uncertainties (e.g. European sovereign debt). Our estimate of a one year forward looking MRP in Australia is circa 12% based on a forward volatility measure from the option market and an assumed constant MRP per unit of volatility. We assess an MRP profile from this level reverting to the long term average over three years and calculate a geometric average of this for 5 years. This provides a conservative and 'level' MRP of 8% based on Australian conditions (including a higher MRP than that implied by the Commerce Commission TAMRP) which we expect otherwise will also be reflective of NZ conditions. This estimate is converted to a TAMRP by adding $R_f \times T$ to it. We note that the AER have increased the MRP from 6% to 6.5% however we are of the view that this does not adequately reflect current market conditions and those expected to prevail over the regulatory period;

- We have estimated a beta of assets from the beta of equity of comparable companies. The delevering process included a positive beta of debt to reflect the reality that debt is riskier than government securities. Because there is substantive estimation error we prefer to round the estimate to one decimal point rather than suggest spurious accuracy with 2 decimal points;

- We have used the Commerce Commission's estimate of the Tax Rate in the absence of us undertaking any research into this item;

- The beta of equity is a 'relevered' beta of assets using 60% gearing and a beta of debt of 0.2. The beta of debt of 0.2 is reflective of an average long term debt risk premium;

- We are in agreement with the principle of adjusting the 'expected' WACC to a higher number because the social cost of underinvestment in infrastructure is higher than that arising from providing an element of economic rent. Without defining relative loss functions for each of these possible outcomes we are unable to specify an alternative to the 75th percentile adjustment. Consequently we have accepted the Commerce Commission's view and used its 'complex adjustment' method to estimate the adjustment. We understand Transpower have separate advice on this adjustment;

- We calculate two WACCs. The first is the plain vanilla WACC which is an after all corporate tax WACC and the version used by the AER. In the case of the 'vanilla' WACC the interest deductibility of debt would be included in the cash flow building blocks for this WACC. The second WACC is the 'classical' WACC. Under this definition, the adjustment for the interest deductibility of debt is incorporated into the WACC and not in the cash flows. Both WACCs are 'correct' provided that the appropriate corresponding definitions of cash flows are used with them.

CONTEXT AND TERMS OF REFERENCE FOR THIS INDEPENDENT REPORT

In June 2010, the Commerce Commission (the Commission) published two papers setting out the proposed input methodologies to be applied in the economic regulation of Transpower from 1 July 2011. These are:

- *Input Methodologies: Transpower Draft Reasons Paper*; and
- *Individual price-quality path: Transpower Draft Reasons Paper.*

A draft of the legal instrument (the Determination) giving effect to the Commission's proposals was published in early July 2010.

We have been asked by Transpower to answer the following questions:

1. Are the Commission's input methodology proposals and draft Determination for Transpower's WACC reasonable and appropriate having regard to:

   (a) the overall purpose of Part 4 of the Commerce Act as set out in section 52A of the Act;

   (b) the benchmarks set by recent WACC decisions of the Australian Energy Regulator for electricity distribution and transmission;

   (c) current data and evidence from capital markets; and

   (d) any relevant benchmarks of the cost of capital for regulated network businesses?

2. In light of your response to the question in (1), please set out an estimate of Transpower's WACC that accords with the overall purpose of Part 4 of the Commerce Act, which you would recommend for use in the development of Transpower's individual price-quality path by the Commission.

In the course of preparing this report, we have read the Code of Conduct for Expert Witnesses as laid down by the High Court of New Zealand, and we agree to comply with it.

The curriculum vitae of R.R. Officer and S. Bishop are appended to this report.

ANSWER TO QUESTION 1: THE APPROPRIATENESS AND REASONABLENESS OF THE COMMISSION'S WACC ESTIMATE FOR TRANSPOWER

We will comment on the above question in the context of our discussion of the parameters that determine the WACC. As a starting point we note that Table X4 of the Commission's Draft Reasons paper on Input Methodologies for electricity distribution services (the EDB Draft Reasons Paper) sets out the Commission's framework for estimating the WACC. We note that this framework also applies to Transpower. For convenience, Table X4 is reproduced below.

Table X4: Summary of Draft Decisions for the Cost of Capital (Chapter 6)

Topic	Draft Decision
Overall Approach for the Cost of Capital	The Commission will estimate the cost of equity using the simplified Brennan-Lally version of the Capital Asset Pricing Model. Seven parameters are required to estimate the cost of capital: 1. Leverage 2. Risk-free rate of return 3. Debt premium and debt issuance costs 4. Tax-adjusted market risk premium (TAMRP) 5. Betas 6. Tax rates The Commission considers that the degree of volatility with regard to the risk-free rate of return and the debt premium is sufficient to update these parameters when calculating suppliers' cost of capital. All other parameters that form part of the cost of capital estimation are assumed to stay constant over time (with the exception of the temporary increase in the TAMRP) and therefore will be fixed in the input methodology determination and will not be updated on a regular basis. Recognising that the cost of capital estimate is subject to some uncertainty (due to uncertainty associated with some of the underlying parameter estimates), the Commission will calculate a cost of capital range.
Implementation for Information Disclosure	For information disclosure, the Commission will annually calculate a range for the five-year term of the vanilla and post-tax cost of capital. The Commission considers it appropriate to apply a range between the 25th and 75th percentiles for assessing profitability.
Implementation for Individual Price-Quality Regulation	For the purpose of the individual price-quality path, Transpower is subject to a four-year regulatory period (made up of one transitional year and a three year period) followed by a five-year regulatory period. The Commission will, for both regulatory periods, select a single point estimate of the vanilla cost of capital with a five-year term. The Commission considers it appropriate to apply the 75th percentile of the vanilla cost of capital estimate.

Topic	Draft Decision
Leverage	The Commission considers that a leverage of 40% should be applied in calculating the cost of capital for Transpower.
Risk-free rate of return	The Commission will estimate a five-year risk-free rate of return using the observed market yield to maturity of vanilla NZ government NZ$ denominated nominal bonds for Transpower on an annual basis.
Debt premium and debt issuance costs	The Commission will estimate the debt premium as the difference between the corporate and the risk-free rate of return for Transpower on an annual basis. The Commission will approximate the corporate rate of borrowing for Transpower using five-year publicly traded bonds, with a BBB+ Standard & Poor's or similar long-term credit rating. With regard to debt issuance costs, the Commission considers that these justify a 30 basis point addition to the cost of debt.
TAMRP	The Commission considers that a long-term rate of 7% for the TAMRP would be appropriate. However, in light of the recent global financial crisis, the Commission considers that a temporary increase of the TAMRP to 7.5% is justified until 30 June 2011. The TAMRP will be expressed as a five-year composite rate. Hence, a TAMRP estimated for the 2010 financial year would be 7.1% and a TAMRP estimated for 2011 financial year would be 7%.
Beta	The Commission will use an asset beta for Transpower of 0.34. Combining this estimate with a notional leverage of 40% equates to an equity beta of 0.57.
Tax Rates	The Commission will assume both the investor and corporate tax rate to be 30% up until 31 March 2011 and 28% thereafter.

In addressing Question 1, we will examine the six parameters involved in the WACC estimation. We will also examine the treatment of diversifiable or non-systematic risk, as well as the Commission's adoption of the 75th percentile point estimate of the WACC.

1. Leverage

Paragraph 6.5.54 of the EDB Draft Reasons Paper states:

> "*As outlined above, the purpose of setting a notional leverage that is invariant over time or across industries under Part 4 of the Act is to mitigate, to the extent possible, the effects of the cost of capital increasing as leverage increases when using the simplified Brennan-Lally approach. One of the effects of suppliers' cost of capital increasing with leverage would be that it would risk creating an incentive for suppliers of regulated*

> *services to increase their actual leverage in order to generate higher allowed rates of return or to argue for higher benchmark leverage*."

It is peculiar to adopt a framework which requires a level of one parameter that is inconsistent with the actual because of estimation errors of another parameter – it reminds us of the aphorism '…it is a complex web we weave when we first start to deceive". The estimation of equity and debt returns should be capable of adjusting for leverage changes under a more conventional framework, recognising that the betas or risk premiums change as leverage changes. We cannot see why the current Brennan- Lally CAPM framework is not capable of such adjustment but we acknowledge Lally's advice in paragraph 6.5.21 of the Commission's EDB Draft Reasons Paper, which states:

> *"When using the simplified Brennan-Lally CAPM in conjunction with the simplified beta gearing model, WACC … rises with leverage and therefore implies that leverage is undesirable. However, the use of debt by companies is typical. This implies that companies are acting irrationally or that there is some deficiency in the models used to estimate WACC. This paper shows that there are some deficiencies in the WACC model currently employed by the Commerce Commission, but these are not readily correctable, leaving the choice between the status quo (which overstates WACC) and a simple alternative in the form of setting WACC equal to the unlevered cost of capital (which would understate WACC). Choosing between these two options is a judgment matter for the Commission."*

It makes it hard to go to empirical evidence to find the correct estimate of a parameter when the use of such evidence may increase errors in another parameter, leaving the Commission with a trade-off between the options, a trade-off that does not apparently have a framework that can be contested.

We can note that 40% gearing appears low by the standards used by Australian regulators of gas and electricity transmission and distribution companies. The most common leverage for electricity transmission and distribution companies in the Australian regulatory environment is 60% debt to debt plus equity. This has been the norm since the initial regulatory decision the Essential Services Commission of

Victoria in 1998. The evidence from our analysis for estimating betas (set out in Attachment 2) shows an average debt to total capital ratio closer to 60% than 40%.[2]

2. Risk-free Rate for use in the Capital Asset Pricing Model (CAPM)

There has been some debate about what is the appropriate risk free rate to use in the CAPM. The debate has not concerned the source of the surrogate "risk free" rate which is a Government Issued security. The debate concerns the duration or term of such a security together with the sampling method used for determining an estimate.

The CAPM is a single period model of no fixed duration and various government securities from government bills to long term government bonds have been used as a surrogate rate. In the context of CAPM theory there is no reason to pick one duration over another. However, ideally the duration of the CAPM should be the duration of the planning period for which the CAPM is to be used to estimate an expected or required return. Typically there is often an implicit assumption of a match between the asset life and investor's planning horizon. Ideally, the maturity of the CAPM should be the maturity of the planning period for which the CAPM is to be used to estimate an expected or required return. This means that if the planning horizon is a long term investment then a long term government bond is the appropriate maturity to use. That is, the rate of return we are attempting to estimate for regulated network assets is that appropriate for long term investments.

This point is consistent with the general guideline that firms should match the length of their financing maturity with the life of the asset to minimise risks associated with funding, a point which we discuss further in the next section.

Further and importantly, it has been conventional to use 10 year bond yields as the proxy of the risk free rate in the estimation of the Market Risk Premium in the

[2] The time available to us has not permitted an 'in depth' analysis of an appropriate capital structure.

CAPM. One of the reasons for choosing such a security to "anchor" the base return has been that it is usually a highly liquid security so that current yield estimates are readily available. The data bases relating to the estimation of the Market Risk Premium that have been assembled typically use such a bond as the surrogate risk free rate.

When a shorter term rate has been proposed it has been usually a 5 year rate on the grounds that this was consistent with the period of the regulatory decision, the approach the Commission has adopted. The objective of the regulator's decision should be to provide an adequate return to support the on-going funding of existing assets and new investment, and insofar as most of these assets are long lived assets a long term bond as a surrogate for the risk free rate is more appropriate.

We consider that the most appropriate risk free rate to use in the CAPM is the 10 year government bond yield.

The date at which the yield on a government bond should be taken as the surrogate for the risk free rate is the date closest to the date of the pricing decision since the yield is meant to reflect the risk free rate that could be expected going forward. It has been common practice amongst regulators to take an average over a particular period e.g. 20 days, on the grounds that a single days' rate may be affected by "unusual events" and be unrepresentative. When interest rates are changing in one direction (e.g. they are "on the rise") the most recent rate is going to be a better reflection of the rate going forward. In these circumstances the shorter the period of averaging should be better.

The consequence of using a 5 year rate in the Draft Decision is that it is likely to be inconsistent with the rate used or implied in the Market Risk Premium. Further, we note that data published by the Reserve Bank of New Zealand indicate that at the present time, the 5 year government bond yield is approximately 78 basis points

below the 10 year bond yield, effectively and inappropriately reducing the permitted return on equity by that amount.

3. Debt Premium and Debt Issuance Costs

The issue is: 'what is a reasonable term to use for a government security which is to be used as the basis against which the company's debt risk premiums are to be measured'. This is fundamentally a different issue to 'what is the appropriate duration or term of the 'risk-free rate' or government rate in the CAPM'.

A company's service or interest cost of debt that is used by the regulator to determine a WACC should reflect the risk that such company-issued debt incurs. In an efficient and well informed capital market one would simply look at the yields on equivalent risk and duration debt of the various forms of the company's debt. However, there may be no such securities existing in the market, in which case the regulator should look for a surrogate and adjust for any difference. To estimate the cost of debt, the Commission uses as a surrogate 5 year government-issued debt because government debt is usually more readily traded and rates observed than corporate debt. Then, using the typical risk premium observed for company-issued debt over the government security of similar duration, the Commission adds this to the yield on government debt to obtain a surrogate for the yield on the company's debt.

The problem with the approach is often the reason for adopting a surrogate. When the corporate debt market is 'thin', it is often difficult for companies to obtain debt whenever they may want it; certainly 'large licks' of debt capital are unlikely to be readily available. This means that companies usually have to reduce their risk of capital raising by approaching the market at mixtures of intervals with the weighted average of the durations of the debt raised approximately matching the duration of the assets being financed.

We understand that Transpower has in place a policy to limit the risk of large concentrations of debt maturing, or being reissued in periods where credit margins are high. Accordingly, we understand that Transpower ensures debt is spread widely over a band of maturities. Consistent with the general principle that firms should match the length of their financing maturity with the life of the assets (to minimise risks associated with funding), we note that Transpower funds with debt with an average maturity of 7 years and with a proportion of funds longer than 10 years (some with a term as long as 15 years).

The Draft Report uses the BBB+ rated security to represent the company's debt status or risk class and then uses a premium over a five year government bond rate to give the risk premium on the company's debt.

In relation to the benchmark credit rating, the AER's recent review of WACC parameters for Australian electricity networks concluded that a credit rating assumption of BBB+ will generate a return on debt that reflects the current cost of borrowing for comparable debt.[3] We note, therefore, that the Commission's BBB+ credit rating assumption is consistent with that applied by the regulator in Australia.

It is implicit in the Commission's reasoning that the company can 'cover' the risk of debt by raising debt with the same term as the five-year regulatory period. (See paragraph 6.7.42 of the EDB Draft Reasons Paper and paragraphs 6.4.4 to 6.4.6 of the Transpower Draft Reasons Paper). This is unlikely to be possible for the reasons given here, and hence the company will incur much more by way of issuance costs than could be expected from a single issuance. We have not estimated this cost and assume that this has been considered by the Commerce Commission in its estimate of the issuance cost allowance.

[3] AER, Final Decision "Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters", May 2009, page xviii.

Moreover, as noted above, we understand that the average term of the company's debt is 7 years and yet the debt margin is based on a 5 year term. The risk margin across the term structure of interest rates is rarely constant, in general the 'normal' picture is that, like the term structure, the typical risk premium increases with term. Other-things-being-equal, we would expect a 7 year debt risk premium to be greater than a 5 year risk premium. Therefore the Draft Decision would tend to under-compensate the company for the cost of its debt.

The use of a 5 year term contrasts with the Australian Energy Regulator ["AER"] in Australia which matches the maturities of 'observed' corporate debt yields and government bonds at 10 years to assess the debt risk premium which is then added to the current estimate of the risk free rate (also with a 10 year maturity).

As an aside, the debt issuance costs are not part of the systematic risk or beta that could be expected to affect the yield or market cost of debt. However, they are real costs and are usually more accurately estimated and included as an explicit cost in the estimate of the net cash flows rather that as some complex geometric average (implicitly) in the WACC.

Moreover, insofar as Transpower uses a mixture of debt – some with a term as long as 15 years – we would expect the debt issuance costs to be relatively high. The process should take into account that the company cannot be expected to and has not been able to raise all its debt at one time in estimating the debt issuance costs and but we have not undertaken a careful examination of this area in the time available.

Overall, the approach taken by the Draft Decision, particularly the assumption of a 5 year debt funding term is at variance to promoting outcomes that are consistent with a competitive market and it is far removed from "mimicking" the approach the company could be expected to take if it faced a competitive market. In particular, we are of the view that the debt cost allowance determined using the Commission's

approach would not fully compensate Transpower for the efficient costs of servicing its debt portfolio.

4. Tax Adjusted Market Risk Premium (TAMRP)

The 'modified Brennan Lally CAPM' is defined as:

$$R_j = R_f(1\text{-}T) + \beta_j(R_m - R_f(1\text{-}T))$$

Where

R_j is the return on asset j;

R_m is the return on the market portfolio;

R_f is the risk-free rate;

T is the investor tax rate;

Estimating the value of T is beyond the scope of this report, so for the purpose of this report we have adopted the Commission's estimate of T.

Assuming T is a constant we will focus on the parameters Rm and Rf and the difference between them i.e. the standard or conventional Market Risk Premium (MRP = Rm - Rf). On the assumption of a constant T, changes in the MRP will reflect changes in the TAMRP where:

$$TAMRP = (R_m - R_f(1\text{-}T)),$$

$$= MRP + R_f.T$$

The EDB Draft Reasons Paper in footnote 507 says:

> "For the non-Australian estimates the MRP is related to the TAMRP by using the formula MRP = TAMRP $-R_f(T)$, where R_f is the risk free rate of return and T is the investor tax rate (30%). For conversion process of the Australian based MRP estimates see Lally, M., *International Comparison of Regulatory Cost of Capital for Gas Distribution Businesses*, Report to the New Zealand Commerce Commission, 28 October 2008, p.12. For all conversion the risk-free rate is 6% based on the ten-year New Zealand government bond rate (averaged over January 2010)."

We do not understand the distinction being made in the footnote between Australian based and non-Australian based MRP's (other than the NZ based estimate).[4] We believe they are identical, they are all (except the NZ TAMRP) defined as: MRP = Rm - R_f and we proceed on this basis.

The ex ante MRP is of the most critical and yet elusive measures of modern approaches to valuation. Ex-post it is impossible for this variable to be a constant because if it were constant there would be no risk and no risk premium. However, this does not mean the ex-ante estimation of this variable cannot be represented by a stable distribution with constant parameters; it is the ex-post measure which is stochastic. Moreover, the inherent stochastic nature of the ex-post MRP and its importance to estimating the ex-ante MRP, inevitably, will make its estimation a subject of controversy and debate.

It is usual to use historical data to estimate the ex ante MRP however the stochastic nature of the historical MRP leads to a wide confidence interval around a point estimate required for the ex ante estimate. We have not estimated an historical MRP for New Zealand but have done so for Australia. We are of the view that an estimate in the range 6- 8% is reasonable under normal conditions. [5]

However, our view is that the ex-ante MRP is not constant and probably cannot be adequately represented by a stable distribution. Unfortunately, however, the theory as to what might cause the parameters of the distribution (and thus the mean ex-ante MRP) to change is not well developed. This makes forecasting changes difficult. Moreover, given the volatility of ex post market excess returns, even detecting such

[4] In fact the book *Triumph of the Optimists* by Dimson, Marsh and Staunton who compared 101 years of global investment returns used data prepared by Officer to reflect the Australian returns (Chapter 18) which were directly comparable to the investment measures used for other countries.

[5] We note that footnote 5 of the paper entitled "Recommendation to the New Zealand Commerce Commission on whether or not it should change its previous estimate of the tax-adjusted market risk premium as a result of the recent global financial crisis", refers to a 7% TAMRP corresponding to a pre Global Financial Crisis MRP of circa 4.9%. Our data and review of the evidence in Australia leads us to a view that it would be difficult to justify an MRP this low in Australia and we are surprised that a NZ MRP would be lower than that prevailing in Australia.

a change after the event is not easy. Given this state of knowledge about the MRP we usually recommend caution before changing an MRP estimate without strong evidence such as the effect of the Global Financial Crisis. We note that the majority of the three experts consider that there should be recognition of the current high market volatility in the TAMRP despite there not being an agreement as to how much to adjust it.[6]

Nonetheless, there is an approach that is gaining acceptance to estimate MRP's in the light of changing economic conditions. The approach - which has some currency among UK academics, and which is applied by some professional fund managers and valuation firms in Australia - does not give a theory as to the causal factors for changing MRP but it does provide estimates of changes in MRP under changing economic conditions. The approach involves estimating an MRP from applying a constant risk premium per unit risk to a forward view of the risk (volatility) of the market.[7]

Regulatory practice is to recognise the impact of volatility on the cost of debt but not the cost of equity i.e. a spot market risk premium is used to estimate the cost of debt but an average risk premium is used to estimate the cost of equity. This leads to narrowing of the spread between the cost of debt and the cost of equity in circumstances like those being experienced currently. This does not make sense.

Consequently, in our view, it is important to estimate a cost of equity that reflects the same economic effects that affect the cost of debt. The approach to estimating the MRP described above does this and our profile of the equity MRP largely mirrors that prevalent in the corporate debt market in Australia.

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[6] See Julian Franks, Martin Lally and Stewart Myers, "Recommendation to the New Zealand Commerce Commission on whether or not it should change its previous estimate of the tax-adjusted market risk premium as a result of the recent global financial crisis".

[7] A detailed outline of the approach and its application to Australian conditions can be found in a number of submissions we have made to the AER. The latest is RR Officer & SR Bishop, "Market Risk Premium: Comments on the AER Draft Distribution Determination for Victorian Electricity Distribution Providers", July 2010.

In an Australian context a current view of market risk or volatility can be derived from trades in options on the ASX 200 Index. The Black and Scholes option pricing model can be used to estimate the implied volatility of the market. By construction it is therefore a forward looking estimate of the risk of the market. We note that Professor Franks comments that he would "examine such data as implied volatility from index options, credit spreads and other macro data."[8] Our approach does this in a formal and transparent way.

In the time available, we have not analysed the NZ data. In fact we do not believe comparable data to that used below exists for NZ. Nevertheless, the close association leading to high correlation between the NZ and Australian market justifies the examination we have conducted on the Australian market to draw legitimate inferences for the NZ market and NZ regulators.

This correlation is apparent in Figures 1 and 2. Figure 1 shows a 90 day moving average of market returns for the Australian All Ordinaries Index and the New Zealand All Total Return (Gross) Index. The correlation is 0.8.

[8] P 5 ibid

Figure 1. Relative volatility of Australian and New Zealand Market Indexes

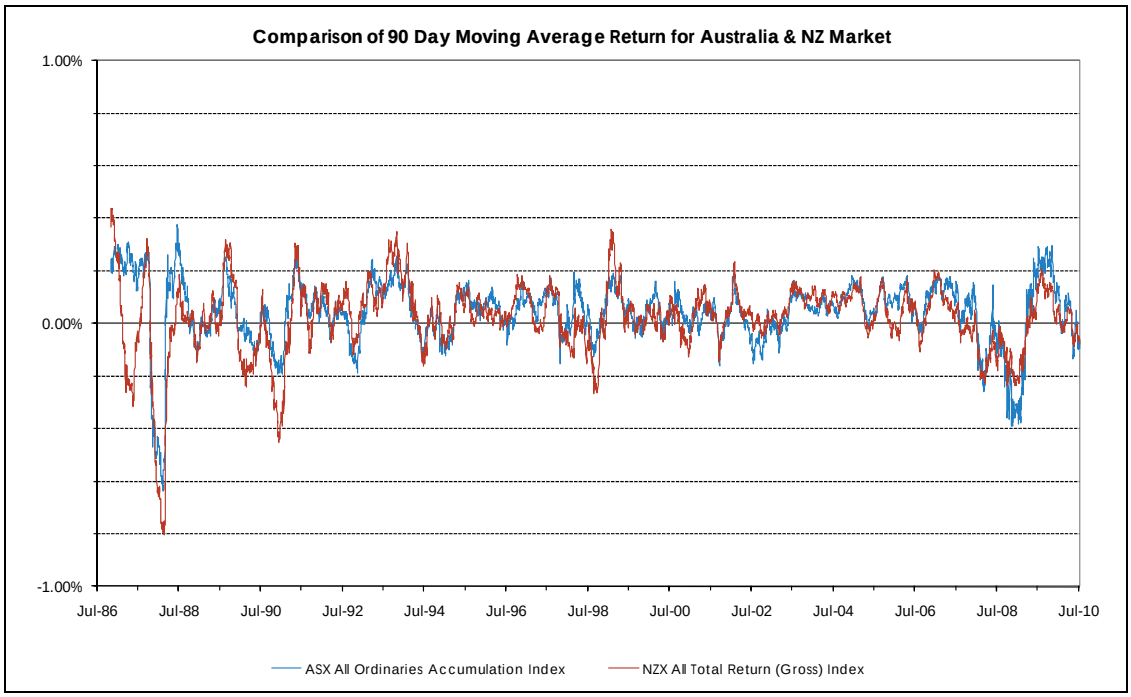


Figure 2 below shows the relationship between an historical estimate of the volatility of the Australian and New Zealand market wide indexes. The correlation is 0.7. This provides some comfort that we can make inferences from our Australian research for New Zealand.

It also shows the impact of two major events on market risk, these being the October 1987 crash and the recent global financial crisis. The latter event is also relatively long-lasting.

Figure 2. Relative volatility of Australian and New Zealand Market Indexes

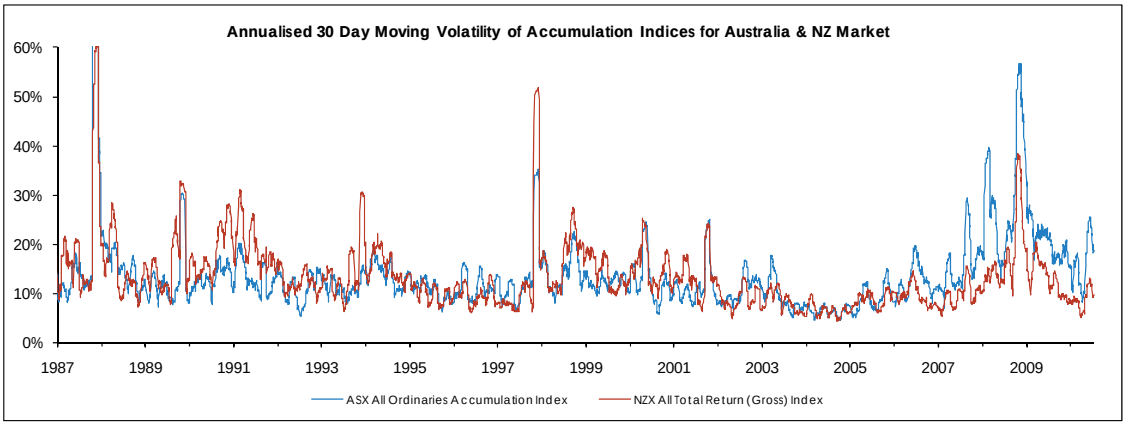
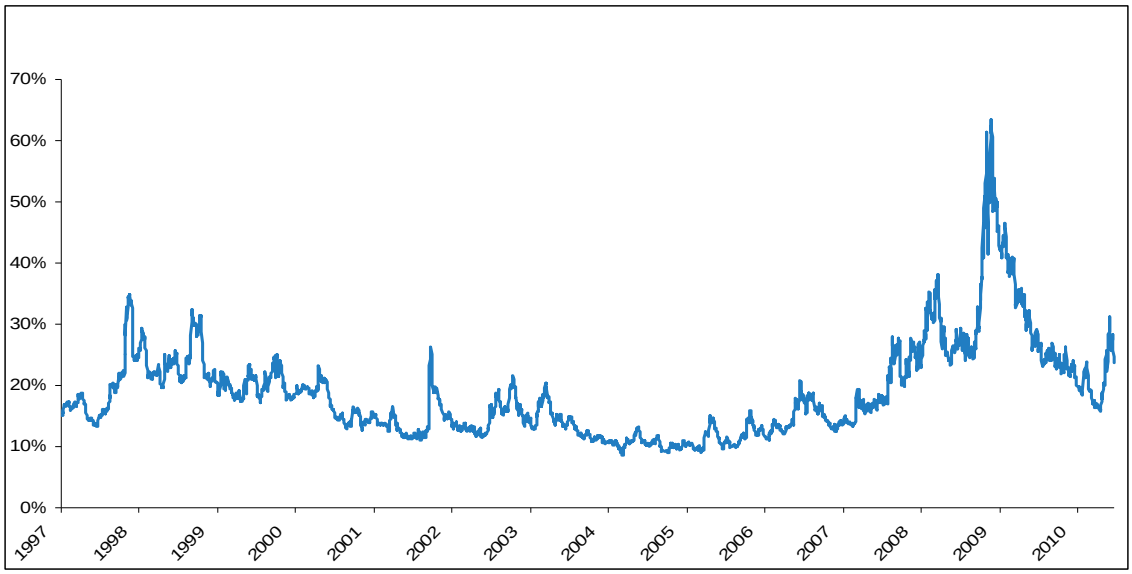


Figure 3. displays a time series of the implied volatility of a three month call option issued against the ASX 200 Index for the longest time period available to us i.e. from 1st January 1997 to 15 July 2010[9]. The behaviour of implied volatility on longer dated options behaves similarly.

The impact of the so called global financial crisis (GFC) is clearly evident in Figures 2 and 3.

[9] The 3 month call option data was used because it was the longest time series available to us. We anticipate that the implied volatilities from longer term options and from put options would behave similarly, but the time series is not available to us. The data is sourced from Bloomberg under the code CITJAVIX.

Figure 3 Forward View of Volatility of Stock Market



Source: Bloomberg

We have found high correlation between the implied volatility and the annualised 30 (and 90) day moving average of the standard deviation of the ASX 200 Index. If we hypothesise that a similar relationship would exist between the NZ historical volatility and a forward looking measure then the current high volatility in NZ suggests that the current MRP would be well above the historical average.

As noted our forward estimates of the MRP are derived by applying a constant premium per unit risk to the forward view of risk (volatility)[10]. The premium per unit risk is derived from the ratio of long term historical MRP and a long term volatility estimate.[11] Ideally we would apply this to a forward estimate of volatility with a horizon equivalent to the regulatory period. However it is not available in either the Australian or New Zealand context. Consequently we assume our

[10] We reported an example of this approach in our submission to the Australian Energy Regulator (AER) as requested by Electricity Trust of South Australia (ETSA) (Officer and Bishop (June 2009)). The approach is used by JF Capital Partners ["JFCP"] and Value Adviser Associates ["VAA"] to update their estimates of the cost of capital to meet current circumstances

[11] Our estimate of the unit price of risk implicit in empirical estimates of the parameters of the CAPM is about 50 basis points i.e. a 7% MRP with an annual average standard deviation (volatility) of 14% implies 50 basis points per unit risk (7%/14%) . This can then be applied to the current implied volatility (IV). The implied MRP from such observations is 11.9% (23.7% * 50 bp) where the average, over 15 days, of the IV of the longest call option (12 months) is 23.7%

implied volatility for a one year option (i.e. a one year forward view) regresses to the mean derived from historical data. The 'glide path' itself is derived from historical patterns in volatility and returns thereby assuming history can inform the future.[12]

Our glide path from the current one year view of MRP of 12% in an Australian context to the long run estimate of 7% provides a geometric average over the 5 year period to 2015 in the range 8% to 11%. We took a conservative view and recommended the lower end of the range of 8% be used in the Australian regulatory hearings.

We anticipate a similar estimate that incorporates the impact of the global financial crisis would be appropriate for New Zealand over the next five years.

The AER have recognised the current highly volatile market conditions have led to an increase in the required market risk premium by investors.

> "The AER agrees generally that estimates of the short-term MRP are likely to be above the long-run equilibrium MRP, . . . "[13]

The practical recognition has been an increase in the MRP from 6.0% to 6.5%.[14] In our view this increase does not adequately reflect the current view of risk expected over the next 5 – 6 years and will not provide an adequate incentive for investment. We are unsure of the quantitative or analytical basis for the addition of the 50 basis points selected by the AER.

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[12] Which is the same assumption as using a historically estimated MRP. Details of the derivation of the glide path are provided in Officer and Bishop (2010).

[13] AER, "Draft decision: South Australia Draft distribution determination 2010–11 to 2014–15", 25 November 2009 p 307

[14] AER, Australian Energy Regulator (2009), "Final decision: Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters," May 2009

We point out, however, that our estimate of 8% over the next 5 years is 2 percentage points above the AER's view of the long term MRP of 6% in Australia. In our view, informed by our assessment of historical data and from including a component in the market return to reflect the yield from imputation tax benefits, 6% is conservative. We note that the equivalent MRP assessed by the Commission for NZ is below the 6% used by the AER under not GFC circumstances. Consequently our additional premium for current economic conditions can be seen as either 2 percentage points above the AER's long term view or 1 percentage point above our view of 7%.

In our opinion the TAMRP in the Brennan-Lally model for New Zealand should be adjusted to reflect the high risk of the current economic circumstances, this would imply raising the Draft Decision's TAMRP estimate by about 2%.

5. Asset, equity and debt betas

The estimate of the asset beta in the Transpower input methodologies Draft Reasons Paper (which refers to the EDB Draft Reasons paper) appears to contain considerable subjectivity:

(i) The Commission appears cognizant of international betas of similar asset types but we understand there has been no adjustment for differences in relative market risks;

(ii) The Commission uses equity betas to derive an asset beta.

A domestic beta, i.e. the covariance risk of an asset or a company with its domestic share market, reflects the relative risk of that asset relative to the domestic market. A beta for an electricity company in the US or UK measures the risk of that company relative to those markets. Further, although such a beta may be indicative of the type of relative risk experienced by a NZ electricity company, certain conditions must apply before one can derive an NZ electricity beta from a US or UK beta.

When the 'Vanilla' WACC is used to estimate the required rate of return for the capital tied up in the asset the asset beta can be estimated as:

$$\beta_A = \beta_E . E/V + \beta_D . D/V$$

It should be noted that the asset beta involves both an equity and a debt beta. The Draft Report assumed the beta of debt was zero despite using a BBB+ rated debt security as the surrogate for the company's debt. There is no doubt that credit or debt spreads (the difference between the debt return and a government debt security) are affected by general economic conditions - our analysis of MRP indicates that. The greater the risk of debt the more closely it resembles equity and therefore the more the spread is affected by market conditions and the greater its beta. The assumption that the beta of BBB+ debt is zero is unrealistic and will tend to bias downwards the asset beta and the regulated WACC.

Our estimate of the beta of assets was derived from the same essential process as followed by the Commerce Commission. We used an Australian and US comparables set as prepared by the AER for recent hearings in Australia. Details are provided in Attachments 2 and 3. A feature of the data is that the process suffers from estimation errors. Additionally it is necessary to assume betas can be transported across countries. Consequently judgement is often required in assessing the outcome, particularly if the sample is small. We rounded our empirical estimate to one decimal point so as not to imply spurious accuracy in the estimate.

In relation to the comparison of the asset beta values adopted by the Australian and New Zealand regulators, the AER do not explicitly estimate an asset beta for electricity transmission and distribution companies to contrast with the Commerce Commission estimate of 0.34. An estimate of 0.32 can be derived from the AER's selected equity beta of 0.8 and use of the Commission's de-levering formula. This estimate of 0.32 is very close to the 0.34 assessed by the Commission for Transpower.

As noted above, we have undertaken an analysis of the equity and asset betas using the same comparable companies as used by the recent AER review of WACC parameters for Australian Distribution and Transmission companies. This is summarised in Attachment 2. We found an average asset beta (0.4) and equity beta (0.7) using a relevering formula that includes a beta for debt of 0.2 and gearing at 60%.

6. Regulatory tax allowances

The 'regulatory tax allowances' are defined (in paragraph 5.1.5 of the EDB Draft Reasons Paper) as :

> *"Total Regulatory Income*
> *– Depreciation deduction for regulatory tax purposes*
> *– Other deductions and adjustments for regulatory tax purposes (e.g. deductible opex, interest)*
> ***= Regulatory Taxable Income***
> ***× Corporate Tax Rate***
> ***= Regulatory Tax Allowance "***

The value of imputation tax credits are given a value of unity (paragraph 6.5.12 of the EDB Draft Reasons Paper), implying that they can be fully rebated against personal tax as soon as the corporate tax is paid. This is clearly unrealistic and although there does not appear to be any readily available evidence from NZ as to their value, Australian evidence would suggest the value of their credits is well below 1.0[15]. A more realistic approach for NZ would be to assume (under Laplace's Principle of Insufficient Reason) a value between 1.0 and 0.0, the two bounds, of γ (the value of imputation credits) = 0.5 which, to be consistent with Australian evidence, would require 'drop-off effect' of about φ =0.7 of dividends with attached credits. Here φ is used to reflect the value (at the time of the

[15] The 'value' is the proportion of tax credits generated by paying tax that is rebated against personal tax. Even if the full amount of credits are distributed any time delay in their distribution and use will reduce the value of the credit, indicating the credits are a wasting asset once they are generated if they are not distributed and used.

distribution) of a dollar of franking tax credits that has been distributed with a dividend. The Australian evidence shows a distribution of tax paid by way of imputation credits of 70%. The value of imputation credits generated is the product of the distribution rate and φ.

Assuming a value of 1.0 would reduce the effective tax rate on the company's income which would imply a lower WACC, other-things-being-equal, than a value of less than 1.0, a more realistic value.

Given the limited time available to us, we have not undertaken the detailed analysis required to give an opinion on the reasonableness of the 'regulatory tax allowance' because in our estimates (and implied in the Draft Decision with the use of the 'Vanilla WACC') the value of the credits is taken into account in the cash flows.

7. The Treatment of diversifiable or non-systematic risk

Insofar as systematic risk is taken into account in the cost of capital one can ignore the presence of diversifiable or non-systematic risk when estimates are made of the WACC for regulatory decisions but this does not mean that diversifiable risks can be ignored when the cash flows are considered. There has been a strong temptation for authorities to ignore diversifiable or idiosyncratic risks in setting regulated prices. The argument typically used is that diversifiable risk or unsystematic risk can be diversified away by investors who as a consequence, do not require compensation e.g.:

> *"Unsystematic risk (or idiosyncratic specific asset risk) is the risk unique to a specific asset (or stock), and this component of the risk of an asset (or stock) is uncorrelated with general movements in the overall market. It includes the risks associated with an asset (or stock) that arise through increasing competition, changes to antitrust legislation, technological innovations, and geographic location. Empirical studies have generally found that the unsystematic or idiosyncratic risk will be eliminated (or*

> *diversified out of) through investors holding a sufficiently large portfolio of stocks. The unsystematic risk associated with an asset (or stock) is therefore also referred to as the 'diversifiable risk*' Footnote 342, Input Methodologies (Electricity Distribution Services) Draft Paper June 2010 (we assume this also applies to Transpower).

It is a mistake to believe that because such risk is diversifiable it does not require acknowledgement and compensation. For example, the probability of encountering a car accident is a diversifiable risk; it is not correlated with the state of the economy or the market factor. However it would be clearly a mistake to believe that an insurance company carrying such risk requires no compensation. In a competitive market the insurance company would require compensation that reflected the probability of the insured having a car accident times the expected cost of that accident plus a premium to cover their operating and working capital costs.

Transpower bears a number of non-systematic or diversifiable risks, and many of these sorts of risks are not readily insurable because the cost of taking out a specific insurance for such diversifiable risk is too costly for the organization, typically because of moral hazard[16] problems or asymmetric information, and so the companies bear their own risks, in effect self insure.

An example of diversifiable risk faced by Transpower is the stranded asset risk arising from the Commission's approach to including capital expenditure in the RAB. We understand that the intent here is to ensure that the community is not underwriting inefficient or unnecessary expenditure. However, the risk to the operator is that the regulator under-estimates expenditure which is either necessary or which could not be efficiently installed at the cost permitted by the regulator. The type of risk described here is not usually the systematic or non diversifiable risk that affects an asset beta. It is risk specifically related to the operator and the

[16]A 'moral hazard' would arise if the company was less diligent in its workplace safety if it was covered for downtime even though worker's compensation insurance could be expected to meet any claims by injured workers. 'Moral hazards' lead to the costs of external insurance to be greater than self insurance.

regulatory regime they are operating under and such risk is generally unrelated to the general capital market movements that affect asset beta. As noted above, although such risk does not affect beta it is risk that must be borne and covered by the operator.

The Draft Decision does not appear to take any account of such self insurance risks implicitly held by Transpower. In fact, in section 6.13.12 of the EDB Draft it rejects making any adjustment for this type of risk although one would need to examine more thoroughly how the Commission treated 'events charges' as these may constitute a form of 'insurable risk' but they would not be expected to encompass a comprehensive cover of all 'insurable risks'. We assume the argument presented for the EDBs also applies to Transpower as we could not see any rejection of this view in the Draft for Transpower.

8. The Commerce Commission's use of a 75th percentile WACC

The Commerce Commission provides the following explanation on page 315 of the Input Methodologies Draft Reasons Paper for the choice of the 75th percentile WACC:

> "The reason for the Commission adopting a cost of capital estimate that is above the mid-point is that it considers the social costs associated with underestimation of the cost of capital in a regulatory setting, are likely to outweigh the short-term costs of overestimation. That is, the Commission is acknowledging that where there is potentially a trade-off between dynamic efficiency (i.e. incentives to invest) and static allocative efficiency (i.e. higher short-term pricing), the Commission will always favour outcomes that promote dynamic efficiency. The reason being that dynamic efficiency promotes investment over time and ensures the longer term supply of the service, which thereby promotes the long-term interests of consumers.
>
> On this basis the Commission considers it appropriate to apply a point estimate for the cost of capital for the DPP and CPP that is based on the 75th percentile."

We have not seen specification of relative loss functions associated with an 'overstatement' or 'understatement' of the WACC that enable a formal analysis of this issue. Nevertheless we have observed similar statements in both the UK and Australian context which recognise the potential asymmetry of the cost of

discouraging investment through a WACC being let too low relative to the cost to the community of allowing an element of economic rent through prices being set too high arising from an overstatement of the WACC. On these grounds we are comfortable with an adjustment to recognise this asymmetry. The choice of the 75th percentile WACC is one adjustment however, without the relative loss functions, we are unable to argue for or against the choice of the 75th percentile versus some other level above 50%.

We note that the Productivity Commission reflects a view that is consistent with the approach of the Commerce 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 to access, or regulated terms and conditions of access, lead to insufficient returns for facility owners. While the denial of monopoly pricing of access also imposes costs on the community, 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 cost of not intervening when action is warranted. [17]

> "However given the asymmetry in the costs in under and over compensation of facility owners, together with the informational uncertainties facing regulators, there is a strong principle case to 'err' on the side of investors. The challenge is how to render this principle operational without creating new problems."[18]

> "… given the cost of inappropriate intervention and the practical difficulties of intervening efficaciously, it is important that access regulators are not overly ambitious. The costs potentially associated with efforts to fully remove monopoly rents might suggest that the focus of regulators should be a more modest one of reducing demonstrably large rents. Similarly, the extensive information required to base access prices on precise assessments of firms' costs, and the attendant risk of mistakes, might provide a case for less intrusive approaches, involving some rules of thumb."[19]

Additionally UK regulators appear to follow a similar view:

> "First Economics notes that since 2002, regulators' determinations of the allowed cost of debt have left a wide gap between the allowed and actual cost. They note that 'a rough rule of thumb' would be that companies can expect to see regulators use a risk free rate worth at least 50 basis points and perhaps as much as 125 basis points above prevailing market levels' when setting the allowed risk free rate. As recently as December 2006

[17] Productivity Commission, "Review of the National Access Regime," Position Paper March 2001 p xv111-xix

[18] Ibid p71

[19] Ibid p71

> Ofgem set the allowed risk free rate at a level 100 basis points higher than the short-term historic rate. The same 'headroom' is observed when comparing the allowed debt premium with the actual debt premium and the allowed cost of debt with the actual cost of debt." [20]

For the purpose of preparing this report, we have estimated the adjustment required to the WACC to establish the 75th percentile using the Commission's formula in the draft determination for Transpower. We understand that Transpower has obtained separate independent expert advice on the question of measurement error and regulated firms' allowed rates of return, which examines, among other things, the size of the increment that needs to be added to the point estimate of the cost of capital of a regulated firm operating in the New Zealand electricity network sector.

QUESTION 2: OUR ESTIMATE OF TRANSPOWER'S WACC FOR USE IN THE INDIVIDUAL PRICE-QUALITY PATH

Our estimate of the expected value of the nominal plain vanilla WACC is 9.3% based on our interpretation of the data available to us. The 75th percentile estimate is 10.2% using the Commerce Commission approach. The equivalent estimates for the 'classical' WACCs are 7.9% and 8.7% respectively. The calculation is summarised in Table 1 along with our estimates of the WACC by the Commerce Commission and as might be calculated using AER parameters. Further explanation follows the Table.

[20] Cambridge Economic Policy Associates, "Indexing the Allowed Rate of Return ORR / OfWat, Final Report, 2007, p6

Table 1 Estimates of WACC

	Commerce Commission	AER 'View'	Our View: NZ Formula	Comments
Parameter				
Leverage	40%	60%	60%	
Risk Free Rate	4.70%	5.48%	5.48%	5 year maturity adopted by the Commission. 10 year for our view
Debt Issuance costs	0.30%	0.09%*	0.30%	The AER number is a proxy
Debt Premium	2.66%	3.25%*	2.66%	Our view is not adjusted for 10 year risk profile
TAMRP	7.00%		9.53%	Added Rf T to Aust. MRP
MRP		6.50%	8%	
Beta of Assets	0.34	0.32	0.4	AER is implied from equity beta
Beta of Debt	0	Not clear	0.2	
Tax Rate	28.0%	28.0%	28.0%	
Calculations				
Beta of Equity	0.57	0.8	0.7	Relever beta of assets
Debt to Equity ratio	0.67	1.5	1.5	
Cost of Equity	7.4%	10.7%	10.6%	Rf (1-t) + TAMRP * Beta equity
Cost of Debt	7.7%	8.8%	8.4%	
Vanilla WACC	7.5%	9.6%	9.3%	
75th Percentile Adjustment	0.7%	na	0.9%	Commerce Commission formula
Vanilla WACC @ 75th Percentile	8.2%	na	10.2%	
Tax adjusted cost of debt in WACC	6.6%	8.1%	7.9%	Tax adjusted cost of debt in WACC as per the Commission's WACC definition
75th Percentile Adjustment	0.7%	na	0.9%	As Above
Tax adjusted cost of debt in WACC @ 75th Percentile	**7.3%**	**na**	**8.7%**	

* Draft Decision for Victoria, June 2010. The AER includes debt issuances costs as a cash flow adjustment rather than a WACC adjustment however we have included an estimate for a WACC adjustment.

Three 'views' of the cost of capital for Transpower are shown in Table 1. The first column uses the inputs we understand the Commerce Commission use in the Draft and their input to the simplified Brennan-Lally model. We have used an estimate of

the 5 year risk free rate assessed from the same source as our 10 year proxy. The rate is 78 basis points below the 10 year proxy. This results in a Vanilla WACC of 7.5% with the 75th percentile being estimated at 8.2% (see additional comments below) and a classical WACC of 6.6% with the 75th percentile estimated at 7.3%. A classical WACC has the interest deduction for tax purposes reflected by a correction to the cost of debt whereas the use of the vanilla WACC assumes this is a cash flow adjustment.

The second column reflects how we understand the AER calculates the vanilla WACC in Australia. For comparison purposes, we have used the NZ risk free rate and investor tax rate as estimated by the Commerce Commission. The debt premium is taken from its most recent Draft decision for Victorian Distribution companies. Debt issuance costs are treated as cash flow rather than WACC adjustments however we have included the equivalent WACC adjusted estimated by the AER. The AER use a beta of equity of 0.8 and we have derived an equivalent asset beta of 0.32 from this plus the gearing of 60% also assumed in the vanilla WACC calculation. We suspect the AER have used a higher beta of equity than the underlying data suggest for a similar reason that the Commerce Commission use the 75th percentile of the distribution of the WACC rather than the mean i.e. to recognise that the social cost of a WACC being 'too low' is higher than it being 'too high'. We used an MRP of 6.5% as used by the AER and the standard CAPM model to arrive at the cost of equity. The outcome is a vanilla WACC of 9.6% and a classical WACC of 8.1%.

The final column shows our estimate of a WACC for Transpower using a combination of our independent assessment of the inputs and the simplified Brennan-Lally model to assess the cost of equity. We have used the same inputs for debt related costs as we understand the Commerce Commission has estimated and the same investor tax assessment. We anticipate that the debt premium will be updated to reflect the situation closer to the actual decision. Our estimate of the TAMRP was derived from the research undertaken to reflect the impact of the GFC

on required returns on equity. We assumed a calibration of the MRP across the two countries (8% is our estimate of the MRP for Australia, two percentage points above the AER's view of the long term MRP and one percentage point above our view of the long term MRP) and added R_fT to arrive at the TAMRP for use in the simplified Brennan-Lally model. The beta of equity as estimated by adjusting the beta of assets, derived from comparable companies, by leverage of 60%. Both the estimate of the beta of assets and the beta of equity used a leverage relationship that included a positive beta of debt. Our estimate of the expected value of the vanilla WACC from these inputs and this process was 9.3%. We adjusted this to the 75th percentile using the adjustment process outlined by the Commerce Commission.[21] The classical WACC estimates are 7.9% and 8.7% respectively. At this time, we have not examined the detailed derivation of the 75th percentile adjustment relationship or the empirical estimates of some of the inputs as estimated by the Commerce Commission. Consequently we include this adjustment for comparative purposes as instructed. We have used our estimate of the standard error of the debt premium derived from 102 monthly observations of the debt yields on an index of NZ BBB+ bonds[22]. In addition, we used our estimate of the expected TAMRP as presented in the Table 1 which is one of the key drivers of the difference in the adjustment in numerical columns 1 and 3. We are unsure of the source of the first term in the Commerce Commission equation however we have included it in our calculation.[23] More details of the WACC calculations are set out in Attachment 1.

[21] Commerce Commission, "Draft Commerce Act (Transpower Input Methodologies) Determination 2010" Sections 3.5.5 – 3.5.7

[22] This will requires a more detailed analysis to be used as a final input however the final estimate of the WACC standard error will be relatively insensitive to the number used consequently we have used the estimate based on the initial research we have undertaken

[23] This dos not appear to relate to the estimates of the inputs on page 313 ibid

Attachment 1: Details of WACC calculations

Equity Return

$R_E = R_f(1\text{-}T) + \beta_E(R_m - R_f(1\text{-}T))$ – the 'Simplified Brennan Lally Model';

$= R_f(1\text{-}T) + \beta_E(R_M - R_f) + T.\ \beta_E.R_f$

The R_f value was taken from the NZ government yields as at 8h July 2010 for 11 year bonds[24]; the β_E was the figure used in the Draft Report; the MRP = $(R_M - R_f)$ was the 8% figure estimated above to reflect the GFC; T is the 'investor tax rate' used in the Draft Report. The 8% MRP has been adjusted to a TAMP by adding R_f x T. The beta of equity is a relevered beta of assets with the beta of assets of 0.4 derived from the empirical work summarised in a later section. Therefore:

$R_E = 5.48 \times 0.72 + 0.7 \times 9.5 + 0.28 \times 0.7 \times 5.48$

$= 10.6\%$[25]

Debt Return

$R_D = R_f +$ Risk Premium + Issuance Costs

The values for the 'risk premium' and 'issuance costs' were taken from the Draft Report although we believe a 10 year rate is preferable for R_f we have used a 11 year rate in this Draft as in the Commerce Commission Draft Report. This will be a conservative estimate as we are of the view that the debt premium should reflect a premium for 10 year debt over the 10 year risk free rate. It is conservative because there a term structure in the risk premium as well as in the risk free rate. Therefore:

$R_D = 5.48 + 2.66 + 0.3$

$= 8.4\%$

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24 See, http://www.nzdmo.govt.nz/publications/data/govtbonds-history-2010-07-15.xls. This was the closest to a 10 year maturing bond.

25 The rates of the 'Simplified Brennan Lally CAPM' are unobservable so we have no way of checking them. They also give a notional R_E less than the debt R_D, which could not occur with observed values. The anomaly is apparently adjusted by setting the D/V at a low level.

Vanilla WACC

Adopting the 'Vanilla WACC' used in the Draft Report to derive a WACC:

$$WACC = R_A = R_E \frac{E}{V} + R_D \frac{D}{V} = R_E (1\text{-}L) + R_D.L$$

The leverage or gearing (L) is as defined in the Draft Report.

= 10.6 x 0.4 + 8.4 x 0.6

= 9.3%

The 75th percentile adjustment to 10.2% appears in Table 1. The adjustment is higher than in the Commerce Commission column because of the higher TAMRP and leverage.

If we adopt an asset beta β_A= 0.4 used in our estimate and apply the Simplified Brennan-Lally CAPM we derive a value of:

$$R_A = WACC = R_f(1\text{-}T) + \beta_A(R_M - R_f) + \beta_A.T.R_f$$

= 5.48 x 0.72 +0.4 x 9.5 + 0.4 x 0.28 x 5.48

= 7.8%

The difference between the two values (9.3% and 7.8%) reflects a logical inconsistency in the Draft Report approach. We believe the difference in values is caused by assigning a β_D of zero when the return is significantly above the risk-free rate, implied by a β_D=0, and the interface of this assumption with the leverage or gearing assumption. Additionally the difference would be minimised if issuance costs were treated as a cost in the cash flows rather than an adjustment to the discount rate.

'Classical" WACC

Adopting the 'classical WACC' definition for the expected WACC:

$$WACC = R_{E.}\frac{E}{V} + R_D(1-T)\frac{D}{V} = R_{E.}(1\text{-}L) + R_{D.}(1-T)\,L$$

The leverage or gearing (L) is that which was used in the Draft Report.

= 10.6 x 0.4 + 8.4 x 0.72 x 0.6

= 7.9%

Australian Regulator's Approach

Adopting an Australian regulators approach but the NZ risk free rate we would have a return on equity of:

$R_E = R_f + \beta_E(R_m - R_f)$

= 5.48 + 0.8(6.5)

= 10.7%

R_D = 8.8%

And a D/V=0.60

So that

Plain Vanilla WACC $= R_A = R_{E.}\frac{E}{V} + R_D\frac{D}{V}$

= 10.7 x 0.4 + 8.8 x 0.6

= 9.6%

Insofar as both the above estimates (Australian and NZ approaches) use the same basic parameter estimates so that to be logically correct and consistent the difference in the WACC estimates must be explained by differences in the 'net cash flows' that are discounted by the respective WACC's .

We recognise that there is a need for some caution in making comparison across different regulatory regimes because of the different approaches to recognising the asymmetry in cost of establishing a WACC that is over-estimated compared with under-estimated as discussed in our answer to 3 f. above.

Attachment 2: Estimation of Beta

We estimated equity and asset betas from Australian and US comparable companies. The derived asset betas were relevered using the relationship below to produce the results in Table 2.

$$\beta_A = \beta_E \times E/V + \beta_D \times D/V$$

Table 2: Estimates of Equity and Asset Betas from Comparable Companies

	Jun 05	Jun 06	Jun 07	Jun 08	Jun 09	Jun 10
Beta Equity						
Ave of Australian Comparables	0.36	0.34	0.40	0.67	0.72	0.62
Ave of US Comparables	0.49	0.53	0.59	0.64	0.51	0.54
Beta Assets						
Ave of Australian Comparables	0.28	0.28	0.27	0.41	0.43	0.37
Ave of US Comparables	0.28	0.33	0.38	0.43	0.34	0.35
Average of Both Countries	0.28	0.31	0.32	0.42	0.39	0.36
Relever using Gearing of:						
40%	0.34	0.38	0.40	0.57	0.51	0.47
60%	0.41	0.46	0.51	0.75	0.67	0.60

We selected the most recent estimate of the beta of assets of 0.4 (0.37 rounded to 0.4 so as not to represent spurious accuracy to two decimal places) to relever to reflect our preferred view of gearing at 60%. This reflects the beta of Australian companies and is essentially the same as the estimate for the US comparables. Also shown is the beta of equity to reflect the Commerce Commission's draft position of 40% gearing.

The process we followed to derive these estimates is summarised below.

- Comparable companies were those used by Associate Professor Henry in his estimates undertaken on behalf of the AER for the May 2009 Final Decision.[26] These comprised 10 Australian and 10 US comparable companies. Not all had continuous data. Details are included in an appendix;
- The beta of equity was estimated by regressing comparable company shareholder returns against a market return derived from a home country

[26] Henry O, "Estimating β", 23 April 2009

broadly based index. Five years of monthly pair-wise return data was used in the regressions. These were estimated on a rolling basis from December 2001 (using data commencing in 1996);

- The equity beta was delevered using the plain vanilla relationship for betas described above. The gearing ratio was based on a four year historical average of gearing derived from the market cap of equity and the book value of debt. The four year averaging period was used because there is evidence that companies move away and then return to a target capital structure[27]. A beta of debt of 0.2 was used to both delever and relever the equity beta. This was based on a pre-GFC average premium for BBB+ bonds of circa 120 basis points and corresponds with a beta of debt of 0.2 if the market risk premium is 6.0%. A relevered beta of equity is relatively insensitive to the use of a positive beta provided the same delevering relationship is used in both directions;
- The number of companies with both beta and gearing data varied over the period due to listing and delisting activity as is evident from the graphs of the observations provided below;
- A relevered beta of equity for Transpower was estimated by relevering the average beta of asset as shown in Table 2.

It is evident from Figure 1 that the beta of equity of comparable companies has risen from around the time of the GFC and has remained at the higher level. A rise is also apparent in the beta of assets as depicted in Figure 2. The rise is apparent despite the sporadic data for the comparable set. Figure 3 captures the average gearing for the comparable Australian companies. The average oscillated between 45% and 58%

[27] by Hovakimian A, T Opler, & S Titman, "The Capital Structure Choice: New Evidence for a Dynamic Tradeoff Model," Journal of Applied Corporate Finance, Spring 2002

Figure 1: Equity Beta Estimates for Australian Comparable Companies

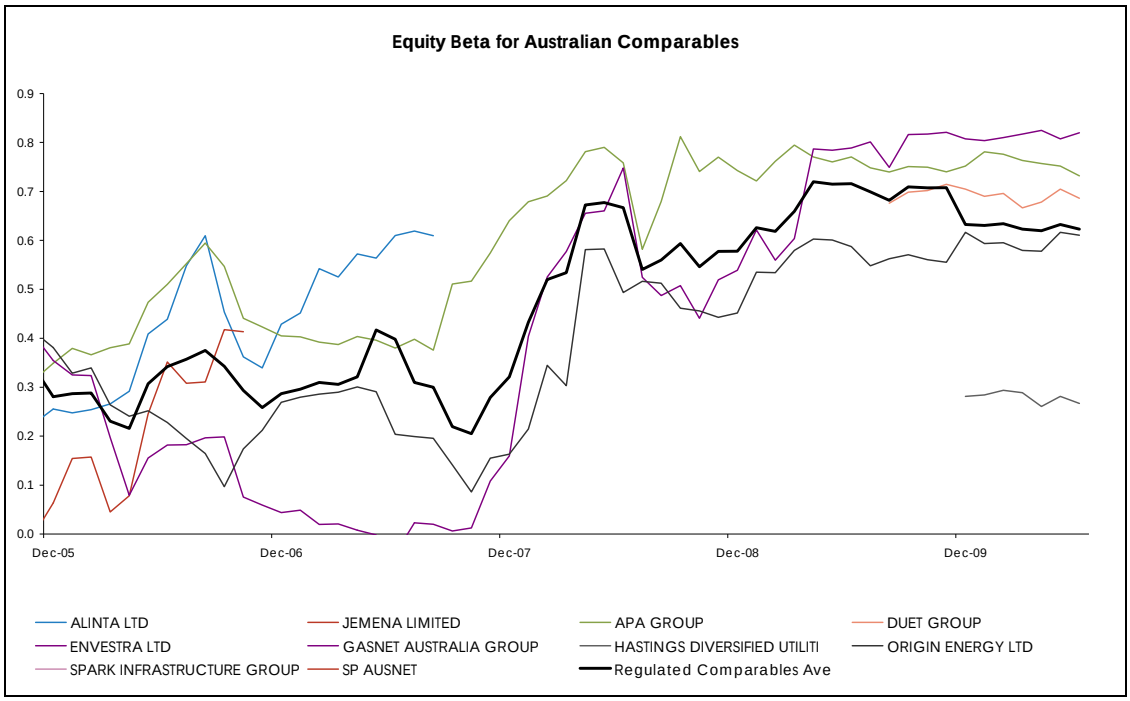


Figure 2: Asset Beta Estimates for Australian Comparable Companies

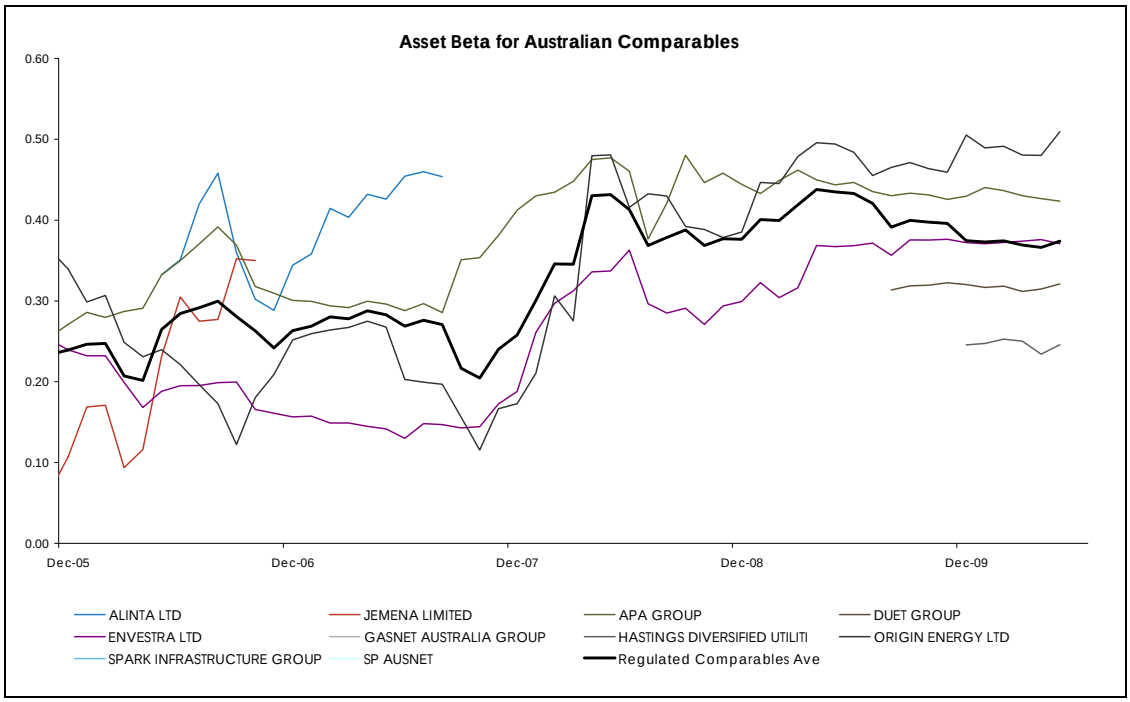
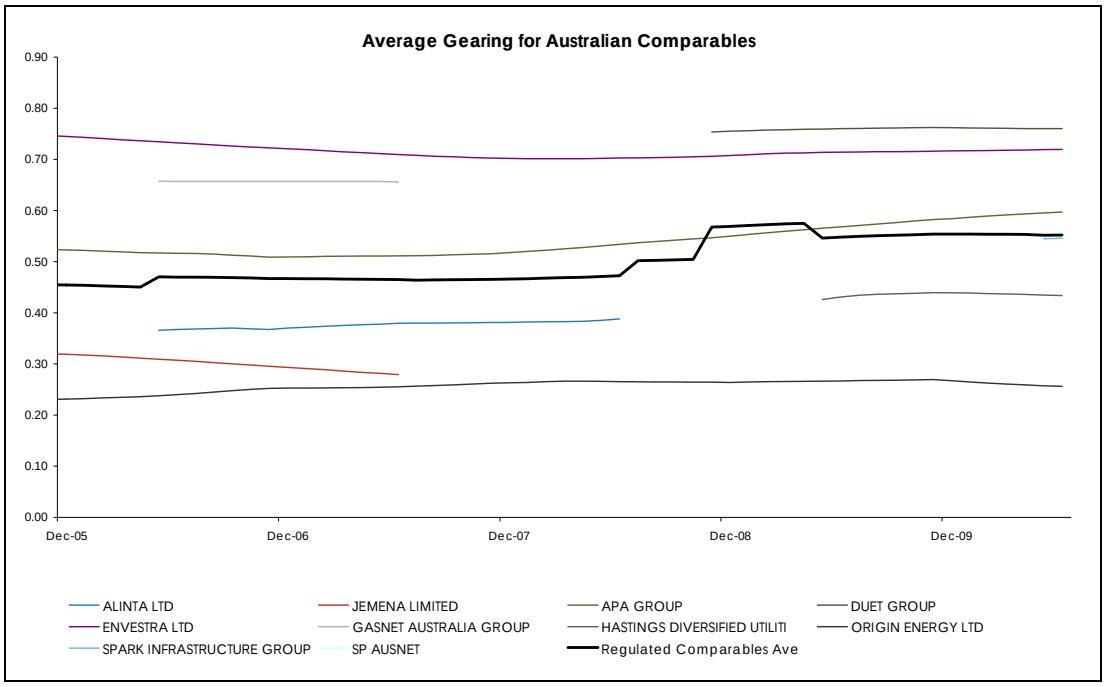


Figure 3: Average Gearing for Australian Comparable Companies



The beta of equity and of assets was also estimated for a set of US comparable companies. A brief description of these companies is also provided in an Appendix. The estimated are graphed in Figures 4 and 5 below.

A lasting rise is less apparent in these graphs with both the average equity and asset beta 'returning' to a pre-GFC crash level in recent estimates.

Figure 4: Equity Beta Estimates for US Comparable Companies

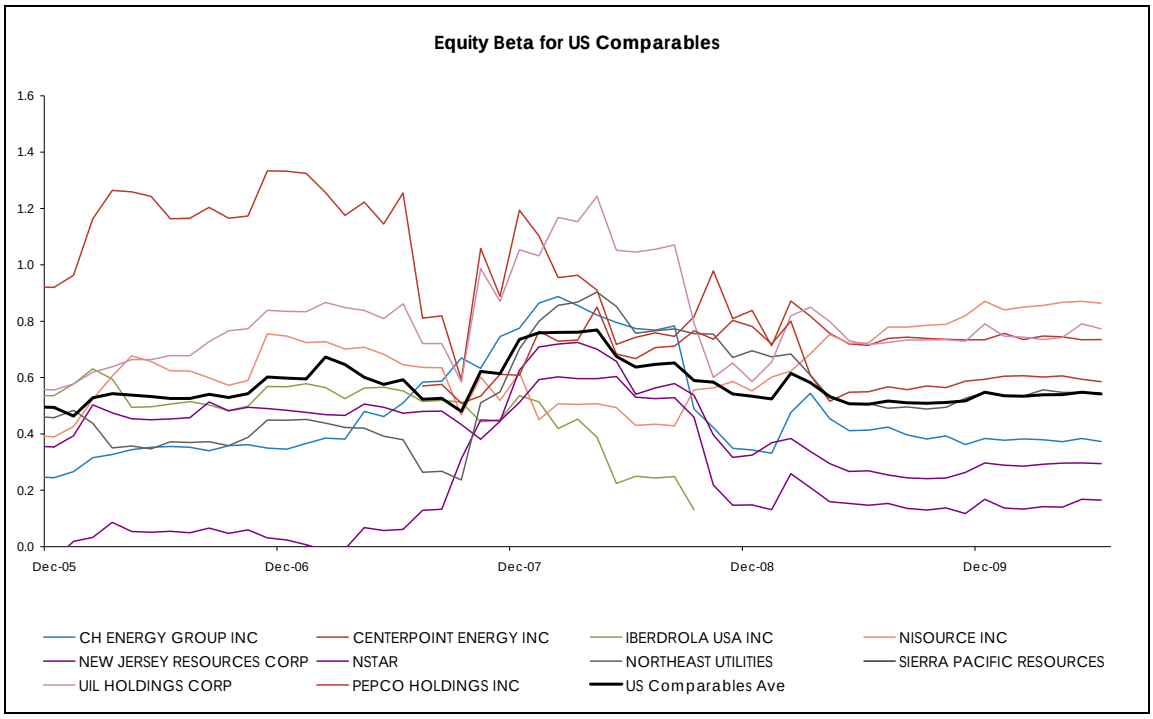
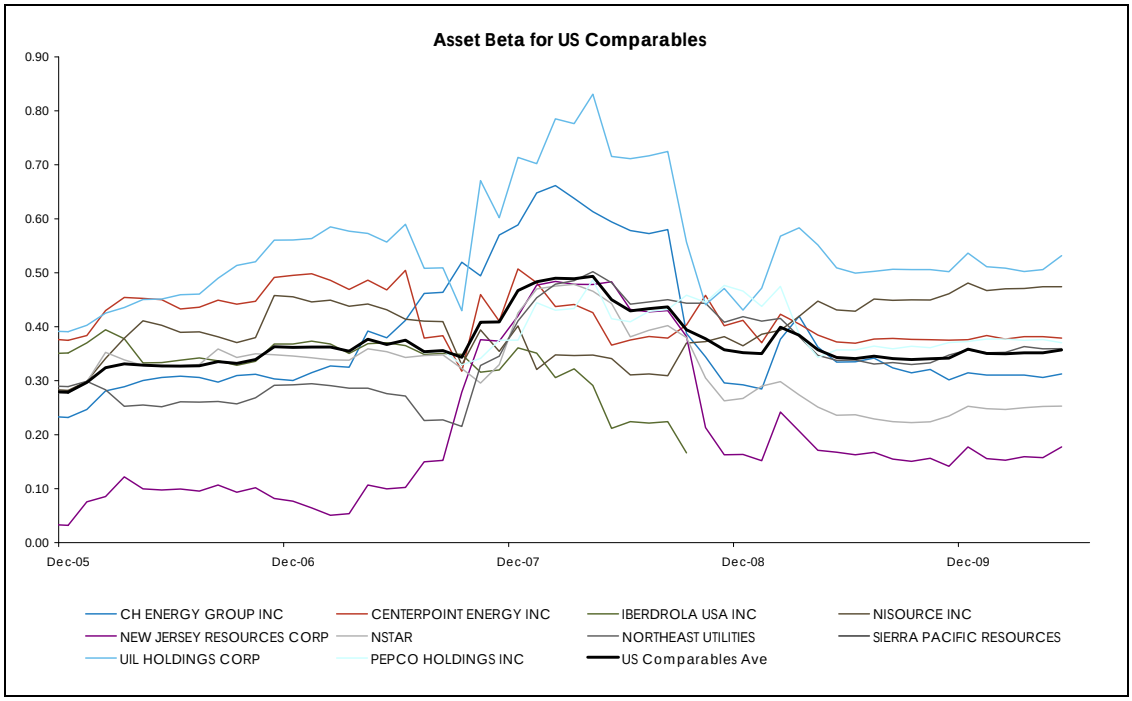


Figure 5: Asset Beta Estimates for US Comparable Companies



Of particular interest is the similarly in the beta of asset estimates across the two sets of comparables. While it is generally not advisable to assume the beta of comparables is transportable across countries there is often little practical choice because markets like Australia and New Zealand are small and a few comparable companies[28]. In this case we draw some comfort from the similarity in the estimates.

[28] This is largely because the composition of the market portfolio can be quite different and because beta is a measure of risk relative to this portfolio.

Attachment 3: Comparable Companies used to Estimate Beta

ALINTA LTD	Alinta Limited is a natural gas distribution and gas retail company in Western Australia. The Company delivers natural gas to approximately 450,000 Western Australian households through its network of pipelines. Alinta also has an interest in National Power Services (Western Australia) Pty Ltd. a construction and maintenance company.
JEMENA LIMITED	Jemena Ltd. is an infrastructure management and development company. The Company offers the construction, operation, and maintenance of electricity distribution and transmission networks, gas transmission and distribution networks/pipelines, and recycled water systems.
APA GROUP	APA Group has interests in a portfolio of high-pressure gas transmission pipelines in Australia covering four states and two territories which transport natural gas.
DUET GROUP	DUET Group invests in energy utility assets located in Australia and New Zealand. The Group's investment assets include gas pipelines and electricity distribution networks.
ENVESTRA LTD	Envestra Limited operates natural gas distribution networks and transmission pipelines in South Australia, Queensland and the Northern Territory. The Company's networks distribute gas to households and businesses in Adelaide, Brisbane (north of Brisbane River), Alice Springs and various regional centers in South Australia and Queensland.
GASNET AUSTRALIA GROUP	GasNet Australia Group, through its subsidiary, owns and maintains gas transmission pipelines in Victoria and New South Wales. The Group also owns and operates a liquefied natural gas storage and vaporization facility, compressor stations and metering, odourant, injection, monitoring, control and communication systems.
HASTINGS DIVERSIFIED UTILITI	Hastings Diversified Utilities Fund invests in utility infrastructure assets such as gas transmission and distribution assets, electricity generation, transmission and distribution assets, hydro and wind power generation assets and regulated and unregulated assets.
ORIGIN ENERGY LTD	Origin Energy Limited is involved in the exploration and production of oil and gas and the retailing of natural gas, liquefied petroleum gas (LPG) and electricity. The Company also participates in natural gas-fired cogeneration and power generation along with infrastructure investment and management services.
SPARK INFRASTRUCTURE GROUP	Spark Infrastructure Group invests in utility infrastructure assets in Australia.
SP AUSNET	SP Ausnet owns and operates electricity transmission and electricity and gas distribution assets in Victoria, Australia.
CH ENERGY GROUP INC	CH Energy Group, Inc. is the parent company of the regulated subsidiary, Central Hudson Gas & Electric Corporation. The Company is a combination natural gas and electric utility serving parts of Albany, Columbia, Dutchess, Greene, Orange, Putnam, Sullivan, and Ulster counties, New York.
CENTERPOINT ENERGY INC	CenterPoint Energy, Inc. is a public utility holding company. The Company, through its subsidiaries, conducts activities in electricity transmission and distribution, natural gas distribution and sales, interstate pipeline and gathering operations, and power generation.

IBERDROLA USA INC	Iberdrola USA, Inc. is a super-regional energy services and delivery company serving customers in the Northeast United States. The Company provides electricity, natural gas, liquid petroleum gas, and district heating and cooling products and services.
NEW JERSEY RESOURCES CORP	New Jersey Resources Corporation provides retail and wholesale energy services to customers in New Jersey and in states from the Gulf Coast to New England, and Canada. The Company's principal subsidiary, New Jersey Natural Gas Co., is a local distribution company serving customers in central and northern New Jersey.
NISOURCE INC	NiSource Inc. is an energy holding company. The Company's subsidiaries provide natural gas, electricity and other products and services to customers located within a corridor that runs from the Gulf Coast through the Midwest to New England.
NSTAR	NSTAR provides regulated electric and gas utility services. The Company is also involved in telecommunications and other non-regulated activities. NSTAR, through Boston Edison Company, Cambridge Electric Company, Commonwealth Electric Light Company, and Commonwealth Gas Company, serves customers throughout Massachusetts.
NORTHEAST UTILITIES	Northeast Utilities is a public utility holding company. The Company, through its subsidiaries, provides retail electric service to customers in Connecticut, New Hampshire, and western Massachusetts. Northeast also distributes natural gas throughout Connecticut.
SIERRA PACIFIC RESOURCES	NV Energy, Inc., through its subsidiaries, generates, transmits, and distributes electric energy throughout Nevada and the Lake Tahoe area of California. The Company provides natural gas services in the Reno Sparks area of Nevada.
UIL HOLDINGS CORP	UIL Holdings Corporation, through The United Illuminating Company, provides electricity and energy-related services to customers and municipalities in Connecticut. The Company's other subsidiary, United Resources Inc., is the umbrella for UIL's non-regulated business units, including Precision Power, American Payment Systems, United Capital, and United Bridgeport Energy.
PEPCO HOLDINGS INC	Pepco Holdings, Inc. is a diversified energy company. The Company primarily distributes, transmits, and supplies electricity and supplies natural gas to customers in New Jersey, Delaware, Maryland, and the District of Columbia.

Attachment 4: Profiles of Experts

Robert Rupert Officer

ADDRESS	c/o Acorn Capital Ltd Level 12, 90 Collins Street Melbourne 3000
TELEPHONE	(03) 9639 0522
FAX	(03) 9639 0515
EMAIL	bobofficer@acorncapital.com.au

AREAS OF EXPERTISE:

- Consulted to a large number of public, private and government organisations on topics encompassing economics and finance generally.
- Specific areas include corporate and international finance, valuation and investment appraisal, foreign exchange management, capital markets, industrial organization, takeovers, and anti-trust.
- Has appeared as an expert witness before the Federal Court, Arbitration Commission, Supreme Court, Trade Practices Tribunal, and a number of other bodies of enquiry or arbitration.

POSITIONS HELD:

2003 -	Self employed Professor Emeritus, University of Melbourne Honorary Professor University of Queensland
1986 - 2002	Professor, Chair of Finance and Deputy Director Melbourne Business School, University of Melbourne
1993/4	Visiting Professor The Wharton School of the University of Pennsylvania
1989	Visiting Professor, Graduate School of Business Stanford University
1976-86	Professor, Department of Accounting and Finance Monash University
1971-76	Senior Lecturer then Reader Department of Management University of Queensland
1967-71	Graduate Student University of Chicago

1964-67	Teaching Fellow Department of Farm Management, U.N.E.
1962-64	Advisory Officer Victorian Department of Agriculture

QUALIFICATIONS:

1962	University of Melbourne	BAgSc
1967	University of New England	MAgEc
1969	University of Chicago	MBA
1971	University of Chicago	PhD

AWARDS:

1958 - 1961	Commonwealth Scholarship
1967	Australian Agricultural Economic Thesis Prize
1970	Beta Gamma Sigma Fraternity (Top 5% of MBA class)
1967 - 1970	Australian Meat Research Committee, Overseas Fellowship
1970 - 1971	General Electric Fellow, University of Chicago
1988	Elected a Fellow of the Academy of the Social Sciences in Australia
1990	Appointed a Fellow of the Australian Society of Corporate Treasurers
1991	Honorary Life Member, Accounting Association of Australia and New Zealand
1999	Elected a Fellow of the Securities Institute of Australia, now Senior Fellow FINSIA
2003	Awarded Centenary Medal for services to the public sector.

OTHER RELEVANT POSITIONS HELD:

From	**To**	
Aug.2009		Melbourne University Publishing (MUP) – Board Member
Sep.2008		Australian and New Zealand School of Government, Investment Committee
Oct.2008		Surf Life Saving Foundation, member Investment Committee
2006		Nonprofit Australia Ltd., Board Member
Oct. 2006		Transport Accident Commission of Victoria, Director
2006		Personal Injury Education Foundation, Chair
2006		JF Capital Partners Funds Manager(≈$4b under management), Chairman
2005		Pentacle Property Funds Management Group Ltd, Chairman
2004	Aug 2006	Deputy Chair Investment Committee and Alternate Board

			Member, UniSuper
2003		2007	Over Fifty Group Ltd., Board member.
2003		2009	Babcock & Brown Direct Investment Fund, Board Member
2001	-		Tactical Global Management Limited (TAA Funds Manager), Deputy Chairman
Mar 1997	-	Apr 1998	Transport Accident Commission of Victoria, Director
May 1996	-	Mar 1997	Inner & Eastern Health Care Network, Board Member
Mar 1996	-	Jun 1996	National Commission of Audit, Chairman
1999	-		Acorn Ltd (funds manager of microcaps), Chairman
1999	-	2001	MEAC, Securities Institute of Australia, Chairman
2001	-	2005	Securities Institute of Australia National Council, Councillor, Chair 2004/05
1996	-		Colonial Foundation, Director
1996	-	1999	Appeal Panel Member, Victorian Office of the Regulator-General
1995	-	2005	Collins Associates Limited, Chairman
1995	-	2009	William Buckland Foundation, Trustee
1997	-	2003	Member, Strategic Research Development Committee, NHMRC
1998	-	1999	Member, Merit Protection and Review Agency
1995	-	May 2006	Victorian Funds Management Corporation, Chairman (2002-2006), Deputy Chairman (1995-2001), (≈ $37b under management)
1995	-	2006	Editorial Board Pacific Basin Finance Journal
Jul 1995	-	May 1996	Member of Eastern Health Care Network Board
1993	-	Feb. 2006	Victorian WorkCover Authority, Board of Management, Chairman from 1/12/97 to 2/01, Acting CEO 1/1/00to1/5/00,
Nov. 1992	-	May 1993	Chairman, Victorian Commission of Audit
1993	-	1998	Bank of Melbourne, Board Member
1993	-	1997	Member of Advisory Board, School of Business, Bond University
1989	-	2006	Editorial Board of ABACUS
1988	-	2003	Associate Editor of Journal of Banking & Finance
1989	-	Jul 1998	Member of the Council of Janet Clarke Hall
1988	-	2008	Member of the Council, Institute of Public Affairs Limited
1987	-	Jul 1998	Member of the Council of International House
1986			University of Melbourne's Investment Committee
1986	-	1988	Victorian Committee of Commercial Law Association
1986	-	1987	President of the Accounting Association of Australia & New Zealand
1985	-	1987	Member of the Executive of Australian Society of Corporate Treasurers (Victorian Chapter)
1984	-		Member of Advisory Council, Centre for Independent Studies
1984	-	1987	Member of the Australian Government's Industrial Property Advisory Committee
1977	-	1985	Editor of Accounting and Finance

PUBLICATIONS:

Officer, R.R. [2004] "Public or Private: Where Government Should Draw the Line" Australian Accounting Review, Issue 33, Vol. 14 No. 2, pp.22-26.

Officer, R.R. [1999], "Privatisation: Efficiency or Fallacy? Two Perspectives" CEDA Information Paper No. 61, May 1999 [opposing view given by John Quiggin]

Officer, R.R. [1999], "Regulating the Media: It is Dangerous to Give it Special Status", Policy, Volume 14, No. 1, pp. 8-14.

Officer, R.R. [1996], "Structural Changes Required to meet the 21st Century", ASX Perspective, 4th Quarter 1996, pp. 12-14.

Officer, R.R., [1995], "Comment on Return on Equity in a Low Inflationary Environment", Economic Papers, Vol. 14, No. 1, p. 96.

Officer, R.R. & Williams, P. [1995], "The Public Benefit Test in an Authorisation Decision", The Law and The Market, The Federation Press, pp. 157-166.

Officer, R.R. [1995], "Commentary on paper by John Quiggin titled "The Equity Premium and Public Holdings on Equity", Short-termism in Australian Investment: Proceedings of an EPAC workshop held in Canberra on 10 November 1994, Economic Planning Advisory Commission Paper No. 6, Australian Government Publishing Service, April 1995.

Officer, R.R. [1994], "The Cost of Capital of a Company Under an Imputation Tax System". Accounting and Finance, Vol. 34, No. 1, pp. 1-17.

Officer, R.R., Christensen, David C., Walker, Russell A. (Commissioners) and Eslake, S. (Executive Officer), 'Report of the Victorian Commission of Audit', Vol. 1 and 2., Government Printer, May 1993.

Officer, R.R. [1990], "The Australian Imputation System for Company Tax and its Likely Effect on Shareholders, Financing and Investment". Australian Tax Forum, Vol.7, No. 3.

Hathaway, N. and Officer, R.R. [1990], "The Twenty Leaders Index as a Futures Contract". Review of Futures Markets, Vol. 9, Supplement, 1990, pp.209-25.

Logan, J., Milne, F. and Officer, R.R. [1989], "Competition in Regulated Markets" in Regulating For Competition edited by M. James, Centre for Independent Studies.

Officer, R.R. [1988], "Rates of Return to Shares, Bond Yields and Inflation Rates: An Historical Perspective" in Ball, R., Brown, P., Finn, F., and Officer, R.R." Share Markets and Portfolio Theory , University of Queensland Press, 2nd. Ed.

Officer, R.R. [1988], "A Note on the Cost of Capital and Investment Evaluation for Companies Under the Imputation Tax". Accounting and Finance. , Vol. 28, No.2, November, pp.1 11.

Beedles, W.L., Dodd, P., and Officer, R.R. [1988], "Regularities in Australian Share Returns". Australian Journal of Management, Vol. 4, No. 1, June, pp.1 29.

Ball, R., Brown, P., Finn, F., and Officer, R. (eds.) [1988], Share Markets and Portfolio Theory. University of Queensland Press, 2nd Edition.

Officer, R.R. [1987] "Treasury Performance Measurement". Bulletin of Money, Banking and Finance No.2. Macquarie University, pp.19 37.

Officer, R.R. [1987] "The Required Rate of Return and Tax Imputation: Estimating the Effect of the Imputation Tax on Investment Appraisal". Australian Tax Forum, 4, (3), pp.405 417.

Bishop, S., Dodd, P., and Officer, R.R. [1987] Takeovers: The Australian Evidence 1972 - 1985. Centre for Independent Studies, Policy Monograph 12.

Dodd, P., and Officer, R.R. [1986] Corporate Control, Economic Efficiency and Shareholder Justice. Centre for Independent Studies, Policy Monograph 9.

Officer, R.R. [1985] "Financial Targeting For Public Enterprise: The Criterion of Rate of Return to Capital". Australian Journal of Management, December, pp.83 98.

Officer, R.R. [1985] "Aspects of Business Taxation Arising out of the Draft White Paper and the Tax Summit". Economic Papers, Vol. 4, No. 3, September, pp.58 64.

Officer, R.R. [1985] "Profit Forecasts in Published Reports". Accounting Forum, vol. 8, June, pp.5 16.

Officer, R.R. [1984], "Capital Gains and Company Taxation". Australian Tax Forum, 1, (3), pp.281 292.

Officer, R.R. [1984], "Process and Consequence of Regulation of a Profession with Special Reference to Real Estate Agents". Albon, L. and Lindsay, G.,(eds.) Occupational Regulation and the Public Interest, Centre for Independent Studies, pp.25 40.

Officer, R.R. [1983], Accountability and Monitoring the Performance of the State Enterprise in State Enterprise and Deregulation, Monograph, Centre of Policy Studies, pp.45 60.

Officer, R.R. [1982], "Company Tax Systems and their Effects on Investor". Economic Record, December, pp.339 351.

Officer, R.R. [1982], "Government Constraints: The Trade Practices Act". Chapter 3 in Webb, L.R. and Allan, R.H. (eds.), Industrial Economics: Australian Studies, Allen and Unwin.

Officer, R.R. [1981], "Measurement of a Firm's Cost of Capital". Accounting and Finance, November, pp.31 62.

Ball, R., Brown, P., Finn, F., and Officer, R.R. [1979], "Dividends and the Value of the Firm: Evidence from the Australian Equity Market". Australian Journal of Management, pp.13 26.

Officer, R.R. [1978], "The Role of Trade Practices Legislation". Australian Business Law Review, March, pp.1 10.

Ball, R., and Officer, R.R. [1978], "Try This on Your Chartist". Superfunds, June, pp.18 19.

Officer, R.R. [1976], "The Prices Justification Tribunal: Retrospect and Prospect". Australian Journal of Management, pp.57 72.

Officer, R.R. [1976], "The Mathews Committee Recommendations: A Dissenter's Note". The Australian Accountant, pp.698 701.

Ball, R., Brown, P., and Officer, R.R. [1976], "Asset Pricing in the Australian Industrial Equity Market". Australian Journal of Management, pp.1 32.

Ball, R., Brown, P. and Officer, R.R. [1975], “Toward Understanding the Share Market”, Alumni News, Alumni Association of the University of Queensland 7 (2), 10-14.

Ball, R., Brown, P. and Officer, R.R. [1975], “Risk and Return on the Melbourne Stock Exchange, in Australian Accountant.

Officer, R.R. [1975], “Seasonality in Australian Capital Markets: Market Efficiency and Empirical Issues”, Journal of Financial Economics, March 1975, pp. 29-51.

Officer, R.R. [1975], “Classical, Neo-Classical and Bayesian Decision Making: A Comparison”, Agricultural Economics Discussion Paper Series No. 4, Faculty of Agricultural Science, University of Queensland.

Officer, R.R. [1975], “Inflation and the Enterprise”, Management Accounting Seminar, Accounting for Inflation, A.S.A. (Qld).

Officer, R.R. [1974], "Financing of Australian Corporations" in The Corporation in Australian Society, Ed. Lindgren, Mason and Gordon, Law Book Co.

Officer, R.R. [1974], “How efficient is the Australian Capital Market?”, Proceedings of the Australian Society of Security Analysts Portfolio Management Seminar, Macquarie University.

Officer, R.R. [1974], “Statistical Foundations of Portfolio Theory”, Proceedings of the Australian Society of Security Analysts Portfolio Management Seminar, Macquarie University.

Officer, R.R. [1973], "The Variability of the Market Factor of the New York Stock Exchange". Journal of Business, 3, (46), pp.434 53.

Officer, R.R. [1973], "The Prospects for Making Greater than Normal Profit on the Stock Market: A Review of Evidence". Management Forum, Q.I.T., 1, pp.2 9.

Officer, R.R. [1973], “Introduction to Market Concepts”, Proceedings of the Australian Society of Security Analysts Portfolio Management Seminar, Macquarie University.

Officer, R.R. [1973], Economic Indicators and the Stock Market”, Proceedings of the Australian Society of Security Analysts Portfolio Management Seminar, Macquarie University.

Officer, R.R. [1972], "The Distribution of Stock Returns". Journal of the American Statistical Association, 340, (67), pp.807 12.

Officer, R.R., and Halter, A.N. [1968], "Utility Analysis in a Practical Setting". American Journal of Agricultural Economics, 2, (50), pp.257 277.

Officer, R.R., and Anderson, J.R. [1968], "Risk, Uncertainty and Farm Management Decisions".
Review of Marketing and Agricultural Economics, 2, (50), pp.3 19.

Officer, R.R., and Dillon, J.L. [1968], "Probability and Statistics in Agricultural Research and Extension". Journal of the Australian Institute of Agricultural Science, 2, (11), pp.171 83.

Variations of the above paper also appeared as:

Dillon, J.L., and Officer, R.R. [1968], "Significant Estadistica versus Significancia Economica a la Extension E Investigacion Agricola: Una Resena Pro Bayesiana". Curadernos de Economica, 5, (16), pp.15 29.

Dillon, J.L., and Officer, R.R. [1971], "Economic V's Statistical Significance in Agricultural Research and Extension: A Pro Bayesian View". The Farm Economist, 1, (12), pp.31 45.

Officer, R.R., Halter, A.N., and Dillon, J.L. [1967], "Risk, Utility and the Palatability of Extension Advice to Farmer Groups". Australian Journal of Agricultural Economics, 2, (11), pp.171 83.

Officer, R.R., and Dillon, J.L. [1965], "Calculating the Best Bet Fodder Reserve". Professional Farm Management Guidebook, 1.

Steven Ross Bishop

QUALIFICATIONS:

1970	Monash University	B Ec
1980	University of NSW	M Com (Hons)
1988	AGSM, University of NSW	PhD

Steve is also a fellow of CPA Australia.

CURRENT EMPLOYMENT

Executive Director and Chairman, Value Adviser Associates Pty Ltd
Director Education and Management Consulting Services Pty Ltd;
Visiting Fellow, Macquarie Applied Finance Centre, Macquarie University.

Value Adviser Associates is a specialist business valuation firm. It undertakes valuations for business decision making, compliance and transactions. Assessing a required rate of return is a essential component of this work. Its' work includes the valuation of direct infrastructure investments for superannuation funds, valuations for regulatory authorities (ATO and State Revenue Offices) and for listed and unlisted corporations.

Steve Bishop is a management consultant, valuer and educator. His primary interest and consulting focus is around the application of financial economics to business decisions. He has guided the implementation of an explicit focus on improving business value ("Value-Based Management" or "VBM") in a number of large and medium sized firms. VBM uses a focus on shareholder value to integrate strategy development, strategy implementation, organisational design and operational excellence.

A core skill in developing strategies that drive value creation is a deep understanding of how economic conditions and relative competitive position affect the strategy of the business and therefore business value. This, plus a deep understanding of valuation principles and practices lies at the heart of VBM and Steve's consulting. Steve's assignments have also included business valuations, cost of capital estimation, merger and acquisition advice, development of corporate and business unit strategic and implementation plans, strategy advice. Additionally he has worked with government and privately owned enterprises on issues of pricing, asset valuation, rates of return and regulation.

Since co-founding Value Adviser Associates in 2008, Steve has been engaged in valuation related assignments for regulatory authorities (principally the ATO and State Revenue Offices), Superannuation Funds and Corporations. An integral part of this work is cost of capital estimation.

Steve's experience in consulting covers a range of industries, including Agrifoods, Chemical, Computer, Electricity (Distribution, Retail, Transmission), Financial Services,

Food Manufacture, Gas Distribution and Transmission, Mining & Minerals, Paper, Packaging, Property, Rail, Retailing, Shipping and Transportation, Telecommunications and Wastewater.

Selected relevant cost of capital related assignments include:

- Preparation of expert reports on Market Risk Premium, Term of the Risk Free Rate for Electricity Distribution and Transmission companies in a submissions to the Australian Energy Regulator (with Professor Bob Officer)
- Preparation of an expert report on the Weighted Average Cost of Capital for Australia Post in submissions to the ACCC (with Professor Bob Officer)
- Preparation of expert report on rate of return for Rail Access Infrastructure as part of Queensland Rail's submission to Queensland Competition Authority
- Expert advisor on cost of capital to Queensland Treasury Corporation for response to ACCC Draft Decision on the Queensland Transmission Network Revenue Cap
- Writing papers comparing and contrasting the post personal tax CAPM with the Sharpe-Lintner version and assessing the appropriate numerical values for the parameters to be used for pricing of New Zealand Electricity Transmission services
- Review and preparation of Board reports on the cost of capital for New Zealand Electricity Transmission business
- Review of procedures for assessing the Optimised Deprival Value of a large electricity transmission business. Much of the focus was on dealing with issues associated with the applying the ODV concept in practice
- Estimation of betas for 14 different business areas of interest to a diversified mining company. The work involved examination of using an international as well as a domestic market index
- Advising on issues in the implementation of sub-firm costs of capital for a large telecommunications company
- Advising on aspects of risk treatment, cost of capital determination, working capital and growth evaluation for Review of Gas Access Arrangement in Victoria
- Estimation of the cost of capital for an electricity retailer in Victoria
- Advising on aspects of estimation of the cost of capital for a Victorian Electricity Distribution business as part of a response to Draft Decisions by the Office of the Regulator General
- Estimation of the cost of capital for a number of business units of a State-based Rail company
- Estimating the cost of capital for Asian Property, Power and Coal companies for local and cross country investments in emerging markets

- Full implementation of Value Based Management, from strategy development to implementation in a several Banks, a division of a Telecommunications Company, Diversified Property Company and a Coal and Power Company in Thailand
- Evaluating a major investment opportunity for a large telecommunications company
- Research and preparation of a document on the state of the art in capital structure choice for an investment Bank
- Publication of a chapter on the capital structure decision in an internationally published handbook on risk management by the Professional Risk Management International Association (PRMIA)
- Development and implementation of a value and strategy based capital expenditure evaluation and approval system for a large Bank
- Strategy development with a Victorian Electricity Distribution Business including customer profitability assessment and pricing, activity based costing linking activities with the financial outcomes, development of key value drivers and key performance indicators, capital expenditure policy development and manual preparation, cost of capital estimation
- Audit of economic cost reflective model in Melbourne Water's waste water business in the context of a pricing review of charges to the corporatised water distribution businesses
- Developing and evaluating alternative capital expenditure options (new, upgrade and replacement) in light of the business's domestic and international strategic position for a large capital intensive business that had neglected capital expenditure for many years
- Advising Victorian Gas Distribution company on the NPV of expanding the gas distribution network to regional towns the consequent subsidies or price arrangements necessary to meet economic cost
- Ongoing advisory role to a listed gas and electricity distribution business on many aspects of regulated pricing including efficiency carry over mechanisms, alternative regulated asset base measures and the treatment of inflation, cost of capital, imputation tax effects, ensuring appropriate compensation for both systematic and unsystematic risks
- Designing a framework for evaluating and prioritising 'enabling' and 'strategic' infrastructure projects for a State owned rail business
- Updating Market Risk Premium data and commenting on other research dealing with an appropriate MRP for regulatory price determinations. A paper was prepared for a distribution company.

Prior to his current role, Dr Bishop was an executive director of Capital Value Pty Ltd, and Mainsheet Corporate Pty Ltd and was a partner in L.E.K. Consulting, a worldwide management consulting firm. Prior to that he worked for Marakon Associates, a consulting firm specialising in Value Based Management and also for the Strategic Services group in Andersen Consulting.

Before undertaking a consulting career in 1988, he was an academic specialising in Corporate Finance at the Australian Graduate School of Management, at Monash University (Associate Professor) at the University of NSW and at Melbourne Business School. His full time academic career covered approximately 14 years.

Steve is lecturing Corporate Finance in the Master of Applied Finance program offered by the Macquarie University Applied Finance Centre. He has presented to a number of academic and professional organisations including the Institute of Directors, the Institute of Chartered Accountants, the Securities Institute of Australia and the Melbourne Business School.

His academic studies focused on Finance and Economics. He is a Fellow of the Society of Certified Practising Accountants and co-author of "Corporate Finance" by Bishop, Faff, Oliver & Twite - a textbook now in its 5th Edition used for MBA, Masters and Undergraduate courses and “Takeovers – The Australian Evidence” by Bishop, Dodd and Officer.