PRICEWATERHOUSECOOPERS

PricewaterhouseCoopers
ABN 52 780 433 757

Freshwater Place
2 Southbank Boulevard
SOUTHBANK VIC 3006
GPO Box 1331
MELBOURNE VIC 3001
DX 77
Telephone 61 3 8603 1000
Facsimile 61 3 8603 1999
Direct Phone 61 3 8603 4973
Direct Fax 61 3 8613 5575
Website:www.pwc.com/au

Murray Reynolds
Economist
Economic Services Branch
Commerce Commission
P.O. Box 2351
Wellington

2 December 2009

Dear Mr Reynolds,

Commerce Commission WACC Conference: Submission on Behalf of Powerco

I have been asked by Powerco to elaborate upon a number of comments that I made during the Commerce Commission's conference on the weighted average cost of capital that was held in Wellington on 12 and 13 November 2009 and to address the specific questions for me that the Commission identified after the conference.

The matters that I will address in this letter relate to:

- my comments during the conference about the ability to 'road test' the CAPM against the predictions of other models that are drawn from finance theory, specifically the Fama-French three factors model and the dividend growth model;
- my comments during the conference about the variability that we have seen with respect to beta estimates for Australian energy utilities;
- the appropriate assumption about the cost of debt financing;
- my comments during the conference about the practice of the Australian Energy Regulator (AER) with respect to the market risk premium and the comparable market risk premium in New Zealand; and
- the comments about the effect of leverage on the WACC.

These matters are addressed in turn.

<u>Use of other financial models to test the CAPM as a cross-check</u>

I noted during the conference that, while it is unlikely to be feasible to apply alternative models to the CAPM to estimate the cost of equity using market evidence from New Zealand, it is feasible to compare estimates obtained using the CAPM in other markets to

Murray Reynolds
2 December 2009

the results of alternative models. Amongst other things, such a comparison may shed light on whether the CAPM systematically may result in higher or lower estimates of the cost of equity for utility firms and in turn shed light on whether the known shortcomings in the CAPM may be material for these firms. In this regard, I referred to two pieces of analysis of which I was aware that provide a test of the comparable results of using the Fama-French model and Dividend Growth Model to the CAPM, which I summarise in turn below.

Application of the Fama-French model

I recently contributed to a report with NERA for a business in Australia that applied the Fama-French three factors models to the set of firms that the Australian Energy Regulator had used previously as the group of comparable entities for equity beta estimation.[1] The Fama-French model is of a similar form as the CAPM, except that it includes two additional risk factors, the 'high minus low' factor (HML, which is difference in returns between firms with a high ratio of their book value of assets to their market value to the firms with a low ratio) and the 'small minus large' factor (SML, which is the difference in the returns made by small firms relative to large firms). Thus, the application of the Fama-French model requires, in effect, the estimate of three betas (rather than one under the CAPM) and two additional risk premia.

- While the additional factors in the Fama-French three factor model were the result of empirical research, the fact that the factors have been found to explain returns across different time periods and in different markets suggest that the factors are a proxy for risk factors that are priced but not captured within the standard CAPM (for example, to identify assets that perform unexpectedly well or badly when re-investment opportunities are good). A fuller explanation of the theoretical justification of the Fama-French model can be found in the report referred to above.

Application of the Fama-French model in Australia is practicable because Dimensional Fund Advisers Australia (with which Kenneth French is affiliated) provide historical estimates of the HML and SML factors for Australia that date back to 1975 and 1980, respectively. As part of testing the Fama-French model for application to regulated utilities in Australia, this report also included an assessment of the relative accuracy of the CAPM and Fama-French models in the US for a large group of US electricity utilities.

[1] NERA, 2009, Cost of equity – Fama-French three factor model, report for Jemena Gas Networks, August (available at: http://www.aer.gov.au/content/item.phtml?itemId=730699&nodeId=4fcc57398775fe84685434e0b749d76a&fn=Appendix%209.1%20-%20NERA%20-%20Cost%20of%20equity%20-%20Fama-French%20Model.pdf). This report is currently being considered by the AER.

Murray Reynolds
2 December 2009

Regarding the application of the Fama-French model in Australia, it was found that the HML factor had been significantly different to zero over the period since 1975, implying a systematic premium to high book-to-market stocks over low book-to-market stocks. In contrast, the second of the Fama-French risk factors (the difference in returns between small and large stocks) was not found to be statistically significant and was found to be slightly negative.[2]

Table 1 sets out the results of the risk premium that we estimated over the risk free rate for a regulated energy business using the Fama-French model in Australia,[3] and compares this to the estimates that would be obtained using the CAPM for different assumptions about the asset beta. A total of nine firms were included in the analysis (comprising the AER's preferred set of comparable entities) and the parameters reported below reflect the average of six different estimates, reflecting three methods for combining the firms (comprising an equally weighted portfolio, value weighted portfolio and a simple average of the parameter estimates for each firm) and two estimation techniques (ordinary least squares and the 'least absolute deviations' method, which is less sensitive to the effects of outliers). These estimates of the cost of equity have been adjusted to be consistent with a target leverage ratio of 60 per cent debt/assets, being the standard gearing assumption in Australia, and assume a market risk premium of 6.5 per cent, being the AER's current standard assumption (which, as discussed below, translates into a New Zealand tax adjusted MRP of 7.3 per cent, before any adjustment is made for the difference in the level of risk in the relevant markets).

[2] We included the SMB factor in our model regardless in order to maintain consistency with the Fama-French three factor model. Omitting the SMB factor raised our estimated cost of equity.
[3] NERA, 2009, Op. Cit., pp.49-50.

Murray Reynolds
2 December 2009

Table 1
Australian application of the Fama French three factor model vs. CAPM

				Risk premium
Fama-French model	*Market factor*	*HML factor*	*SMB factor*	
Risk Premium	6.50%	6.24%	-1.23%	
Beta	0.59	0.48	0.30	**6.46%**
CAPM	*Market risk premium*	*Asset beta*	*Equity beta (60% leverage)*	
	6.50%	0.30	0.75	**4.88%**
	6.50%	0.35	0.88	**5.69%**
	6.50%	0.40	1.00	**6.50%**
	6.50%	0.45	1.13	**7.31%**

It can be inferred from the table above that the Fama-French model produced estimates of the cost of equity that were consistent with an asset beta of 0.40 and a tax-adjusted MRP of 7.3 per cent (before any adjustment is made to the premium to account for the difference in the level of risk between the Australian and New Zealand markets). A commensurately higher asset beta would be required to the extent that a lower tax adjusted MRP is used.

Regarding the application of the Fama-French model in the US, as part of the examination of the merits of the Fama-French model for regulated utilities, we also tested the predictive accuracy of the Fama-French model for a large portfolio (21) of US electricity and gas utilities compared to the CAPM using data over the period between August 1980 and May 2009. Specifically, the purpose of the test was to ascertain how much of the observed returns can be explained by the relevant financial model – with the unexplained return being referred to as the 'alpha'. The model that produces the lower 'alpha' in absolute terms is the one that provides the more accurate estimate of the cost of equity. In

addition, the sign on the 'alpha' can provide insight into whether the relevant model over- or under-predicted the return for the assets in question.

Our estimated 'alphas' and the associated standard errors of these estimates are set out in Table 2 (the alpha is in per cent per annum).

Table 2
Fama-French vs. CAPM for US energy utilities

		Equally weighted portfolio	Value weighted portfolio
CAPM	*Alpha*	8.19	7.16
	Standard error	2.27	3.95
Fama—French	*Alpha*	4.24	4.34
	Standard error	2.44	3.48

From this, we concluded that:

- the absolute pricing error under the Fama-French three factors model was approximately half that of the CAPM for the portfolio of US energy utilities, and the pricing error went from being statistically significant under the CAPM (at least with the equally weighted portfolio) to insignificant under the Fama-French three factors model; and

- over this period the CAPM under-estimated the returns for these firms.

Application of the dividend growth model

During the gas distribution price review undertaken by the Essential Services Commission of Victoria (ESC) in 2007-08, NERA provided analysis that showed the average equity returns for electricity utilities authorised by US regulators from 1996 to mid 2007.[4] NERA's table summarised 228 regulatory decisions. The purpose of NERA's analysis was to demonstrate the implied equity beta from these US decisions; however, an alternative

[4] NERA (29, October, 2007), *Equity Beta for Gas Distribution*, Report for APIA, ENA and ETNOF, p.10. This analysis ultimately was difficult for the regulator to take into account because the law required the application of the CAPM.

interpretation of NERA's work is that it provides the ability to test how the cost of equity under the CAPM would compare to the decisions adopted by US regulators. I note further that, as the dividend growth model is used extensively in the US (albeit not in all cases), its analysis also permits (in part) a comparison of the estimated return using the CAPM to the dividend growth model.

Columns 2, 3 and 4 of Table 3 below reproduce the information that NERA presented, namely the authorised return by US regulators, the leverage for the firm in question and the average bond rate over the period in question. Taking the complete years of data from 1996 to 2006, the average equity return authorised by US regulators was 10.95 percent. The remaining columns are our contribution, and show the cost of equity that would be estimated for the firms in question using the CAPM assuming an asset beta of 0.40 and a market risk premium (classical) of 6 per cent. Note that the equity beta reflects the gearing for the firms in question.

This analysis shows that if an asset beta of 0.40 and market risk premium of 6 per cent is assumed, then the average cost of equity for these firms would be estimated at 10.21 percent using the CAPM, which is 0.74 percentage points lower than the authorised returns. While in 2 of the 11 years the CAPM would have provided a higher return, in the vast majority of instances under these assumptions the CAPM would have understated the returns authorised by US regulators.

We would conclude from this analysis that estimates of the cost of equity using the CAPM (and using an asset beta of 0.40 and market risk premium of 6 per cent) would have understated materially the allowed regulatory returns over this period. We would further infer that the analysis provides weak evidence that the dividend growth model may produce higher estimates of the cost of equity for utility firms than the CAPM, given the extensive use by regulators of the dividend growth model in the US.

Murray Reynolds
2 December 2009

Table 3
US regulated returns compared with CAPM required return

Year	Regulated Equity return (%)	Debt as % of Capital		Assumed Asset Beta	Assumed Market Risk Premium	CAPM Equity return (%)	Diff. (%)
1996	11.19	56%	6.44	0.4	6	11.85	0.66
1997	11.29	52%	6.35	0.4	6	11.37	0.08
1998	11.51	51%	5.26	0.4	6	10.11	-1.40
1999	10.66	51%	5.72	0.4	6	10.61	-0.05
2000	11.39	51%	5.98	0.4	6	10.92	-0.47
2001	10.95	56%	5.02	0.4	6	10.48	-0.47
2002	11.03	52%	4.61	0.4	6	9.58	-1.45
2003	10.99	50%	4.01	0.4	6	8.82	-2.17
2004	10.59	54%	4.27	0.4	6	9.50	-1.09
2005	10.46	51%	4.29	0.4	6	9.22	-1.24
2006	10.43	53%	4.80	0.4	6	9.86	-0.57
Average	**10.95**					**10.21**	**-0.74**

Source: NERA and PwC analysis

Lastly, I note that a market risk premium of 6 per cent in the US equates to a tax adjusted market risk premium in New Zealand of approximately 7.7 per cent (before any adjustment is made for the likelihood that New Zealand investors would require higher returns than in the US because of the greater risk in returns).

Murray Reynolds
2 December 2009

Variability in beta estimates

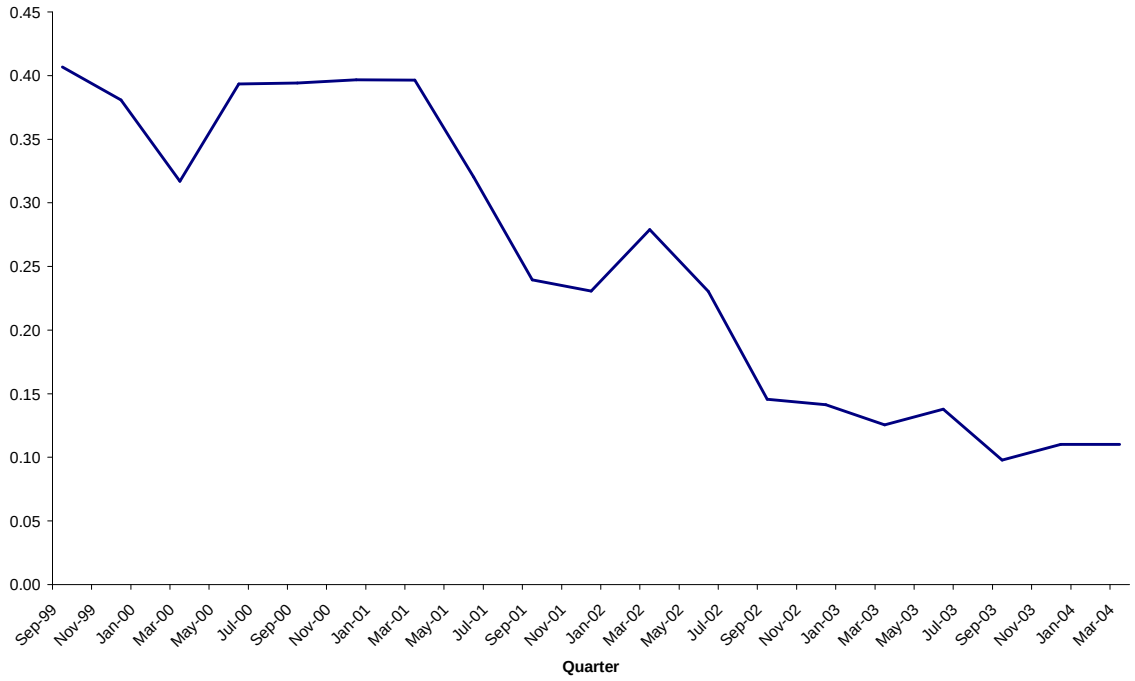
I noted during the conference that the beta estimates that Australian regulators have obtained for Australian firms have been disconcertingly variable, and at times implausibly low. I noted during the conference that at the time of the review of the prices for the electricity distribution in Victoria (with the new prices coming into effect in 2001), there was confidence that an asset beta of approximately 0.40 was consistent with the market evidence; however, shortly after that the confidence faltered as beta estimates fell significantly for the regulator's set of comparable entities. Figure 1 shows the change in the betas for the regulator's set of comparable entities over time.[5]

Since that time, it has become widely accepted that the substantial fall in reported betas can be attributed, at least in part, to the effects of the technology bubble (where 'old economy' stocks like utilities moved converse to the market as a whole). As such, it has become common in Australia to remove observations drawn from the bubble period (which spans between about 1998 and the end of 2001). However, while beta estimates have again increased, they remain low, and concerns now exist that the period after the bubble and prior to the Global Financial Crisis (2002 to the end of 2006) also may be an unusual period that may have caused bias in beta estimates for certain sectors, noting that this period was characterised by market volatility that was extremely low by historical standards and by debt finance that was extremely cheap and in apparently unlimited supply.

[5] The observations for the period ending with June 2002 are reported in: Essential Services Commission (Vic) (2002), Review of Access Arrangements – Final Decision, October, p.354, and has been extended by the author for the remaining period. The betas are those produced by the Australian Graduate School of Management Risk Management Service, which estimates betas using monthly returns over the previous four years.

Murray Reynolds
2 December 2009

Figure 1
Change in asset betas for the Australian comparable entities



To a regulator, the problem is that the testing and theorising as to whether betas measured during a particular period may be 'trusted' is likely to come some time after the period in question. In my advice to regulators, I have stressed the importance of providing stable and predictable returns to investors, and as such recommended making use of the full suite of information that is available, but also placing a strong weight on the previously adopted value for the beta estimate and requiring the new evidence to provide a convincing case for change. For example, in a report to the Australian Competition and Consumer Commission in 2002 while with my previous employer (and shortly after the fall in beta estimates noted above), I recommended as follows:[6]

[6] Allen Consulting Group (2002), Empirical evidence on proxy beta values for regulated gas transmission activities, July, pp.5-6. Note that this report advocates using beta estimates from public 'beta books', but am now of the view that it is preferable to undertake customised estimates in order to understand in depth the reliability of the estimates. In addition, if I was writing the same

Murray Reynolds
2 December 2009

Exclusive reliance on the latest Australian market evidence would imply adopting a proxy equity beta (re-levered for the regulatory-standard gearing level) of 0.7 (rounded-up) for these activities. Moreover, regard to evidence from North American or UK firms as a secondary source of information does not provide any rationale for believing that such a proxy beta would understate the beta risk of the regulated activities. Rather, the latest evidence from these markets would be more supportive of a view that the Australian estimates overstate the true betas for these activities, although concerns are expressed with the reliability of the beta estimates from these other countries.

That said, however, the report cautions against exclusive reliance on this evidence at this point in time. It is noted that most Australian energy regulators have used a proxy equity beta in the range of 1 (for the regulatory-standard gearing level of 60 per cent debt-to-assets) when assessing or setting regulated charges. The use of a proxy beta of 0.7 would represent a substantial reduction in the estimates of the costs of capital associated with these activities compared to the assumptions previously adopted. While such a revision would be warranted in the face of reliable, objective evidence, it cannot be concluded definitively that this quality of evidence exists at this time.

First, the primary source of evidence – which derives from the listed Australian entities – consists of a group of only four firms, and a full period (four years) of observations is only available for two of these. Secondly, we are concerned about the magnitude of the beta estimates derived for firms operating in other countries. In particular, the re-levered equity betas for the US firms are substantially lower than the estimates that have been derived for different time periods. It may be that the recent events on US share markets may have affected the beta estimates, which may produce a bias if those events were not considered by investors to be normal events; however, it is impossible to prove or disprove such a conjecture.

Accordingly, in the near term, while noting that how the Commission chooses to exercise its discretion is for it alone to decide, it is recommended that it adopt a conservative approach, which is suggested to imply not using a proxy equity beta that is too far from the range of previous, relevant regulatory decisions. That said, this report has demonstrated that no implication can be drawn from current market evidence that the proxy betas that Australian regulators have adopted are likely to understate the 'true' beta – rather, as noted above, the current evidence suggests regulators systematically have erred in the favour of the regulated entities.

In the future, however, the recent listings of energy utility firms on the Australian Stock Exchange imply that more information from the Australian capital market will be available in the future, and so greater reliance on market evidence should be possible over time.

---

report today and had the benefit of hindsight, I would more cautious about when and to what extent the quality of beta estimates for utility firms in Australia would be expected to improve.

Murray Reynolds
2 December 2009

The proposition that regulators should require a hurdle to be met has since been adopted by a number of regulators,[7] and has been enshrined in the rules governing the price regulation of electricity transmission and distribution entities, the relevant clause being as follows:[8]

> (4) where the credit rating levels or the values attributable to, or the method of calculating, parameters referred to in paragraph (d) cannot be determined with certainty:
>
> (i) the need to achieve an outcome that is consistent with the national electricity objective; and
>
> (ii) the need for persuasive evidence before adopting a credit rating level or a value for, or a method of calculating, that parameter that differs from the credit rating level, value or the method of calculation that has previously been adopted for it.

In my view, it would be appropriate for the Commission to apply a similar principle when considering whether the asset beta that it adopts now should change from the values that it has previously adopted in its recent determinations.

Cost of debt financing

As I noted at the conference, in my view it is appropriate for a benchmark assumption to be made about both the leverage ratio and the cost of debt financing for regulated firms. Adopting benchmark assumptions for these parameters maximises the incentives for businesses to make efficient financing decisions, insulates customers from the risk of inappropriate decisions and is also most consistent with the outcomes of competitive markets, where superior or inferior performance results in higher or lower profitability for the firm in question rather than the capacity (or requirement) for a particular firm to charge a different price to its competitors.

One of the issues that arose during the conference was the appropriate assumption to adopt about the benchmark financing practice. In my view, this is an empirical issue that should be informed by the observed practices of utilities in Australasia. I also note that the AER's recent decision on cost of capital parameters for the Australian electricity networks provides a wealth of information about financing practices in Australia.

[7] See, for example, AER, 2008, Review of access arrangement for GasNet, April, p.67.
[8] National Electricity Rules, clause 6.5.4(e). The items to which this clause applies are the nominal risk free rate, equity beta, market risk premium, maturity period and credit rating for corporate bonds assumed in the debt margin, assumed leverage and assumed utilisation of imputation credits.

Murray Reynolds
2 December 2009

I note further that the Commission previously has adopted the view that an efficient utility should issue debt of the same term as the regulatory period. In my view, an observation of the financing practices of the most relevant Australasian utilities would suggest that this is not the standard practice, but rather that maturities are staggered over time in order to manage the risk that adequate debt finance will be available at the time that a refinancing is to be undertaken. The AER found in this regard that the average original term of Australian utilities was close to 10 years. The AER accepted as a consequence that the credit margin that a utility was required to pay would reflect the term of the initial issue.

It has been further suggested that, even if an efficient firm issued debt that was a longer term, it would use 'swaps' to only fix the interest rate that was payable for increments that matched the regulated period. By doing so, it was suggested that the firm could reduce its funding costs (assuming the yield curve is upward sloping), while still managing its refinancing risks.

I note, however, that it is important in this regard for the Commission to include all of the relevant costs that an efficient firm would incur were it to issue longer term debt but then hedge its interest rate for a shorter period. The costs that the firm seeking to hedge its debt comprises two parts – the first being the execution fee (in effect, a transaction cost) and the second a credit margin. This latter component reflects the fact that if the firm seeking the swap goes into liquidation, then the entity issuing the swap may be left with an unhedged risk for which it would seek compensation in advance (it is common in Australia for the entity issuing the swap to trade bond futures to manage the risk associated with providing the swap). I am informed by the PricewaterhouseCoopers Australia Project Finance team that the combined execution and credit margin costs can vary significantly over time, being in the order of 5 basis points per annum several years ago for a five year swap for a BBB rated entity, but are currently in the order of 20 to 35 basis points per annum for the same deal.[9] The precise amounts, however, are not normally made public and so the Commission would need to consult relevant New Zealand finance practitioners to obtain an up-to-date estimate should it choose to assume that an efficient firm would issue longer term debt and seek swaps to manage interest rate risk.

I note that the AER determined that an efficient firm would issue longer term debt (and so incur a credit margin consistent with that term), but then seek swaps to lock-in interest rates to coincide with the regulatory period. The AER determined that the all-up cost of

[9] To be clear, these amounts are normally taken as an upfront fee; however, these amounts have been converted into an equivalent addition to the five year interest rate on the swap.

debt was equivalent to fixed rate debt of about 7.4 years,[10] but nevertheless decided to assume a ten year fixed rate financing benchmark. I note here that the AER did not take account of the cost of locking in interest rates as assumed, and hence its decision (at least at the present time) was not necessarily a 'conservative' one.

Australian market risk premium converted to a New Zealand estimate

The AER recently has adopted a market risk premium in the Australian context of 6.5 per cent. Part of the Australian context is that regulator's assume a partial valuation of imputation credits – the AER's current assumption is that imputation credits are valued at 65 per cent of their face value.

The process for converting this estimate into an equivalent in New Zealand involves several steps. First, the non-cash benefit that is implicitly included in the Australian market risk premium must be removed, and secondly, the required 'tax adjustment' to the New Zealand 'cash' market risk premium must be made. A third adjustment that could be contemplated is to raise the New Zealand market risk premium further to take account of the greater historical variability of returns to the New Zealand market.

If the assumptions that Dr Lally has assumed previously when making this adjustment are adopted – with the exception of the assumed utilisation of imputation credits – then this results in a New Zealand equivalent market risk premium of 7.3 per cent,[11] before any adjustment is made for the likely difference in required returns from the New Zealand market compared to Australia. In my view, therefore, a market risk premium of at least 7.5 per cent would be consistent with the current assumptions in Australia.

I note that the AER's assumption that imputation credits are only valued at 65 per cent of their face value can be challenged, and note that the debate about the valuation of imputation credits is a vigorous one in Australia. However, this assumption is what the AER assumes, and if one was to replace this assumption with a view that the true value is either higher or lower, then overall view of the AER with respect to the required returns for regulated utilities would be misstated (that is, if the AER adopted a higher valuation for imputation credits, then it would set lower regulated charges, and vice versa for a lower assumed valuation).

[10] AER, 2009, Review of WACC Parameters – Final Decision, May p.164.
[11] These assumptions are that 85 per cent of dividends are fully-franked, an average dividend yield across the market of 4 per cent and an investor tax rate of 30 per cent (Lally, 2008, International Comparison of Cost of Capital for Gas Distribution Businesses, October, p.28). A risk free rate of 5.8 per cent has been assumed in the calculation above.

Murray Reynolds
2 December 2009

Leverage assumption and levering method

During the conference, the Commission noted that under the Brennan-Lally form of the CAPM and use of the Harris and Pringle levering equation, the Commission noted that the estimated WACC would rise with leverage. It expressed the concern that this made its decision over the choice of leverage important and was further concerned that if the allowed WACC would change with leverage, then it may induce firms inefficiently to 'lever up' in order influence the regulated returns.

In my view, the appropriate mechanism for the Commission to address the perverse incentive problem is to adopt a benchmark level of gearing when estimating the WACC – rather than to use a firm's actual gearing – and to base this benchmark on a sufficiently wide sample that individual firms would have little influence. I also note that firms are often subject to covenants in debt agreements that substantially limit their ability to effect large changes in gearing, and hence whether the concern is a practical one may be questioned in any event (I am not an expert on this matter and expect the firms to provide evidence on this matter directly).

Turning to the concern about the level of leverage that should be assumed in light of the relationship between the WACC and leverage, I agree with the views expressed by John Redmayne at the conference that the effect on the WACC of a movement in leverage within a reasonable band (which I would define as between 40-60 per cent debt-to-assets) is modest in the context of the overall uncertainty associated with estimating the WACC. Having said that, I note that the choice of levering method has the least effect on the estimated WACC the closer is the target level of gearing to the actual gearing of the firms for which betas are estimated. In Australia, we typically adopt a gearing level of 60 per cent debt-to-assets, which also coincides closely with the average leverage of the firms that Australian regulators typically treat as comparable entities for beta estimation. I note, however, that US utility firms typically have gearing levels somewhat lower than this.

Lastly, I note that Professor Lally in a subsequent paper for the Commission has noted that the reason that the WACC changes with leverage given the equations selected (and an assumed debt beta of zero) is because the allowance for the cost of debt is greater than the risk free rate. In the context of this discussion, Professor Lally has observed that using the promised yield on debt is likely to lead to the WACC being overstated as the WACC should reflect the expected cost of debt, and exclude any embedded default premium.

On this last matter, while I acknowledge Professor Lally's position as being correct in principle, with the exception of firms in situations of financial distress the standard practice

amongst both finance practitioners and regulators is to use the promised yield on debt when estimating the WACC. Accordingly, seeking to remove the default premium would result in the Commission departing materially from established practice. In addition, it is questionable how large the default premium component is in practice. Information from Standard and Poor's suggests that the cumulative probability of default of a bond issued within the BBB band over 5 years is just less than 2.5 per cent (0.7 per cent for an A rating), which rises to just over 5 per cent over 10 years (1.9 per cent for an A rating).[12] These figures would suggest that the default premium is only a modest portion of the observed debt margins.

* * *

If you would like to discuss any aspect of this advice further, please do not hesitate to contact me (61 3 8603 4973).

Yours sincerely

Jeff Balchin
Executive Director
Advisory

[12] Standard and Poor's, 2009, Default, Transition and Recovery: 2008 Annual Corporate Default Study and Rating Transitions, April, p.43. These probabilities reflect the observed cumulative default rates for firms using data over the period 1981 to 2008.