



Cost of Capital Cross Submission

Professor Robert G. Bowman

2 December 2009
Synergies Economic Consulting Pty Ltd
www.synergies.com.au

Disclaimer

Synergies Economic Consulting (Synergies) has prepared this advice exclusively for the use of the party or parties specified in the report (the client) and for the purposes specified in the report. The report is supplied in good faith and reflects the knowledge, expertise and experience of the consultants involved. Synergies accepts no responsibility whatsoever for any loss suffered by any person taking action or refraining from taking action as a result of reliance on the report, other than the client.

In conducting the analysis in the report Synergies has used information available at the date of publication, noting that the intention of this work is to provide material relevant to the development of policy rather than definitive guidance as to the appropriate level of pricing to be specified for particular circumstance.

Contents

Framework	5
WACC Level	6
NPV = 0 Paradigm	7
Global Financial Crisis	8
Leverage	10
Cost of Debt	11
Asset Beta	14
Market Risk Premium	15
Range	16

Cost of Capital Cross Submission

I welcome the opportunity to provide further responses to the issues raised at the Commerce Commission's (the Commission's) Cost of Capital Workshop (the Workshop), held on the 12th and 13th of November 2009. In providing my response, reference will also be made to the WACC submission prepared by Synergies Economic Consulting dated August 2009, which was prepared for Vector Limited (the August submission).

Framework

The choice of model that is used to determine the cost of capital was discussed at length at the Workshop and I do not intend to revisit that issue in detail here. As discussed in the August submission, a primary concern with the application of the Brennan-Lally CAPM is the assumption of a closed economy.

As one participant at the Workshop noted, no particular model is likely to reflect the reality of where New Zealand sits in the world economy.¹ However, we do need to consider the practical (and theoretical) implications of that reality when specifying values for parameters within that model. In this regard, one of the key drivers will be the identity of the price-setting investor, which in the case of New Zealand could be expected to be a foreign investor.

An alternative that is often postulated to closed economy models is the international CAPM (or ICAPM) and this was discussed at the Workshop. I am not advocating the application of that model here because of the practical difficulties with implementing that model in practice (and in any case based on the discussion at the Workshop my understanding is that this model is not on the table as an alternative to the Brennan-Lally CAPM). However, one point that was made at the Workshop that I want to respond to is the assumption that the application of the ICAPM will always result in a lower WACC², which in turn could be seen to imply that firms are already 'better off' if a closed economy model such as the Brennan-Lally CAPM is applied.

The assertion that ICAPM would result in a lower WACC than with TA-CAPM is not supported. Although there may be some marginal attraction of investments in New Zealand because of diversification potential for global investors, there are at least two influences that would be much stronger against the assertion:

¹ Cost of Capital Workshop Transcripts, 12 November 2009, p.27.

² Cost of Capital Workshop Transcripts, 12 November 2009, p.26.

- New Zealand equities are very small both individually and collectively. There is a wealth of data supporting the proposition that small firms and small countries/economies have significantly higher risk and required return.
- The appropriate ICAPM to use would be the one that incorporates exchange rate risks. The New Zealand dollar is a very volatile currency³ and would have a high risk attached to it. A full ICAPM would reflect this with resulting higher WACCs.

As we have previously submitted, I consider it preferable for the Commission to apply one model. What I would note is that any model is susceptible to estimation error, which provides further support for selecting an estimate from the upper bound of the range.

WACC Level

A simple test of the adequacy of the regulatory WACC was proposed by one Workshop participant. He asserted that transactions for electricity lines businesses have been characterised as purchasers paying prices higher than the related ODVs. He suggested that the purchase prices were indicative of a 50% premium on ODV.⁴ He then suggested a conclusion that this was evidence that WACC was being set too high.

While I dispute that this is a relevant test, to the extent that we do observe purchasers paying a premium above ODV there could be a number of reasons behind this. For example, it could reflect the 'premium for control' that the bidder is willing to pay, or their assessment of the efficiencies that they think they can extract from the business. One participant suggested that this merely suggested that there were substantial real options in the businesses.⁵ Another highlighted the issues in making any sort of valid comparison based on ODV, as this often is no reflection of the actual costs of doing business.⁶ Given there are a number of potential factors at play here, I consider the assumption that it must reflect an overinflated WACC as a highly presumptuous (and potentially uninformed) one. Such statements add no value to this debate.

Rather than attempt to reconcile any differences between purchase prices and ODVs, I suggest another simple test that refutes the allegation of excessive WACCs. Basic economics and commercial nous suggests that any regulated business that is allowed a return on its investments substantially in excess of its required rate of return should

³ See page 81 of Synergies WACC submission (31-8-09). The New Zealand dollar is one of the world's most speculative currencies (B. Gaynor, "The Las Vegas of the Currency World", NZ Herald, 4 July 2009).

⁴ Cost of Capital Workshop Transcripts, 12 November 2009, p.31.

⁵ Cost of Capital Workshop Transcripts, 12 November 2009, p.34.

⁶ Cost of Capital Workshop Transcripts, 12 November 2009, p.55.

invest heavily. So if the WACC is too high, we should expect to observe substantial over investment in the industry (or the consistent installation of capacity that is in excess of demand).

There is no evidence of over-investment in the industry. Distributors have consistently indicated that there will be a ramp-up in investment requirements as existing assets reach the end of their economic and physical lives. If distributors saw an opportunity to generate an excess return, then this investment would already be evident.

NPV = 0 Paradigm

Based on the discussion at the Workshop it is evident that the Commission's continued reliance on the 'NPV = 0' paradigm is highly contentious, particularly as it relates to the term of the risk-free rate. In this context, the Commission has argued that it is necessary to set the risk-free rate to equal the term of the regulatory period to ensure that the NPV is zero over that period. This issue was addressed in detail in Synergies' August submission and I will therefore not seek to represent the arguments in detail here.

It is a foundational tenet of management and finance that companies should only invest in projects that will create value. This is operationalised at the decision making level with the tenet that firms should only invest in projects that have a positive net present value (i.e., $NPV > 0$).

To the extent that firms are being seen as indifferent as to whether or not they would invest at a zero NPV, this would only hold if all costs were correctly and accurately accounted for, the WACC was correctly specified and the firm was being appropriately compensated for all risks. Apart from the fact that such certainty is unlikely to ever hold in practice, if the firm did consistently invest on this basis it would add no value to its shareholders.

Further, to the extent that it could be implied that the Commission is seeking to ensure that this outcome is only ever achieved on an ex post basis, this provides no incentive for regulated businesses to outperform their benchmarks, which is inconsistent with the objective of incentive regulation. The Commission has clearly stated that this is not its intention. However the key risk with its continued application of the NPV = 0 test in this way, is that unless it provides full compensation for the cost of hedging this risk, regulated businesses face a negative NPV outcome.

The NPV = 0 paradigm would place a lower bound on WACC for a regulated company, provided the analysis to implement the test fully reflects commercial realities faced by the companies. If the Commission does not incorporate all

commercially prudent costs and risks in its analysis, the NPV = 0 test is not substantive and should not be applied. I consider that the most practical solution to this is to estimate the risk-free rate based on a ten year horizon, which will be discussed further below in my response on the cost of debt.

The Commission must be careful that it does not develop theoretical constructs that are at odds with commercial practices that have stood the test of time. The Commission's positions should reflect sound commercial practice, not attempt to lead or change such practice.

Global Financial Crisis

Seemingly everyone at the Workshop agreed that the GFC has resulted in higher risk premiums for both debt and equity. Just how enduring the impacts will be was debated. The common belief was that the level of risk would subside, but there was some support for the view that there has been a permanent repricing of risk.

It was near unanimous that data on the risk free rate and the debt risk premium should be measured at the appropriate time within the regulatory process, thus including the impact of the GFC in cost of debt data. It is just as compelling to include the impact of the GFC in the cost of equity data. Dr Lally agreed that the GFC would have increased the market risk premium (MRP). He suggested that the impact of the crisis would likely subside and might be eliminated within five years.

There is an objective way to consider the attenuation of the crisis and the current magnitude of its affect on the cost of equity capital. The companies at the Workshop disclosed that their debt risk premiums on five year debt have risen by 150 to 200 basis points as a result of the GFC. Clearly, equity is riskier than debt, and I expect that the MRP should be affected more than the debt risk premium by the crisis.

The MRP is inherently volatile, which in turn reflects the nature of the risk borne by equity holders and the continual repricing of that risk. When estimating WACC within the context of the CAPM, we are taking a long-term, forward-looking view as to the value of each parameter. The observed MRP in one month could be very different from the observed MRP six months later. For this reason, regulators (and practitioners) tend to set the MRP based on the long-term average. Despite the short-term volatility the MRP exhibits, historically the long-term average MRP (estimated over a horizon of a minimum of thirty years) has remained remarkably stable.

However, these observations pre-dated the GFC. The impact of the GFC on financial markets was unprecedented and as outlined above, may have indeed prompted a permanent repricing of risk. For example, in Australia, the return on the All Ordinaries

Index fell by more than three standard deviations from the long-term average. This is a significant and abnormal event.

Further, if a historical average was calculated using this most recent data, it would actually suggest a lower historical MRP because of the impact of the significant compression in returns in 2008 (this impact still pervades over reasonably long time horizons, which highlights the significance of the impact of the GFC). Solely relying on updated historical data (even if this is over a long time period) could therefore lead to an underestimate of the MRP in the current environment. Indeed, following periods of such abnormally low returns, it is common to observe an increase in the forward-looking MRP.

The fact that debt margins have more than doubled their pre-GFC levels has further highlighted the significant impact of the GFC on capital markets. This impact will directly flow through to the regulated cost of debt because the debt margin will be set based on current market conditions, which in turn is assumed to be the best indicator of the long-term, forward-looking cost of debt.

The long-term, forward-looking MRP cannot be so easily observed. The inherent volatility of the MRP means that short-term estimates cannot be used as an indicator of the long-term forward-looking MRP, and to do so would materially increase the risk of error. As outlined in Synergies' August submission, despite the existence of forward-looking measures concerns regarding the reliability of these measures means that considerable caution must be exercised in placing any reliance on them when attempting to estimate a long-term, forward-looking MRP.

In my view, it is therefore appropriate to continue to set the MRP with the long-term historical average as the starting point. If the MRP is being reviewed during a period of extreme market conditions – to the extent that the long-term historical average is not necessarily considered reliable – an adjustment should be made for the impact of those conditions on the cost of raising equity. Given this impact is difficult to quantify, at a minimum the adjustment could be based on the observed increase in the cost of debt since the period prior to the event (in this case, being the commencement of the GFC). For example, based on the evidence cited at the Workshop, the MRP should be increased by at least 150 basis points.

To the extent that the effects of the crisis subside and the markets return to more 'normal' (or pre-GFC) conditions – presuming this does of course occur – that adjustment could be reduced or removed altogether. In looking for evidence of this, reference again could be made to the debt markets. If and when this occurs, the long-term MRP would then be applied. Alternatively, if there is evidence of a permanent

repricing of risk as a consequence of the crisis, the long-term value of the MRP will have to be revisited.

Other issues in relation to the MRP are considered further below.

Leverage

One issue discussed at the Workshop (with an example prepared by Commissioner Duignan) was the impact of changes in leverage on WACC under the Brennan-Lally CAPM and the classical CAPM. The example showed WACC increasing with increasing leverage for the Brennan-Lally CAPM but decreasing for the classical CAPM. In both cases the relationship is plotted as linear.

The standard explanation of the relationship between leverage and the WACC is referred to as the Static Trade-off Theory; the tax advantages of debt are traded off against the financial risk disadvantages of debt. From this perspective, the tax advantage dominates at low levels of debt so the WACC decreases with increasing leverage. However, as leverage increases, the risk of default and bankruptcy increases and begins to dominate the tax advantage. WACC begins to rise with increasing leverage. The result is a U shaped curve on a plot of WACC (vertical axis) against leverage (horizontal axis). The optimal capital structure is where the trade-off between these two effects is balanced and WACC is minimised.

However, with the Brennan-Lally model and related assumptions imposed by the Commission, the tax benefit of debt to the issuing company would be small or even zero. Thus, it should be expected that the plot of WACC against leverage would be slightly up-sloping with the slope increasing at an increasing rate as the level of debt begins to imply appreciable levels of default risk. Stated another way, the models applied by the Commission are consistent with the optimal capital structure for companies being zero, or at least very low.

This implication of the Commission's assumptions must be strongly questioned as empirical observations are that New Zealand companies, regulated and unregulated, employ significant amounts of debt in their capital structures. The commercial logic of using substantial amounts of leverage can be explained by expanding the analysis to include considerations other than tax and bankruptcy effects. Associate Professor Lally has prepared a paper on WACC and leverage. He provides a number of reasonable

explanations of this conflict.⁷ This restores the expectation that the relationship between WACC and leverage will be U shaped, with an optimal point.

An interpretation of Lally's paper, with which I agree, is that the graph presented at the Workshop is overly simplified, and the issue it presents is not one which need occupy the attention of the Commission or regulated companies.

The issue of an appropriate assumed leverage for regulated businesses remains important. As mentioned above, we observe companies employing substantial amounts of debt. I believe it is reasonable and appropriate to assume that the levels of debt are rational reflections of the risk and return of debt. Companies have incentives to limit leverage to a prudent level because of the marginal cost of debt, deteriorating credit ratings and increasing risk of bankruptcy. Some limits on leverage are imposed by debt covenants, some are imposed by the need for a firm to retain unused debt capacity, but most important is simply the penalty of a rapidly increasing cost of debt as leverage gets above moderate levels.

To summarise, companies use debt in their capital structures until the cost of marginal debt becomes onerous.

Clearly, regulated companies are choosing to carry levels of debt of greater than the 40% assumed by the Commission. These higher levels of debt do not appear to be penalised by significant increases in borrowing costs or deteriorating credit ratings. Therefore, I believe the Commission should consider increasing its assumed leverage. This was explored further in Synergies' August submission.

Cost of Debt

This parameter is where the NPV = 0 test has been applied, and where the need to fully reflect commercial realities is most clear.

Practitioners were very clear that they endeavour to fund long term, in line with the maturities of their assets. They do not accept the Commission's view of using maturities to match the regulatory period.

The Commission appears to believe that firms should simply borrow at 10 years and then swap to 5 years. The Commission would then accept the cost of the swap as an allowable cost. However, it is not possible to fully adjust the effective interest rate to the 5 year rate through available swaps and hedges.

⁷ M. Lally (2009), WACC and Leverage, 17 November, posted in the Commission's website at - <http://www.comcom.govt.nz/IndustryRegulation/Part4/ContentFiles/Documents/WACC%20and%20Leverage%20-%20A%20Note%20by%20Dr%20Martin%20Lally0.pdf>. See page 7.

The debt markets available to the various companies represented at the Workshop vary widely. Some must turn to overseas markets to raise their required finances. Others are small and not able to make public issues of debt. Further, in the current environment, they are not able to access long maturities for their debt. They must borrow for terms of 3 to 5 years because of conditions in the New Zealand debt market. They are roughly brought in line with the Commission's position, but are being forced to accept refinancing risk by the incompleteness of the debt markets. Securities or transactions that might allow them to ameliorate the refinancing risk are not available to these companies. Therefore, any system which allows incurred costs to be included in allowable costs will not benefit these companies. Because of incomplete markets, they are exposed to refinancing risk, which cannot be hedged. Yet the standard approaches to estimating the WACC will not reward them for this risk that is thrust upon them.

Calculation of the cost of debt capital is very complex. Attempting to identify and capture the range of costs associated with debt financing is very difficult and firm specific. The Commission's insistence on setting the maturity date at the regulatory period simply compounds the complexity and difficulty.

In a very real sense, the Commission's position has opened a Pandora's Box. Setting the risk-free rate at ten years is consistent with the commercial wisdom of matching maturities of long-lived assets and debt. Firm-specific idiosyncrasies faced by different companies were largely ignored in the regulatory process. Now the Commission's position, which is at odds with commercial wisdom, has focused attention on the issue of refinancing risk and the diversity of approaches to managing debt maturity. Certainly the GFC has exacerbated the situation by driving home the fact that refinancing risk is not some abstract concept but is a very real risk faced by all firms.

This issue was considered at length by the Australian Energy Regulator as part of the development of its guidelines in relation to the WACC parameters that will apply to regulated electricity transmission and distribution businesses.⁸ The AER had originally proposed that the use of a maturity that matched the length of the regulatory period in its Draft Decision. In the Final Decision, it reverted to the use of a ten year maturity based on evidence submitted by the regulated businesses, which showed that they do seek to obtain funding for longer terms. In making that determination the AER acknowledged that the assumption of a shorter term would increase refinancing risk:

On this basis, despite the strong conceptual arguments for a term matching the length of the regulatory period on the equity side, the AER considers it is reasonable and appropriate to

⁸ Australian Energy Regulator (2009), Final Decision: Electricity Transmission and Distribution Network Service Providers, Review of the Weighted Average Cost of Capital (WACC) Parameters, May.

take a cautious approach on this matter and retain a 10-year term assumption. This reflects the AER's concern that refinancing risk not be increased for the sector, which is particularly important given the current market conditions.⁹

The Commission's decision is essentially forcing the businesses to adopt certain practices in relation to the management of their debt. As outlined above, the circumstances of the various businesses are different (particularly depending on their size and access to capital markets) and the most prudent, commercial risk management strategy for each will also vary.

More importantly, regulation should complement prudent commercial risk management practices, rather than attempt to drive certain behavior. It makes no sense to me to essentially require businesses to engage in hedging strategies to mitigate risks that will be created by the regulatory regime itself, even if these costs can be appropriately compensated (noting that practical difficulties that have already been raised in relation to estimating these costs). This problem can be avoided by using a ten year maturity.

Apart from the fact that I consider that this better complements prudent commercial practice, it avoids the difficult issue of compensation for these hedging costs. I recommend that the risk free rate is set at the rate of the longest maturity government debt that has a reasonable level of liquidity. Currently that is the 10-year bond.

Notional credit rating assumption

One other issue that I identified in the Straw Person example that was not discussed in detail at the Workshop was the notional credit rating assumption, although I note that one participant suggested that the Commission may need to tighten its definition of credit rating.¹⁰

The Straw Person example appears to almost interchangeably refer to BBB+ and A-, after presenting a range of credit ratings in Table 4 of that example. It then goes onto reference data from Bloomberg's A fair value curve. Given the Straw Person example was meant to be based on electricity distribution, it is not clear how it arrived at a conclusion of A, particularly given the two New Zealand electricity distribution businesses included in the Commission's sample, being Powerco and Vector, are rated BBB and BBB+ respectively.

⁹ *ibid.*, p.173.

¹⁰ Cost of Capital Workshop Transcripts, November 13, 2009, p.151.

It is possible that the Commission was not intending to be so precise with this example but I would like to emphasise that I do not see BBB and A as readily interchangeable. It is important to establish an appropriate rating assumption for the relevant business and then estimate the industry wide cost of debt based on that credit rating assumption, not some other category. I therefore concur that this area may need to be tightened by the Commission.

Asset Beta

In the Straw Person example, the Commission also stated that one of the steps it would use in estimating beta would be a qualitative assessment of systematic risk, that is, it would:

- Qualitatively assess the level of systematic risk for the electricity distribution industry in New Zealand arising from the general economy;
- Qualitatively assess the level of systematic risk for the electricity distribution industry in New Zealand arising from how the regulatory environment is actually imposed (including the allocation of risk between shareholders and customers, and the ongoing clarity and certainty of the allocation of risk) and from how the approach to the imposition of regulation may change in future...¹¹

No further reference is made to this assessment in the analysis. The Commission's example conclusion in relation to equity beta appears to be solely based on the statistical analysis of the comparator sample.

The qualitative factors referred to above are typically addressed by a first principles analysis. These factors have been comprehensively addressed by Professor Lally in previous reports he has prepared for the Commission.¹² Based on comments made at the Workshop, the use of first principles analysis appeared to have reasonably widespread support.

In estimating beta the Commission has also previously estimated the asset beta of comparable US companies and then added 0.2 to the average asset beta to reflect the higher systematic risk associated with the regulatory regime in New Zealand compared to that of the US, based on the analysis of its adviser, Professor Lally¹³ who cited evidence by Alexander et al¹⁴. This in turn was based on first principles analysis Lally had undertaken. In its Straw Person example, the Commission did not make this

¹¹ Commerce Commission (2009), Cost of Capital Straw Person Example – Electricity Distribution Industry, para.46.

¹² For example, refer: M. Lally (2008), The Weighted Average Cost of Capital for Gas Pipeline Businesses, 28 October.

¹³ For example, refer: M. Lally (2008), The Weighted Average Cost of Capital for Gas Pipeline Businesses, 28 October.

¹⁴ I. Alexander, C. Mayer & H. Weeds (1996), Regulatory Structure and Risk: An International Comparison, Policy Research Working Paper 1698, The World Bank, December.

adjustment. In footnote 24 of this example it states it “will consider proposals for adjustments that outline how and why such adjustments should be made in the future, supported by data and other evidence.” At the Workshop, however, the Commission did indicate that it has not necessarily yet made a decision to drop this adjustment and it also acknowledged that perhaps the Straw Person example should have addressed this.¹⁵

In my view, the Commission had presented a well reasoned and commercially sensible explanation for why it judged the New Zealand regulatory regime to be more risky and how the up-lift of 0.2 in asset beta was determined. The up-lift was based on direct empirical evidence and sound application of first principles analysis.

I am not aware of any changes in circumstances or the introduction of new evidence to support a change of position on this parameter and the adjustment for the differences in regulatory systems.

The Commission should continue with its sensible position of adding 0.2 to the estimates of asset beta based upon US companies. I also consider that it is important to undertake a first principles analysis to determine whether any further adjustments to the beta may be required based on the systematic risk of the relevant business, although based on the Straw Person example it is not clear how this might be taken into account in future decisions.

Market Risk Premium

The MRP is a very important and difficult parameter to estimate. I believe the discussion of the MRP in the panel of experts’ *Recommendations to the New Zealand Commerce Commission on an Appropriate Cost of Capital Methodology*, as well as and the Commission’s Revised Draft Guidelines was very inadequate. The experts’ report devoted less than two pages to MRP. The Commission gave it only three pages in its Revised Draft Guidelines. Important issues such as measurement using arithmetic or geometric returns are not even mentioned (although I note that in the Workshop the Commission indicated that it assumed the use of an arithmetic average would be uncontroversial, which in turn had been endorsed by Professor Myers¹⁶). More importantly, two of the experts do not have obvious experience with the quality of historical data in New Zealand or with the use of a tax adjusted CAPM.

Their conclusion is:

¹⁵ Cost of Capital Workshop Transcripts, 13 November 2009, p.201.

¹⁶ Cost of Capital Workshop Transcripts, 13 November 2009, p.185.

...the Panel considers that the Commission's present MRP estimate of 7% (for the simplified Brennan-Lally CAPM) is reasonable.¹⁷

However, it is not clear what is meant by a "reasonable" estimate, as opposed to a best estimate. Given the discussions of estimation error, a reasonable estimate and a best estimate could be quite different. In that same report, Professor Franks says:

...the Commission's estimate is higher than those generally adopted by regulators in the US and the UK, but is within appropriate bounds given the nature of the New Zealand economy.¹⁸

An analysis that compares MRP estimates between the US, UK and New Zealand, as well as across different models, would be complex. To make an assertion with no discussion or explanation is not indicative of robust analysis.

In my opinion, the treatment of MRP in the experts' report and the Revised Draft Guidelines is inadequate to support any position. At a minimum it would be appropriate to provide a careful and transparent discussion of the processes used to conclude that 7% is a reasonable estimate of MRP. Included in the discussion should be a full discussion of the unique characteristics of TA-CAPM relative to other models and data from other countries.

Historical data on excess market returns in New Zealand are not representative of expected excess market returns going forward. Synergies' August submission proposed a forward looking, building block approach and provided substantial support for the estimate, which is 9%. The only criticism that was raised in the hearing in relation the approach was that the 2.5% increment that was proposed to reflect the risk difference between the US and New Zealand share markets is excessive. Synergies provided a range of evidence to support its position, particularly with respect to the smallness of the market and its listed companies. I would appreciate any comments the Commission can provide as to weaknesses in relation to that analysis.

Range

I support the Commission's prescription of one standard deviation for estimating the range on parameters and the WACC. Although technical issues can be raised about its statistical validity, it does provide a consistent and easily understood structure to setting a range. Without such a structure, there is little guidance on how the range should be determined.

¹⁷ J. Franks, M. Lally & S. Myers (2009), Recommendations to the New Zealand Commerce Commission on an Appropriate Cost of Capital Methodology, para.86.

¹⁸ *ibid.*

An important fundamental point is that the range on the WACC should be set after the best estimate of WACC is determined. Factors such as asymmetric risk and unsystematic risk are omitted variables in the very restrictively specified CAPM. The best estimate of WACC should include full consideration of these factors.

The range on WACC should reflect both parameter errors and model errors. Aggregating parameter errors can be done in a number of ways. As suggested at the Workshop, simply adding the individual parameter errors is, at best, an upper limit. Assuming the estimation errors of individual parameters are all uncorrelated, as suggested by Dr Lally, provides a lower limit.

I favour using Monte Carlo and assuming correlation where it seems clearly present. In my view, estimation error in the debt risk premium and the MRP would be strongly positively correlated. After Monte Carlo is used to estimate the range from estimation error in individual parameters, an additional increment should be added to reflect model error. Although there is little to guide such an increment, a modest amount such as a half percent would certainly be appropriate.

After an appropriate range on WACC is determined, it is then necessary to determine the location on the distribution to use for the final decision on WACC. The basis for choosing a WACC higher than the best estimate is the asymmetry between the cost and benefits of establishing a WACC that is too high or too low. Therefore, I believe the final decision should be determined by the potential for adverse social consequences of under investment in the industry. The amount may vary across industries and even companies within an industry.

The fundamental factor supporting an up-lift in WACC is the serious social costs of underinvestment in infrastructure. Therefore, the amount of the up-lift, or the percentile of the assumed distribution, should depend upon the need for investment in an industry. Arguably, an industry where no infrastructure investment is needed would not require an up-lift. However, an industry where substantial investment is needed should receive a substantial up-lift; much more than the Commission's 75 percentile.

I concur with the proposal made by a few participants at the Workshop that a "loss function" is needed. A loss function would provide a mapping between the potentially adverse social consequences of under investment and an acceptable level of risk that the regulatory WACC is too low to encourage the necessary infrastructure investment. I believe the Commission should develop a loss function, but the particular form such a loss function might take is open for discussion. I also believe it is important that the Commission's approach in this area is public and transparent. Otherwise another level of regulatory risk will be added.

It is my understanding that the electricity lines businesses require substantial investment over the medium term. Further, power is a critical social infrastructure. This is an issue that the Commission should address. Any decision on the appropriate up-lift, should be consistently referenced to the Commission's view on the need for investment.