Key reforms to rate of return under the IMs

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1 Executive summary

1. The Commerce Commission published the *Input Methodology Review: update paper on the cost of capital topic* to highlight aspects of the cost of capital IMs which it considered to be most beneficial to obtain further stakeholder input prior to the draft decision. This report makes the following key recommendations.

1.1 Equity

a. The Commerce Commission should use a methodology that reduces the volatility in the simplified Brenan-Lally (SB-L) CAPM cost of equity estimates which may require determining the value of the risk free rate and TAMRP closer to the time of determination rather than fixing them in the IM determination or, alternatively, fixing the real cost of equity in the IMs;

b. The Commission should have regard to biases in the SB-L CAPM;

c. The Commerce Commission should adopt a 10 year term for the risk free rate;

d. Empirical analysis shows that there is no impact of a change in form of control on the asset beta of the firms and there is no need to change the asset beta from current 0.34 level;

e. No attempt should be made to apply 'Black's simple' discount model;

f. The Commission should align its approach to estimating the risk free rate and TAMRP with international precedent. If the Commission does this then will resulting estimate of the cost of equity will be much more stable – resolving much of the DPP/CPP issues currently facing the industry; and

g. Of Dr Lally's five methodologies for estimating the TAMRP the focus should be on Ibbotson, DGM and Siegel version 2. Less weight should be given to survey estimates and no weight should be given to Siegel version 1.

1.2 Debt

a. The Commission should adopt as guiding principle that the compensation for the cost of debt should reflect a specific and transparent debt management strategy that the Commission determines is efficient. Specifically, the IMs should reflect a two step process:

b. First, define a benchmark debt management strategy that the Commerce Commission considers efficient; and

c. Second, estimate the cost of debt that a business following that debt management strategy would have and provide compensation based on that estimate.

d. A key advantage of adopting this guiding principle is that it will allow a regulated business to, if it so chooses, adopt that debt management strategy and, in doing so, align its actual costs with the allowance set under the IMs.

e. If efficient business practice involves a staggered debt issuance/maturity profile (e.g., as a way of managing refinancing risk) this will lead to the benchmark incorporating a trailing average.

f. The tenor of the cost of debt should reflect actual business practice amongst EDBs with the scale to fund the vast majority of their debt from public bond markets – consistent with the use of yields from those markets to set the cost of debt. International evidence is that this will imply a tenor or 10 years or more.

g. The Commission should, when estimating the cost of debt allowance, have regard to a wider sample of bonds; including bonds issued by New Zealand businesses in foreign currency, as this is more reflective of the debt financing practices of the benchmark businesses;

h. Individual businesses should be able to nominate averaging periods for the cost of debt (or at least for the base rate component of the same) and those periods should be kept confidential until after they pass. Such an approach would prevent any party from taking advantage of the regulatory process by manipulating prices around the time when key regulatory decisions are being made;

i. The Commission should fully compensate for the transaction costs of implementing the benchmark efficient debt management strategy determined in a. above

1.3 DPP/CPP consistency

a. The Commerce Commission should adopt a policy of:

- setting the CPP WACC equal to the DPP WACC; and
- focusing all reform efforts on establishing a process for estimating the DPP WACC that is as accurate as possible.

The first policy will make the CPP and DPP WACC the same. The second policy will mean that the DPP WACC will also be much more stable overtime than the current IM WACC. Of these, we consider the second policy to be the more important issue to address. This is because it is essentially inaccuracies in the DPP WACC estimation that causes artificial differences between the DPP and CPP WACC in the first place.

1.4 Compensation for inflation

a. The current IM's do not adequately target nominal returns despite the cost of debt being assumed to be a nominal cost (given that firms issue nominal debt). The IMs

need to be reformed so that, at a minimum, they adequately target a nominal return on the cost of debt. This can be done in a number of ways.

b. In addition, where inflation forecasts are used it is important that they be as accurate as possible. Under current circumstances, this requires more weight to be given to market based estimates of expected inflation, such as break even inflation rates from government bond markets.

2 Introduction

2. CEG has been engaged by the New Zealand ENA to prepare an expert report which provides an overview of the current provisions of the rate of return provisions of the Input Methodologies. This report provides such an overview. In addition we have been asked to provide separate reports on

   - Estimating asset beta;[1]
   - Compensating for and forecasting inflation;[2] and
   - The application of Black's simple discount rule.[3]

3. These 'companion reports' are summarised in this report but the detailed anlaysis of the relevant issues is to be found in the relevant report.

4. The remainder of this report is structured as follows:

   - **Section 3** addresses asset pricing models and the best estimate of asset beta;
   - **Section 4** addresses the measurement of TAMPR;
   - **Section 5** addresses the term of the risk free rate and internal consistency with the TAMRP estimate;
   - **Section 6** addresses the estimation of the cost of debt and the need for the adoption of a benchmark debt management strategy as a guiding principle;
   - **Section 7** addresses the potential use of a split WACC;
   - **Section 8** addresses the role of inflation forecasting and indexation in the current IMs and whether the IM's should target a real or nominal return to investors.

5. I have made all inquiries that I believe are desirable and appropriate to answer the questions put to me. No matters of significance that I regard as relevant have to my knowledge been withheld. I have been assisted in the preparation of this report by Yanjun Liu in CEG's Sydney office. However, the opinions set out in this report are my own.

Thomas Nicholas Hird

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1 CEG, Asset beta, February 2016

2 CEG, Inflation: revaluations and revenue indexation, February 2016.

3 CEG, Use of Black's simple discount rule in regulatory proceedings, February 2016.

3 Asset pricing models and beta

3.1 Use of asset pricing models

3.1.1 Summary

6. In our view, it would be prudent for the Commerce Commission to have regard to the evidence from asset pricing models other than the simplified Brennan-Lally CAPM (SB-L CAPM) in estimating the cost of equity. One way to do this is to explicitly estimate the outputs of these models and directly reflect these in the IMs. However, we note that this would be resource intensive for both the Commission and the industry.

7. Alternatively, the Commission could satisfy itself, based on evidence already in existence, that the SB-L CAPM is likely to underestimate the cost of equity for EDBs. If satisfied that this is the case, the Commission could consciously attempt to counteract this effect by choosing parameter inputs for the SB-L CAPM that are towards the top end of the range of estimates. This is the approach of both the Australian Energy Regulator (AER) and the West Australian Economic Regulation Authority (ERA) in Australia.

3.1.2 Analysis

8. In its decision on Input Methodologies, in December 2010, the New Zealand Commerce Commission determined that the most appropriate asset pricing model to use for the derivation of results for the return on equity, was the simplified Brennan-Lally CAPM (SB-L CAPM)[4]. The Commission considered that the case for using an alternative model, such as the Black CAPM, was not sufficiently convincing.

9. The Commission referred to a report that had been prepared by Professor Bruce Grundy[5], and reported that:

   - There was no evidence of the superiority of the Black CAPM, and Professor Grundy had merely asserted that it provided a better fit to the data;
   - the assumptions of the Black CAPM were not properly documented, and no critique was provided of those assumptions;
   - there was no discussion of any empirical evidence in support of the Black CAPM; and
   - the performance of the Black CAPM in empirical tests had been mixed.

4 Input Methodologies (Electricity Distribution and Gas Pipeline Services), Reasons Paper, New Zealand Commerce Commission, December 2010; paragraph 6.4.31.

5 The Calculation of the Cost of Capital, A report for Vector, prepared by Bruce D. Grundy, 13th August 2010.

10. The reasoning applied by the Commission was largely upheld by the New Zealand High Court in a later judgement that was handed down in relation to an appeal of the input methodologies. The appeal had been instigated by a number of parties, including electricity distribution businesses (EDBs) and suppliers of electricity lines services. The High Court affirmed the position of the Commission which was that the bias in the SB-L CAPM that the Black CAPM seeks to address is contested.[6]

11. Nonetheless, the High Court did not close off the possibility of making adjustments to the return on equity results from the model that has been widely used by the Commission, the SB-L CAPM. The High Court noted that[7]:

> *There is no principle that bars well-based adjustments being made to the output of a model, although it is a task that should be approached with caution. If it were the case that the SB-L CAPM was known to produce biased estimates in certain relevant circumstances – in this case low-beta utility firms – consideration would need to be given to addressing that bias.*

12. In its reasons paper for Input Methodologies that was released in December 2010, the Commission also reported that one of the key assumptions of the Black CAPM was "unrealistic", while citing the seminal article authored by Fischer Black himself[8]. An important point to note is that the Black CAPM is actually a more flexible model than both the Sharpe and SB-L CAPM which are identical in the respect that they both assume that investors can/will borrow or lend freely for investment in risky assets at a single risk-free rate.[9] The Black CAPM introduces the more realistic assumption that borrowing to invest in risky assets will attract a risk premium. Under the Black CAPM, investors can borrow at a risk-free rate, r_b, and can lend at a risk-free rate $r_l < r_b$.

13. If the assumptions of the Black CAPM are regarded as unrealistic, then that assessment will also apply to the assumptions underpinning the SB-L CAPM, because the latter model is simply a more confined (less realistic) version of the former model. Furthermore, the

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6 Wellington International Airport Ltd & Ors v Commerce Commission [2013] NZHC [11 December 2013]; paragraph 1707.

7 Wellington International Airport Ltd & Ors v Commerce Commission [2013] NZHC [11 December 2013]; paragraph 1704.

8 Input Methodologies (Electricity Distribution and Gas Pipeline Services), Reasons Paper, New Zealand Commerce Commission, December 2010; paragraph 6.4.31.

9 This is clearly an unrealistic assumption and making it more realistic must raise the return on low beta stock. Both the Sharpe CAPM and the SB-L CAPM assume investors can borrow at the risk free rate. The Sharpe CAPM is as set out in Sharpe, Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk, The Journal of Finance Volume 19, Issue 3 September 1964, pages 425–442. The simplified Brennan-Lally CAPM involves an amendment to the Sharpe CAPM to reflect the impact of taxation including dividend imputation. The SB-L CAPM retains the assumption that investors can borrow at the risk free rate. In fact, it accentuates the impact of this assumption by assuming that investors can also fully claim deductions for such borrowing. This reduces the assumed return on zero beta equity to less than the risk free rate.

Black CAPM was actually developed by three separate authors, Black (1972), Vasicek (1971), and Brennan (1971), although the convention is simply to refer to the collective model as the 'Black CAPM'[10]. The specifications from the three authors differ only in respect of the restrictions that are placed on the mean return to a zero beta portfolio. The model by Brennan is the most general model, while Black's model and Vasicek's model are special cases of Brennan's model.

14. Over the past two years, there have been a number of developments that we believe should be brought to the attention of the Commission. Firstly, economic regulators in Australia have re-examined the possible use of the Black CAPM[11]. Secondly, further empirical work has been done which shows that the Black CAPM is capable of producing results for the return on equity which are unbiased for stocks with low values for the equity beta. Thirdly, there has also been empirical work undertaken for other asset pricing models, such as the Fama French three-factor model. Additional evidence has been gathered as to the use of that model by regulators in overseas jurisdictions. A detailed discussion of the Black CAPM and of the FFM is provided in Appendix A of this report.

15. On the subject of the methods applied by regulators in Australia, the Black CAPM has been incorporated into the decisions made in the recent past by the Australian Energy Regulator (AER), and the Economic Regulation Authority of Western Australia (ERA). Thus, for example, in a recent distribution determination for United Energy, an electricity distributor in Victoria, Australia, the AER reported that[12]:

> *Having had regard to material on the Black CAPM, we have also formed the view that there are merits in the theory underpinning the model. In particular, we consider this supports considering an adjustment to the SLCAPM return on equity estimate in relation to the equity beta to account for market imperfections. We have had regard to this theory in choosing to take a conservative point estimate of the equity beta.*

16. The Western Australian regulator, ERA, has recognised that due consideration should be given to the Black CAPM when formulating assessments of the rate of return on equity.

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[10] Black, Fischer, Capital market equilibrium with restricted borrowing, Journal of Business 45, 1972, pages 444-454.

Brennan, Michael, Capital market equilibrium with divergent borrowing and lending rates, Journal of Financial and Quantitative Analysis 6, 1971, pages 1197-1205.

Vasicek, Oldrich, Capital market equilibrium with no riskless borrowing, Memorandum, Wells Fargo Bank, 1971.

[11] For example, in its rate of return guideline, the Australian Energy Regulator reported that it would use the theory underpinning the Black CAPM to assist in the selection of a point estimate for the equity beta. See:AER (2013), Better Regulation, Explanatory Statement, Rate of Return Guideline, December 2013; page 60.

[12] AER (2015), Preliminary Decision, United Energy determination, 2016 to 2020, Attachment 3 - Rate of return October 2015; page 3-264.

The following paragraphs are extracted from the ERA's recent draft decision for the operator of the Dampier to Bunbury pipeline[13]:

> *The Authority has come to the view that the Black CAPM is relevant for the purpose of estimating a return on equity for regulatory decisions in Australia. All of its underlying assumptions except for one are the same as those underlying the Sharpe Lintner CAPM. The Black model therefore satisfies the criterion of having a theoretical foundation.*

And:

> *….the Authority will recognise the theoretical insight from the Black CAPM when estimating a return on equity with the Sharpe Lintner CAPM. The Authority will have regard to these outcomes when estimating the equity beta from within the estimated range.*

17. On the basis of this logic the ERA sets the value of the equity beta used in the CAPM towards the top end of the range estimated for equity beta.

18. There is also significant empirical work that has been undertaken to evaluate the relationship between the historical returns to stocks and historical estimates of beta, and to derive estimates of the zero beta rate of return. The latter variable, being the mean return to a portfolio of stocks with beta equal to zero, is a core component that is used when applying the Black CAPM.

19. A number of international studies were evaluated in a recent report prepared by the CEG for Networks NSW[14]. CEG (2014) found that stocks with low beta estimates earn higher returns than are predicted by the Sharpe (also known as the Sharpe-Lintner) CAPM, and stocks with high beta estimates earn lower returns than have been predicted by the Sharpe-Lintner CAPM. The poor empirical performance of the Sharpe-Lintner CAPM likely occurs for two reasons. First, risks other than systematic risk are impounded into share prices (in particular, stocks with a high book-to-market ratio persistently earn higher returns than stocks with a low book- to-market ratio). Second, the common measurement of systematic risk – the regression coefficient of excess stock returns on market returns – is an imprecise measure of risk.

20. Based on its review of a significant number of academic papers across a range of countries, CEG found that there was support for the use of the Black CAPM and that the average estimate in the empirical literature is that the 'zero beta premium' is approximately equal

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[13] ERA (2015), Draft Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline, 2016-2020, Appendix 4 Rate of Return, Submitted by DBNGP (WA) Transmission Pty Limited. Economic Regulation Authority, Western Australia, 22nd December 2015, Appendix 4, Rate of Return; paragraphs 745 and 747.

[14] WACC estimates, a report for the NSW DNSPs, prepared by the Competition Economists Group (CEG), May 2014.

to one half of the difference between the expected return to the market portfolio and the government bond rate. That is, the "MRP" measured relative to the required return on zero beta equity is around one half of the MRP measured relative to government bond rates. This is the same estimate as found by SFG in a recent study[15] of the Australian market who estimated the historical average 'zero beta premium' (the average return above the risk free rate earned by a portfolio of zero beta equity) at 3.34% (approximately half the historical average MRP in Australia of 6.5%).

21. More recently still the ERA has estimated the zero beta premium in Australia. The ERA estimates the zero beta premium divided by the market risk premium over the last 20 years has been between 0.61 and 2.23 depending on estimation method.[16] That is, the return on zero beta stock has averaged 61% to 223% of the return on the market portfolio. While this is a large range it is notable that zero is not included in the range. That is, the estimates are consistent with the conclusion that the standard CAPM will materially underestimate the returns on low beta equity.

22. The idea that there is evidence against the Sharpe CAPM (of which the SB-L is a variation that retains the key assumption that investors can borrow at the risk free rate) is not, in itself, controversial. The AER has acknowledged that[17]:

> *'the SLCAPM has weaknesses'.*

23. Similarly, the AER's advisers, Partington and Satchell, have pointed out that[18]:

> *'it would be fair to say that a substantial weight of academic opinion takes the evidence to be against the CAPM.'*

24. Satchell, in work with Muijsson and Fishwick, is more explicit and states that[19]:

> *'One of the observations over the cross section of stocks is that the historical risk-return tradeoff is flat or inverted: within the CAPM one would expect that stocks with high systemic risk would outperform their low risk counterparts, but results have shown otherwise.'*

25. Another adviser to the AER, John Handley, has noted that[20]:

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15 SFG, Cost of equity in the Black Capital Asset Pricing Model, May 2014.

16 ERA, Draft Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline 2016 – 2020: Appendix 4 Rate of Return, p. 185, Table 25.

17 AER (2015), Preliminary decision Jemena distribution determination2016–20: Attachment 3: Rate of return, October 2015, page 290.

18 Partington, G. and Satchell S., Report to the AER: Return of (sic) equity and comment on submissions in relation to JGN, May 2015, page 9.

19 Muijsson, C., E. Fishwick and S. Satchell, Taking the art out of smart beta, University of Sydney, September 2014, page 2.

'It is well known that an apparent weakness of the Sharpe-CAPM is the empirical finding, for example by Black, Jensen and Scholes (1972) and Fama and French (2004), that the relation between beta and average stock returns is too flat compared to what would otherwise be predicted by the Sharpe-CAPM – a result often referred to as the low beta bias.'

26. We therefore consider that the Commission should review the available empirical evidence, both Australian and international, on the ability of the Black CAPM to produce unbiased predictions of the rate of return on equity. The review should be undertaken with regard for the comment by the High Court that there is no principle that bars well-based adjustments being made to the output of a model.[21]

27. Alternatively, the Commission could also follow the AER and the ERA in being cautious in selecting SB-L CAPM parameters such that these parameters are chosen from the top end of the range.

3.1.3 Black's simple discount rule

28. We have addressed the potential use of Black's simple discount rule in regulatory proceedings. The conclusion from that study are repeated here for convenience. We concur with HoustonKemp's correction of IWA's methodology, and have also carried out further evaluation of the analysis carried out by Loderer and IWA.

29. In particular, Loderer's implementation of Black's Rule suffers from the following drawbacks if it is to be applied to New Zealand regulated businesses:

    i. The S&P 500 index as the chosen benchmark security does not have a high correlation with three quarter of the firms in the Compustat sample;

    ii. The international risk-free percentiles were estimated for a list of countries that did not include New Zealand;

    iii. The future net cash flows are assumed to be normally distributed, which does not accord with the asymmetric costs of regulated businesses;

    iv. The future net cash flows are estimated based on managerial estimates, and are assumed to be free of idiosyncratic sources of variation;

    v. No attempt was made to establish the accuracy of managerial estimates of future net cash flows; and

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20 Handley, J.C., Advice on the rate of return for the 2015 AER Energy Network Determination for Jemena Gas Networks, 20 May 2015, page 5.

21 Wellington International Airport Ltd & Ors v Commerce Commission [2013] NZHC [11 December 2013]; paragraph 1704.

vi. Managerial estimates tend to be opaque and subjective, which does not accord with the methodological transparency that is required in regulatory decisions.

30. IWA's application of Loderer's method for the Transpower decision is also subjected to the following additional shortcomings:

i. The S&P 500 index was selected as the benchmark security without testing for correlation against Transpower's cashflows – most likely because no data was available;

ii. US Treasury bills were used for calculating the risk-free percentile instead of using New Zealand data;

iii. Future net cash flows (NCFs) were assumed to be normally distributed and were derived from arbitrary estimates of pessimistic cashflows; and

iv. Inconsistent use of risk-free rates when calculating risk-free percentiles and when discounting the certainty equivalent cashflows.

31. Two further observations should be noted about IWA's conclusions. First, IWA's conclusion that the MAR NCFs materially exceeded the Black's Rule certainty equivalent NCFs is incorrectly based on a comparison of the undiscounted cashflow streams. Correctly discounting the cashflow streams results in a narrower gap in NCFs.

32. Second, IWA's interpretation of the low NCF obtained from Black's Rule implies that the correct discount rate is higher than allowed by the Commission (i.e., that there is a high risk premium associated with the cash flow). This is because a lower the certainty equivalent value as a proportion of the risky cash flow implies the cash-flow is more risky, not less.

3.2 Measurement of beta

33. The Commission has stated that:

> *Under the IM review we will be re-estimating these values using updated data and reassessing the comparator companies using a similar six-step process as outlined in the Initial IMs reasons paper.[26] As was the case in 2010, there are a limited number of listed New Zealand firms with similar characteristics to firms that we regulate. We therefore, as previously, intend to use overseas firms in the comparator sample.*
>
> *We consider that there are three main issues associated with the estimation of asset beta that we will need to take into account as part of the IM review:*
>
> - *the difference in asset betas estimated using different sampling frequencies and over different time periods;*

- *the justification for any adjustments applied to the asset betas across different sectors; and*
- *the extent to which the form of control should impact our assessment of the asset beta.*

34. The ENA has asked us to examine the second and third of these issues having regard to the same sample of businesses that the Commerce Commission used to set beta in the current IMs. Our detailed analysis is set out in our companion report.[22] A summary is provided here for convenience.

3.2.1 Sampling frequency and periods

35. We have estimated the monthly, weekly and daily asset betas. Our results are summarised in Table 1 below (Table 1 reports asset betas ending May 2010/2015 in order for comparison to the Commission's 2010 estimates).

Table 1: Asset beta results summary assuming zero debt beta, ending on 31st May

Asset beta (average of all definitions)	Previous 5 year beta (2010)	Last 5 year beta (2015)	Last 10 year beta (2015)
Monthly	0.35	0.30	0.34
Weekly	0.38	0.36	0.38
Daily	0.40	0.41	0.40
Average	0.38	0.36	0.38

Bloomberg data, CEG analysis

36. Apart from the last 5 year monthly beta estimate, all other estimates are higher than 0.34 and in fact, the average weekly and daily asset betas remain above 0.34. Moreover, beta estimates derived from pooling the last 10 years of data are all at, or above, 0.34 – including monthly beta estimates. In our view the weight of this evidence suggests that the best estimate of beta over the last 10 years is above 0.34. We consider that a reasonable midpoint estimate for the asset beta is around 0.36 to 0.38.

37. This estimate does not take account of the merits of selecting a point estimate from the upper end of the range in recognition that the SB-L CAPM tends to underestimate returns on low beta stocks (as set out in the previous section).

38. We followed the Commission's 2010 methodology closely with one important alteration. Instead of estimating only one monthly/weekly asset beta for each firm, we estimated 21/5 monthly/weekly asset betas for each firm; with each one corresponding to a different

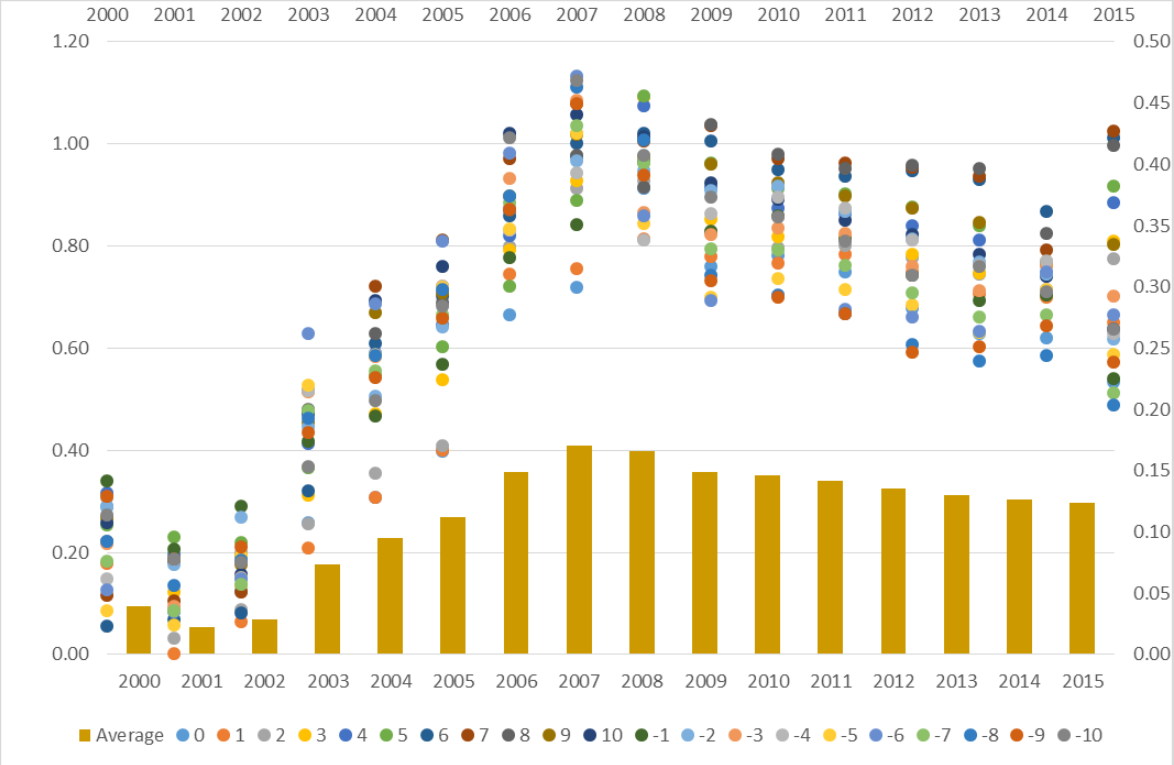
[22] CEG, Asset beta, February 2016.

trading day within the month/week that defines the end/beginning of the return sampling period.

39. For example, we have estimated five weekly betas – with the sampling period for each beta estimate ending on a different weekday (week ended Monday, Tuesday etc.). Similarly, we have estimated 21 different monthly asset betas (i.e., with returns measured from and to the last trading day in a month and from and to every trading day ±10 days from the last trading day).

40. Figure 1 illustrates why this approach is critical. It shows the estimated 5-year monthly asset beta with a year-long rolling window from 2000 to 2015, each based on the 21 different definitions of the beginning/end of a 'month'. Average monthly betas for each year are represented by the bar plots (left vertical axis), while monthly asset betas from different definitions are shown as scatter plots (right vertical axis).

Figure 1: 5-year monthly asset beta based on 21 versions of a 'month' (ending on -10th, -9th...last...1st, 2nd ...10th trading day in each month)

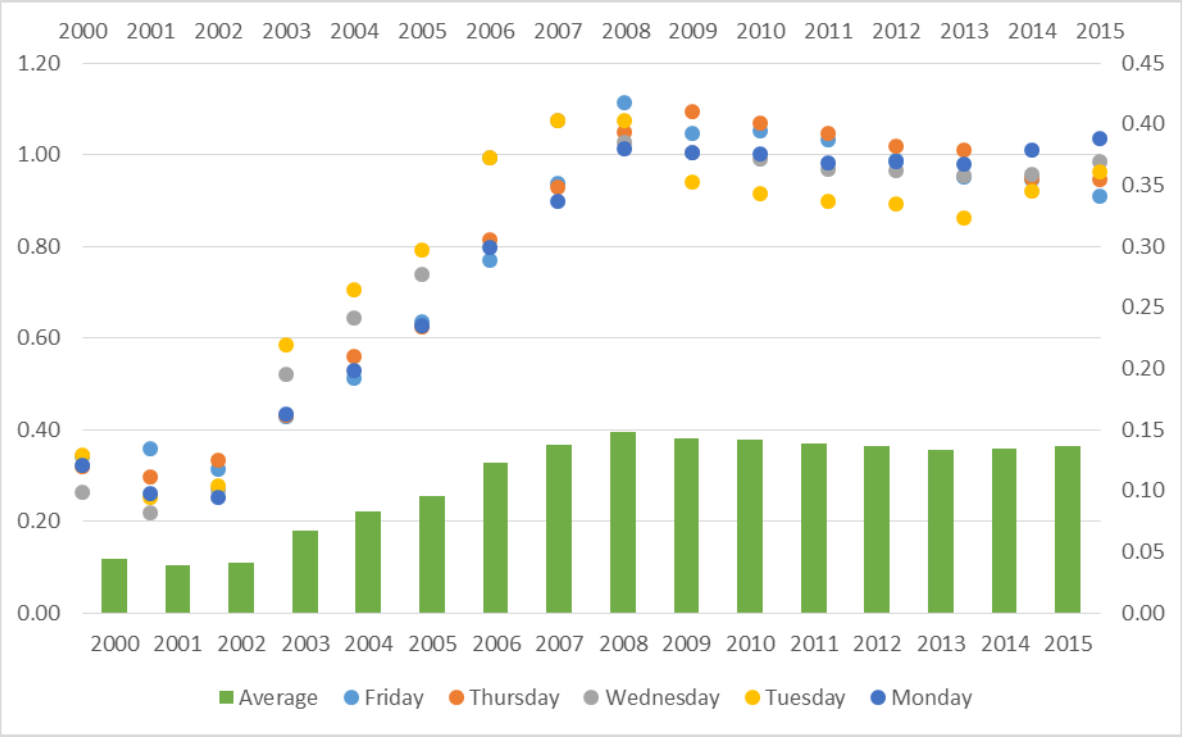


Bloomberg data, CEG analysis

41. It can be seen that the monthly beta estimate is highly sensitive to the day that is defined as the beginning/end of the month. While the average of these for the 2015 estimates is only 0.30, the range of results extends from 0.20 to 0.43. In light of this, we consider that the use of a single 'monthly' asset beta estimate will be very unstable and reliance on such an estimate is likely to lead to error. Variability in weekly betas also exists, but the range

of weekly betas is much smaller (see Figure 2 below), because the increased number of observations in a 5-year weekly beta estimate (260) as compared to a monthly beta estimate (60) makes it less likely that small changes in the sampling period can produce large changes in the measured beta.

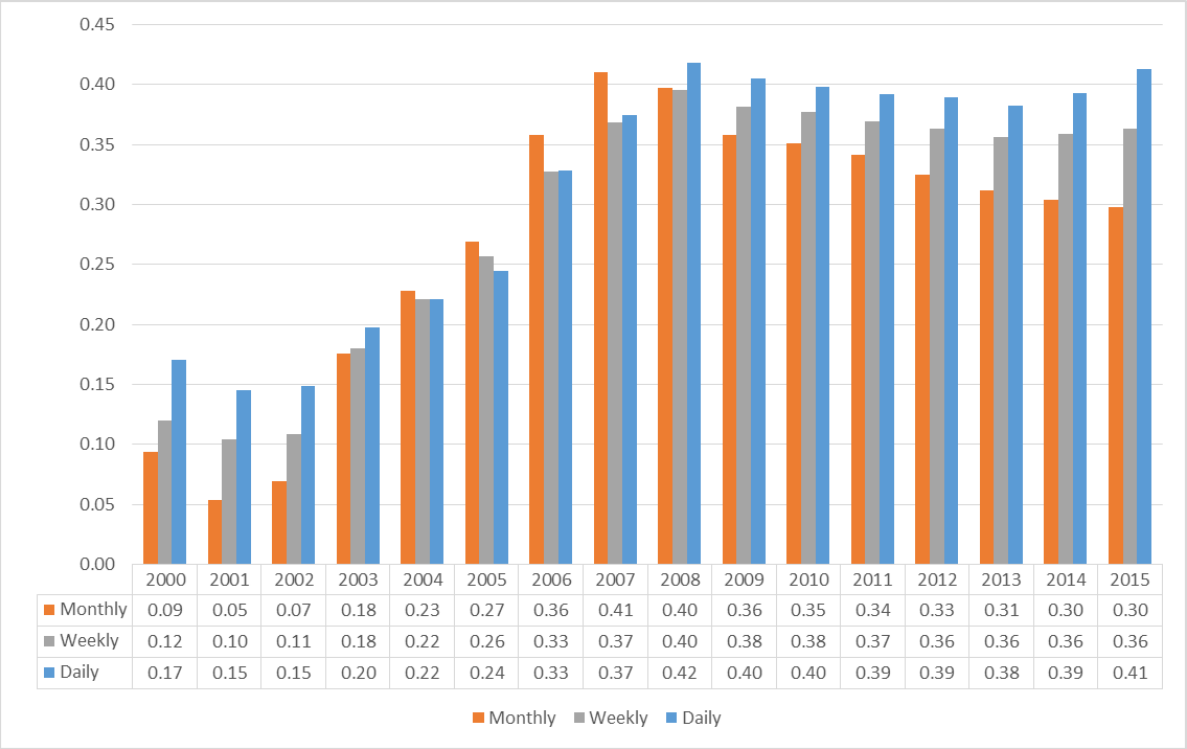
Figure 2: 5-year weekly asset beta based on 5 versions of a 'week' (ending on Friday, Thursday… Monday in each week)



Bloomberg data, CEG analysis

42. We note that daily beta estimates do not suffer from the same source of variability because there is only one definition of a day. Figure 3 below shows that although the average 5-year monthly beta has fallen materially since 2010, the average 5-year weekly betas have not fallen to the same extent, while daily betas have actually risen. This highlights the statistical noise associated with estimating beta.

Figure 3: Average 5-year monthly, weekly and daily asset beta rolling on a yearly basis



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Monthly	0.09	0.05	0.07	0.18	0.23	0.27	0.36	0.41	0.40	0.36	0.35	0.34	0.33	0.31	0.30	0.30
Weekly	0.12	0.10	0.11	0.18	0.22	0.26	0.33	0.37	0.40	0.38	0.38	0.37	0.36	0.36	0.36	0.36
Daily	0.17	0.15	0.15	0.20	0.22	0.24	0.33	0.37	0.42	0.40	0.40	0.39	0.39	0.38	0.39	0.41

Bloomberg data, CEG analysis

3.2.1 Impact of form of control

43. We have surveyed past Commerce Commission assessments of whether the differences in the US regulatory regime should imply an upward adjustment to asset beta for New Zealand firms subject to what might, at least in theory, be regarded as higher risk incentive regulation. We note that the Commerce Commission, in its 2010 Input Methodologies Paper, concluded that there was insufficient empirical evidence necessary to make an adjustment to the asset beta estimate to account for different levels of systematic differences due to regulatory policy.[23]

> *In theory, regulatory regimes can allocate risks between regulated suppliers and consumers differently, such that a regulatory regime can either insulate the regulated supplier from more risk or expose the regulated supplier to more risk. Consequently, the regulatory regime can affect the asset beta that should be set and differences in regulatory regimes should in principle be taken into account.*
>
> *Previous research suggests that US electricity utilities were subject to less risk than UK electricity utilities and that this was a function of the different*

[23] New Zealand Commerce Commission (2010) *EDB and GPB Input Methodologies Reasons Paper*, p. 541-542

regulatory regimes. The Commission notes that the results from research by Buckland and Fraser questions the results of the previous research.

The Commission does not consider that it has any recent empirical evidence that demonstrates different regulatory regimes affect or reduce the level of systematic risk in any material way. The empirical evidence considered by the Commission has not shown a significant difference between the systematic risks associated with regulated US and UK entities or for regulated US entities subject to different regulatory regimes.

44. We note that the Commission's 2010 position was to avoid *raising* the asset beta unless there was solid empirical evidence that US regulated businesses had *lower* asset betas than NZ regulated businesses by virtue of being subject to 'rate of return regulation' – i.e., regulation where prices can be reset to reflect cost changes without having to wait until the end of a predefined regulatory period ('incentive regulation).

45. Our own empirical analysis concludes that the Commission was correct and that there was no discernible difference in asset betas for US firms that are subject to incentive regulation and those that are not. We further extend this analysis to compare firms subject to a price cap with those subject to a revenue cap. Our findings are summarised in Table 2.

Table 2: Revenue vs price cap - distinguishing between monthly, weekly and daily asset betas

	Previous 5 year beta (2010)	Last 5 year beta (2015)	Last 10 year beta (2015)	Number of firms
Monthly				
Decoupled/Revenue cap	0.35	0.30	0.33	39
Price cap	0.36	0.30	0.34	25
Grand average/total	0.35	0.30	0.34	64
Weekly				
Decoupled/Revenue cap	0.39	0.37	0.40	39
Price cap	0.36	0.35	0.35	25
Grand average/total	0.38	0.36	0.38	64
Daily				
Decoupled/Revenue cap	0.41	0.43	0.42	39
Price cap	0.37	0.39	0.38	25
Grand average/total	0.40	0.41	0.40	64

Bloomberg data, CEG analysis

46. It can be seen that there is no reliable difference in asset betas. In fact, businesses subject to a revenue cap tend to have higher asset betas than those on a price cap. This is consistent with international precedent, with CEPA only finding a single example of a

regulator making an adjustment within an industry depending on the form of price control.[24]

With the exception of the Colombian energy regulator, CREG, we are unaware of other regulators outside of New Zealand who apply an explicit adjustment.

[24] CEPA, International comparison of regulatory precedent on the weighted average cost of capital, p. 12

4 Measurement of TAMRP

47. The Commission's update paper does not discuss its views on the TAMRP but does direct readers to its (then still forthcoming) decision on the UBA/UCLL. That decision is now released and in it the Commission has set the TAMRP at 7.0%, which is the same level as currently in the IMs. However, the 7.0% TAMRP currently in the IMs was arrived at by having regard to the very stable long run historical average estimate of TAMRP (referred to by Dr Lally and others as the Ibbotson estimate). The Commission has arrived at the same value in its Chorus decision in a different fashion. Notwithstanding the fact that the value of the TAMRP has not changed, the Commission's current methodology, particularly with its use of surveys and the Siegel version 1 method, is highly problematic. Moreover, the Commission appears to not be fully aware of how Dr Lally is implementing his methodology and the changes in Dr Lally's approach.

4.1 Dr Lally's methodology risks permanently depressing the allowed cost of equity

48. The Commission's current approach is to accept a methodology developed by Dr Lally as appropriate. Dr Lally first set out a methodology in his June 2014 report that resulted in a 7.0% TAMRP.[25] Dr Lally's conclusion from that paper is set out below.

Table 5: Estimates of the TAMRP with a Five-Year Risk Free Rate

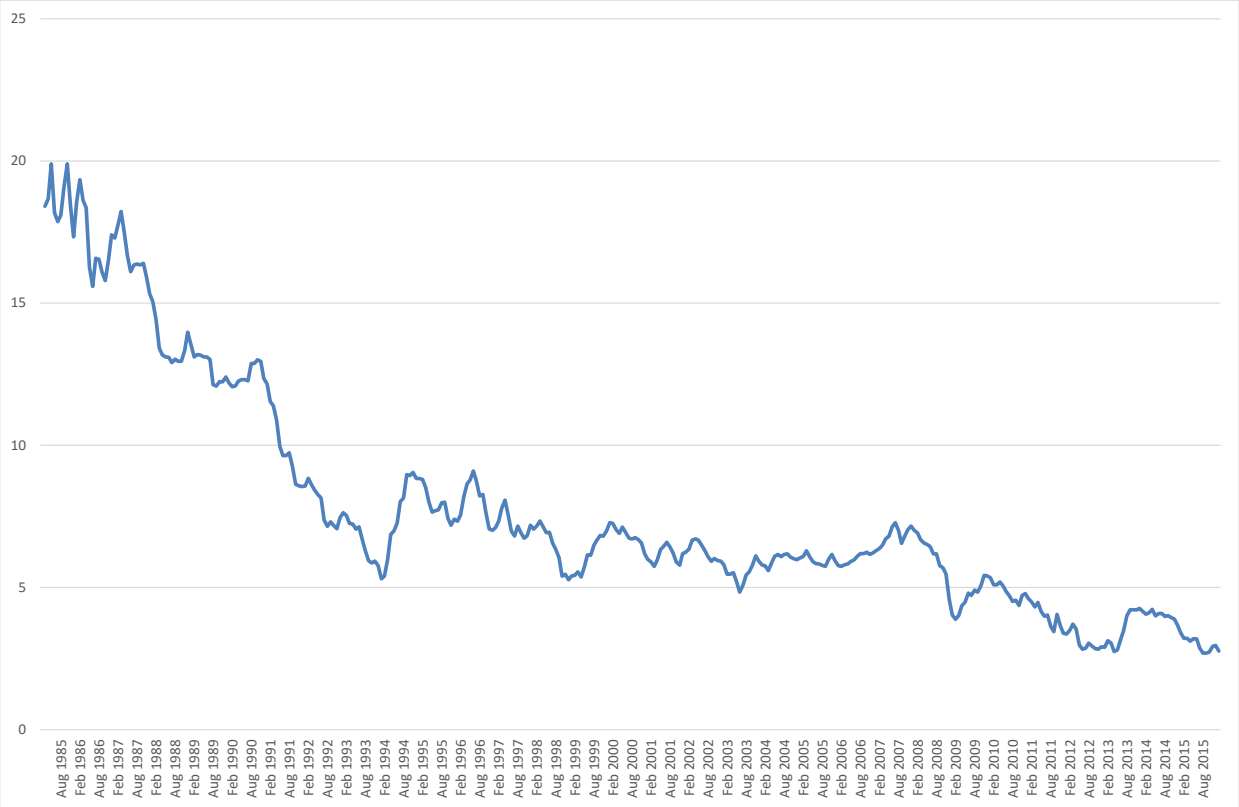
	New Zealand	Other Markets
Ibbotson estimate	7.1%	7.6%
Siegel estimate: version 1	5.9%	6.3%
Siegel estimate: version 2	6.9%	6.4%
DGM estimate	8.2%	9.7%
Surveys	6.7%	7.3%

Using only New Zealand data, the median estimate is .069. Using foreign data, the median estimate is .073. Collectively this suggests that an appropriate estimate of the TAMRP at the present time is .07, based upon the use of the five-year risk free rates. This corresponds to the estimate currently used by the Commission.

[25] Lally, Review of submissions on the cost of debt and the TAMRP for UCLL and UBA services, June 2014.

49. In 2014, risk free rates in New Zealand were near historic lows as evidenced by

Figure 4: 5 year NZ Government bond rates



50. CEG had submitted for Chorus that this historic low risk free rate environment was critical. Specifically, that while a TAMRP of 7.0% may be reasonable in normal market conditions it was not reasonable at the current level of risk free rates. We demonstrated, based on DGM that estimates of the market cost of equity were about the same in early 2014 as they had been in 2007.[26] However, the much lower risk free rates at that time implied a higher TAMRP. That is, market cost of equity had not fallen with risk free rates. On this basis CEG argued that reliance on the Ibbotson TAMRP estimate that underpinned the 2010 IM estimate was inappropriate.

51. In response, Dr Lally's adopted our DGM estimate as reasonable. However, he introduced three new methods estimate the New Zealand MRP. These are the three lowest estimates in the above table from Dr Lally's 2014 report (Siegel version 1, Siegel version 2 and Surveys). This, along with the selection of the median of the 5 methods, had the effect that one of Dr Lally's newly proposed three methods would be selected. This happened to be Siegel version 2 which gave a TAMRP of 6.9%. This allowed Dr Lally a TAMRP that was unchanged from the Commission's 2010 IM estimate (7.0%).

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26 CEG, Response to Commerce Commission UCLL/UBA WACC consultation paper, March 2014, Figure 6 and section 6 more generally.

52. However, by 2015 risk free rates had fallen even further to new historic lows. The Siegel version 1 estimate had responded by rising above 7.0%. The conclusions of Dr Lally's most recent report[27] are set out below for the purpose of comparison.

Table 4: Estimates of the TAMRP with a Five-Year Risk Free Rate

	New Zealand	Other Markets
Ibbotson estimate	7.1%	7.0%
Siegel estimate: version 1	5.9%	5.9%
Siegel estimate: version 2	8.0%	7.5%
DGM estimate	7.4%	9.0%
Surveys	6.8%	6.3%

Using only New Zealand data, the median estimate is .071. Using foreign data, the median estimate is .070. Collectively this suggests that an appropriate estimate of the TAMRP at the present time is .070, relative to the five-year risk-free rate.

53. Now, the Ibbotson estimate became the median which, at 7.1, was slightly above the 7.0% - with Dr Lally once more recommending 7.0%. However, Dr Lally made a critical change to his methodology between his 2014 and 2015 reports and, absent that change, the median TAMRP would have risen materially above 1.0.

54. Notably, the Commission states that:[28]

> *Dr Lally consequently recommended no change in approach. He re-estimated the TAMRP using updated data to 1 September 2015, based on the average of his preferred five methods. This resulted in a TAMRP of 7.0%, when rounded to the nearest 0.5%, as shown in Table 4 below.*

55. This statement is not correct. The Commission states that Dr Lally recommended no change in approach but, in fact, Dr Lally made significant changes in approach – both of which served to reduce the estimated TAMRP. Dr Lally's DGM estimate of the TAMRP was:

- June 2014 report - based on the same assumptions and values as CEG (our model was supplied to the Commission – presumably to be supplied to Dr Lally, who sets out the assumptions in detail);29

27 Lally, Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services, 13 October 2015 p. 35

28 Commerce Commission, Cost of capital for the UCLL and UBA pricing reviews, para 191

- October 2015 report – based on a new set of modelling assumptions. CEG reported that an update of our model resulted in a TAMRP relative to the 5 year risk free rate of 9.1% (up from 8.2%).30 By contrast, Dr Lally's new methodology (not an update) resulted in a reported TAMRP of 7.4% (down from 8.2% in in June 2014 report). The key reason for this lower DGM TAMRP appears to be that, in 2015 (and unlike his 2014 estimate), Dr Lally does not include the value of imputation credits in his estimate of the value of future dividends.

56. Dr Lally's survey estimate of TAMRP was:

- June 2014 report - based on the mean respondent TAMRP (6.7%) rather than the median respondent TAMRP (7.1%);
- October 2015 report – based on the median (6.8%) respondent TAMRP rather than the mean respondent TAMRP (7.4%).

57. Had Dr Lally actually updated his methodology (as opposed to altering it), the estimated TAMRP would not have remained constant at the 7.0% IM TAMRP between June 2014 and October 2015. Rather, it would have increased to 7.4% (or 7.5% given that the Commission's UCLL/UBA decision appears to have introduced a policy of rounding to the nearest 0.5%).[31]

58. This rise in TAMRP would have been consistent with the fact that risk free rates fell materially between 2014 and 2015. It would also have been consistent with the rise in the Siegel version 2 estimate and the DGM estimate (if a constant methodology had been maintained as per the CEG estimates).

59. The fact that, notwithstanding historic low risk free rates, due to Dr Lally's methodological choices (both in 2014 and new choices in 2015), TAMRP did not rise above 7.0 is deeply concerning. This is not just because this is an underestimate in the current market conditions. Perhaps even more concerning, is that a methodology that is calibrated such that it delivers a TAMRP 7.0% in current market circumstances of historically low risk free rates will almost certainly deliver lower estimates of the TAMRP in the future – if and when risk free rates rise.

60. That is, if Dr Lally's methodology was to be adopted, the underestimate of the cost of equity in the current market circumstances would not be transitory and conditional on historic low risk free rates. Rather, it risks becoming permanent; extending into a future period when/if risk free rates return to more normal levels. To see this note that:

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29 Lally, Review of submissions on the cost of debt and the TAMRP for UCLL and UBA services, June 2014, p. 34. Note that page 34 sets out the DGM estimate at a 10 year risk free rate maturity and page 37 simply amends this to add the difference between the 5 and 10 year risk free rates.

30 CEG, Response to the further draft determination, August 2015, p. 52 (measurement period 1 to 27 July).

31 Commerce Commission, Cost of capital for the UCLL and UBA pricing reviews, para 191.

- The Ibbotson and Siegel version 1 estimates are long run historical averages and, absent consistently exception market outcomes, will not change materially over the next few decades;
- The DGM and Siegel version 2 estimates have risen with falling risk free rates and will almost certainly fall with rising risk free rates.
- Survey estimates are difficult to characterise because we know next to nothing about what respondents are thinking when they answer the survey (or who they are) and how this changes over time. However, the rise in survey estimates between 2013 and 201532 suggests that at least some respondents are supply a forward looking MRP. Those same respondents can be expected to report a lower MRP should interest rates rise.

61. Consequently, if risk free rates rise then we can expect a fall in at least two of Dr Lally's TAMRP estimates and likely three. Given the median of all five is currently 7.1% (rounded down to 7.0%) we can expect that this would result in the median falling below 7.0%. That is, while the TAMRP methodology, designed and calibrated by Dr Lally, did not result in an increase in TAMRP with interest rates falling to record low levels, no such symmetry can be expected when/if interest rates return to more normal levels. In that scenario we are likely to see a fall in estimated TAMRP that offsets the rise in risk free rates (notwithstanding that no rise in the estimated TAMRP occurred as risk free rates fell).

4.2 Siegel version 1 and survey estimates are unreliable

62. The core reason why Dr Lally's methodology delivers a TAMRP estimate of 7.1% and not higher is the introduction of the Siegel version 1 and survey estimates by Dr Lally. On the basis of Dr Lally's implementation of these methods the estimates from these methods have been the lowest of the five estimation methods he proposes.

4.2.1 Siegel version 1 method should not be used

63. We have previously stated that, in our opinion, the TAMRP and the risk free rate should be determined concurrently. In our view, if the Commission is to use a prevailing measure of the risk free rate, then it should determine a TAMRP consistent with that risk free rate. We proposed the use of a DGM, which gives use to a forward-looking measure of the TAMRP that is prevailing during the same average period as the risk free rate.[33] The DGM remains the only methodology proposed that is *both* forward-looking and prevailing during the averaging period.

64. We continue to hold this view. However, if the Commission is to continue to use a version of Dr Lally's averaging of different estimates and combine these with a prevailing risk free

[32] In 2013 the Fernandez survey reported a mean/median MRP of 5.4%/5.8%. In 2015 it was 6.6%/6.0%

[33] CEG, Response to Commerce Commission UCLL/UBA WACC consultation paper, March 2014, section 6

rate, then we consider that only two of these should be used: namely the Siegel (version 2) and the DGM method.

65. In our view, the Siegel (version 2) methodology is the most effective and accurate way in which historical average market return data can be used to determine a forward looking risk free rate. The reasons for this view are set out in detail in Hird and Grundy (2013).[34] Essentially, rather than using the historical average excess return as the estimate of investors expected excess return, this approach uses the historical total real return as the estimate of investors expected total real return. The TAMRP is derived by subtracting from this the prevailing risk free rate.

66. The Siegel (version 2) estimate reacts to changes in current market conditions due to its direct reliance on prevailing estimates of the risk rate. That said, it does not react to changes in the expected market return and is, therefore, not wholly forward-looking. In this respect, it is inferior to the DGM.

67. However, to the extent that the Commission continues to rely on the historical average excess returns (Ibbotson and Siegel (version 1)) and survey evidence we consider that the former should be combined into a single estimate.

68. From Dr Lally's own presentation of the Ibbotson and Siegel (version 1) estimates, it is clear that these are two alternative measures for a single number – namely the historical average of excess returns relative to 10 year bond rates. The Siegel (version 1) is proposed as a correction to the Ibbotson methodology to adjust for what may, or may not, be an accurate estimate of unexpected inflation over the relevant historical time period. But for this adjustment the Siegel (version 1) estimate is the same as the Ibbotson estimate.

69. Including both as separate estimates in the sample doubles the weight given to measures based on historical average excess returns. This would be inappropriate even if one considered that these estimates were superior to the other estimates. However, for the reasons set out above, we consider that they are inferior which strengthens the case for combining them into a single estimate. Dr Lally does not state his own opinion as to which is preferable.

70. In our view the Siegel (version 1) methodology involves a highly speculative adjustment – assuming that investors persistently overestimated inflation on average in history – to the tune of over 1.0% pa on average. In addition to being speculative, we do not regard this as a plausible assumption especially when noting that inflation has both fallen and risen in history and there is no a priori reason to believe that investors failed to predict rising inflation but accurately predicted falling inflation.[35] For this reason, we prefer to rely

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34 Hird and Grundy, *Estimating the return on the market*, a report for the Australian ENA, 2013.

35 NERA (2013) provides evidence from two long-running US surveys of inflation forecasts that there was a tendency to under-estimate inflation up until the appointment of Paul Volcker as Chairman of the Federal Reserve in 1979 and then overestimated over the first half of the 1980s before actual inflation and inflation expectations stabilized under the inflation targeting regime introduced by Volcker. See NERA, The Market, Size and Value Premiums, a report prepared for the Energy Networks Association, June 2013, pp. 21-22.

solely on the Ibbotson estimate of the TAMRP as the best estimate of the historical average excess return (a proxy for the TAMRP).

71. The above views were put to the Commission in previous CEG reports and Dr Lally responded in his most recent 2015 report. Dr Lally's response is as follows. On the question of whether they are essentially measuring the same thing (historical expected excess returns) Dr Lally states:[36]

> *"...whilst these two estimators have considerable overlap in that both use the historical average market returns, the point of distinction between them (the historical average long-term real risk free rate versus an improved estimate of the expected long-term real risk free rate) causes a significant difference in outcomes. In particular the difference of 1.2% shown in CEG (2015, Table 20, first column) is 60% larger than the standard deviation of the distribution of results shown there. Similarly, human DNA has a 95% commonality with that of chimpanzees, but the 5% difference induces a huge difference in behaviour."*

72. Dr Lally fails to grapple with our contention in the above. Both Ibbotson and the Siegel version 1 estimates are attempting to measure the same thing – the average excess return investors expected through time. The Ibbotson estimate assumes that investors did not systematically misestimate inflation in the long run. The Siegel version 1 estimates assumes that they did. One of these answers is best and the best answer should be used to estimate historical average expected excess returns.

73. There are multiple other variations on the same theme that could be imagined and implemented and which would give rise to a still different value. For example, while we do not hold this view, it could be assumed that the liquidity premium in stocks was higher in the first half of the last century and that, therefore, observed returns in that period were consequently higher. It could be argued that these historical averages need to be adjusted down to make them comparable to risk premiums in the current period with lower liquidity premium.

74. Moreover, such an adjustment could be combined with either the Siegel version 1 or the Ibbotson estimate such that there would be four different estimates of historical average excess returns as a proxy for historical average market risk premium. These would all be 'different' and so, on Dr Lally's logic, would all be given equal weight – even though they are all attempting to measure the same thing.

75. Of course, the same applies to the DGM – there are a number of different assumptions that can be applied in implementing the DGM. Dr Lally does not propose that each possible methodological assumption within the DGM should deliver a separate TAMRP estimate to go into his methodology. However, based on consistent application of the logic

[36] Lally, Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services, 13 October 2015, pp. 13-14.

for inclusion of Ibbotson and Siegel version 1 estimates with equal weight this is precisely what should occur.

76. On the issue of whether it is reasonable to assume persistent under-estimation of inflation by investors in order of 1% per annum (implying that investors adjust to rising inflation rates materially slower than they adjusted to falling inflation rates).[37]

> *Furthermore, in respect of CEG's claim that underestimation of inflation during part of the historical period outweighed subsequent overestimation, this is rebutted by an examination of the parameter values used. In particular, as shown in Lally (2014, equation (6)), the Siegel version 1 estimator is the Ibbotson estimator net of the (post-tax) difference between the average actual real risk-free rate and the estimate of the expected long-term real risk-free rate. The Siegel estimate presented there uses data from 1931-2013 and embodies an average real risk-free rate for 1931-2002 of 1.5% (Lally and Marsden, 2004, Table 2) and 2.9% for 2003-2013 (Lally, 2014, Table 2), with a time-weighted average of 1.70%. By contrast, following Lally and Marsden (2004), Lally (2014b, section 6.3) uses an estimate for the expected longrun real risk-free rate of 3.5%. These last two parameters imply that the underestimation of inflation that occurred when inflation rose dominates any overestimation that occurred when it fell.* ***Thus, the proposition that inflation was on balance significantly underestimated over the historical period examined is not "highly speculative" as claimed by CEG but consistent with the data used to generate the Siegel estimate.*** *A possible response to this would be to claim that the estimate for the expected long-run real risk-free rate is less than the 3.5% used by Lally (2014) and Lally and Marsden (2004), and in particular is approximately 1.7%. However, as noted in Lally (2014, section 6.3), the average real rate on inflation-protected New Zealand government bonds since their inception in 1996 has been 3.6%. In respect of earlier periods (1931-1995), in which only nominal bonds were available, there has been no long period in which inflation was stable and therefore no period in which realised real yields on these nominal bonds would be a reliable indicator of expected real yields. As argued by Lally and Marsden (2004, section 5), the best such evidence comes from 1961-65, in which inflation was comparable to that in the preceding five years, and the average real bond yield in this period was 2.4%.* ***Further evidence comes from Australia, from the 1883-1939 period in which inflation was relatively stable and averaged 1%*** *per year Brailsford et al (2012, Appendix); the average real yield on government bonds during this period was 3.5%. All of this suggests that the expected long-run real risk-free rate in New Zealand was well above 1.7% and was approximately 3.5%. Furthermore, in addition to (net) underestimation of inflation as an explanation for this disparity, Lally and Marsden (2004, section 5) note the presence of*

[37] Lally, Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services, 13 October 2015, Ibid, p. 14

interest rate controls in New Zealand in the period 1972-1984, which would also have had the effect of lowering the real yield on nominal bonds.

77. In response we note that Dr Lally states that the proposition that inflation was on balance significantly underestimated over the historical period is consistent with the "data" used to generate the Siegel estimate (as per the first bolded sentence). However, in reality the 'data' that Dr Lally refers to is the yield on CPI indexed New Zealand government bonds of 0.36% since their inception in 1996. That is, Dr Lally takes the average yield on CPI indexed bonds over a less than 20 year period and assumes that this is a reasonable proxy for the real yield investors expected over an 80 odd year period. We consider that the assumptions underpinning this use of "data" are indeed speculative.

78. This applies not just to the back-casting of required real yields from before 1996 but also to the assumption that real yields on CPI indexed bonds represented investors expected real risk free return from the moment that these bonds were introduced. In reality, it is likely that a significant liquidity premium existed in the early years of indexed bond yields. This was a fact noted specifically by the RBNZ in 1997 when it reflected on the recent introduction of CPI indexed bonds:[38]

At present, for example, issues tend to be much less actively traded – and hence less liquid – than other bonds.

79. And

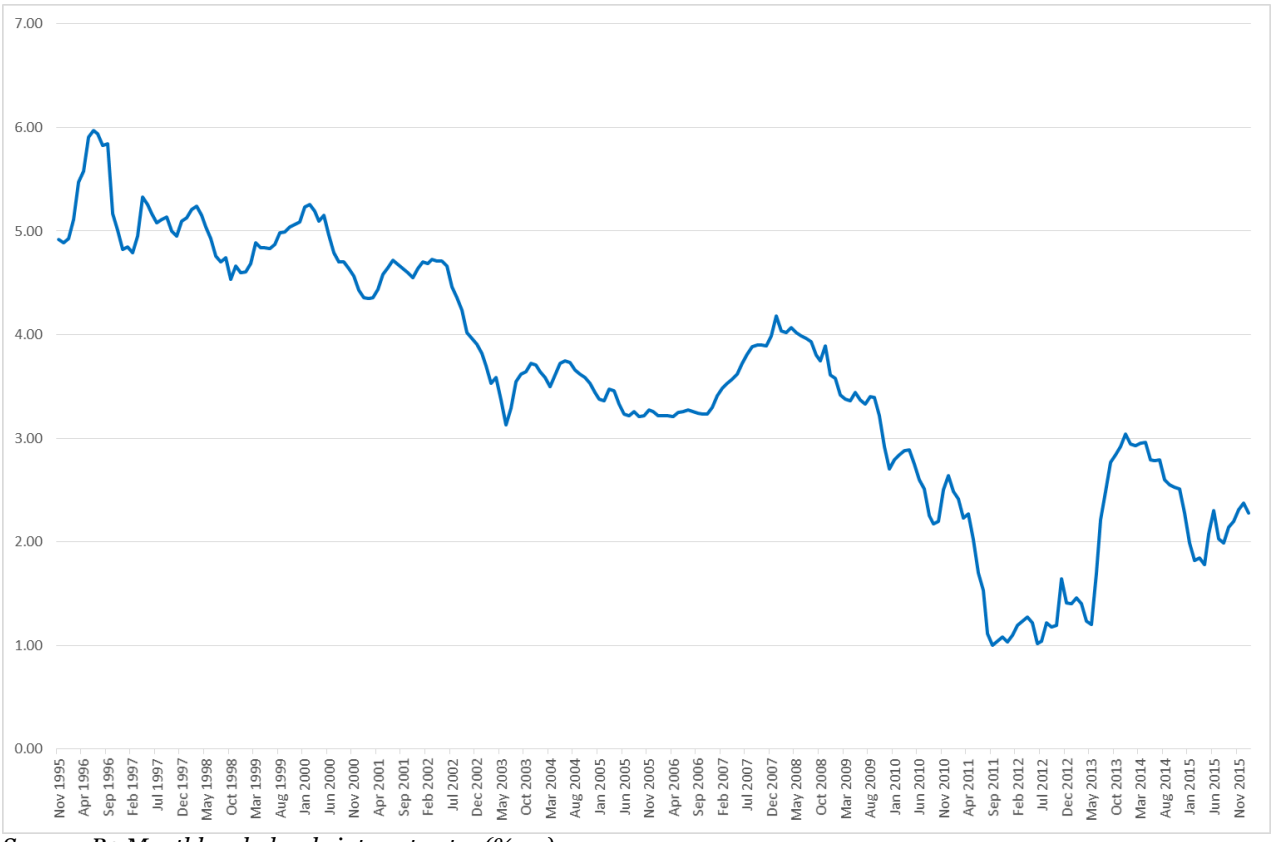
Liquidity premium. Indexed bonds are usually quite illiquid relative to nominal bonds. If indexed bonds are less liquid, investors may require a higher yield to compensate. Thus, when comparing indexed and nominal bonds to derive inflation expectations, it is important to account for any premium due to differences in the liquidity of each instrument – something which is, of course, particularly difficult to get at.

80. That is, even during the period that CPI indexed bonds were on issue it is likely that the early period included a liquidity premium in yields. Notably, the yield on CPI indexed 10 year bonds is currently around 2.1%[39] and has declined significantly since they were first issued.

[38] Reserve Bank Bulletin, Vol 60 No. 4, 1997, p. 322 and 328.

[39] B2 Monthly wholesale interest rates (% pa), 2025 bond (January 2015).

Figure 5: Longest dated CPI indexed bond



Source: B2 Monthly wholesale interest rates (% pa)

81. We note that in commenting on a very similar graph to the above but for UK index linked bonds the advisers to Ofgem, Wright and Smithers, noted:[40]

> *Thus both historical and more recent evidence point to the same conclusion: in contrast to the stock return there is no evidence of stability in the risk-free rate, at any maturity.*

82. There are at least two explanations for this instability. One is that the real yields investors require on risk free assets are not stable and can vary significantly over time. The other is that there were factors in the early years after these instruments were issued that tended to raise yields on these bonds relative to later years (such as a liquidity premium). Either explanation makes Dr Lally's assumption that the average expected real yield on nominal NZ Government bonds from 1931 to 1995 highly speculative.

83. Dr Lally also argued that the studies we refer to suggesting no systematic underestimation of expected inflation were for shorter horizons than 10 years and therefore did not disprove his thesis that investors did systematically underestimate inflation at a 10 year

[40] Wright and Smithers, The Cost of Equity Capital for Regulated Companies: A Review for Ofgem, February 2014, p. 15.

horizon (despite not doing so at shorter horizons). Dr Lally notes that he has provided an example of how this is possible.[41] However, the fact remains that Dr Lally presents no evidence that this is what investors did do. While it may be *possible* in a mathematical sense to systematically overestimate inflation at long horizons but not at short horizons this is not *likely*. Absent any information the best assumption is for no systematic bias in investor perceptions. With evidence that there was no systematic bias in predicting short term inflation this strengthens the case for the same assumption at long horizons (which should already be the default). Moreover, given that excess returns on equities versus 10 year bonds[42] are measured over a one year horizon (not a ten year horizon) it is not at all clear why Dr Lally believes:[43]

> *However, the risk free rate data underlying the Siegel analysis in Lally (2014, section 6.3) is for ten years and therefore the relevant period for assessing inflation forecast errors is ten years rather than the one year used in the two surveys.*

4.2.2 Survey methods should not be used

84. Dr Lally's reliance on survey evidence is problematic. Dr Lally argues that the most important characteristics of survey results are that they are recent, that they are product of careful consideration and that they contain results for other markets.

85. In my view, a survey would have to be well-designed and well-targeted to produce useful information about expectations of the forward-looking TAMRP. In respect of the Fernandez survey relied upon by Dr Lally, the term over which respondents were estimating the MRP is not clear as Dr Lally himself concedes.[44]

86. This was noted recently by the Australian Competition Tribunal in its consideration of survey evidence relied upon by the AER.[45]

> *Surveys must be treated with great caution when being used in this context [of estimating the MRP].*

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41 Lally, Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services, 13 October 2015, p. 15.

42 The return on a 10 year bond over a year is, just as it is for equities, the cash-flow plus price change on the asset over the year.

43 Lally, Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services, 13 October 2015, p. 15.

44 Lally, Review of submissions on the cost of debt and the TAMRP for UCLL and UBA services, June 2014, p. 39

45 Australian Competition Tribunal, *Application by Envestra Limited (No 2) [2012] ACompT 3*, 11 January 2012, paragraphs 165–166.

Consideration must be given at least to the types of questions asked, the wording of those questions, the sample of respondents, the number of respondents, the number of non-respondents and the timing of the survey. Problems in any of these can lead to the survey results being largely valueless or potentially inaccurate.

When presented with survey evidence that contains a high number of non-respondents as well as a small number of respondents in the desired categories of expertise, it is dangerous for the AER to place any determinative weight on the results.

87. I note that a consequence of the Tribunal's view expressed above is that the quality of analysis applied by the AER to considering survey evidence is now much higher than it was previously.

88. In considering these views Dr Lally responds:[46]

Sixthly, CEG argues that the survey-based estimator does not warrant as much weight as the DGM and Siegel version 2 estimators because the number of respondents is small, because the responses are not clearly the result of very careful consideration, because the timing of the responses differs from that of the averaging period used by the Commission to determine the risk-free rate, and because such responses may not be forward-looking (because the question asks about the MRP that they are using rather than that which they expect to prevail and therefore may elicit responses that reflect the historical average). However, whilst I agree with the second of these points, all estimators have their drawbacks and this drawback of the survey results does not suggest that it is inferior to other approaches to the extent of warranting a reduction in its weight. I do not agree with the remaining points: the sample size in the latest such survey is 31, the timing difference between the survey and the averaging period used by the Commission is only a few months, and any user of an MRP understands and intends that it applies to the future and therefore the MRP used is necessarily an estimate of what will prevail.

89. We do not agree with this characterisation. Firstly, it does not cover the fact that it is not clear what term of the risk free rate (or even whether it is a prevailing risk free rate) the MRP is being measured relative to. As noted in section 5, the survey that Dr Lally relies on reports:[47]

Table 8 shows that most of the respondents use for US, Europe and UK a Risk-Free Rate (R_F) higher than the yield of the 10-year Government bonds.

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46 Lally, Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services, 13 October 2015, p. 4.

47 Fernandex, Oritz, and Acin Discount Rate (Risk-Free Rate and Market Risk Premium) used for 41 countries in 2015: a survey, November 2015, p.11.

90. Dr Lally makes no mention of this and no adjustment for it.

91. We also find Dr Lally's other reasoning unconvincing. His assertion that "any user of an MRP understands and intends that it applies to the future" is unsubstantiated by any evidence and is not in accordance with our own experience where a finance academic/practitioner may well respond to the question with their estimate of historical average excess returns while holding a completely different view about investors' current risk premiums. Indeed, contrary to Dr Lally's view the authors of the study he uses makes precisely this point in the study.[48]

> *Fernandez (2007, 2009b) claims that the term "equity premium" is used to designate four different concepts:*
>
> *1. Historical equity premium (HEP): historical differential return of the stock market over treasuries.*
>
> *2. Expected equity premium (EEP): expected differential return of the stock market over treasuries.*
>
> *3. Required equity premium (REP): incremental return of a diversified portfolio (the market) over the risk-free rate required by an investor. It is used for calculating the required return to equity.*
>
> *4. Implied equity premium (IEP): the required equity premium that arises from assuming that the market price is correct.*

92. While the survey question does ask for the "Required equity premium" no guidance beyond this is provided for what this term means. We consider that it is highly likely that respondents will have a different concept in their minds when answering this question. In addition to the above we would add a further likely interpretation which is "what will the premium of equites over bonds be in the next year or so". Indeed, a number of respondents did provide negative estimates of the MRP[49] – suggesting that they were answering precisely this question (as no rational investor would require a negative return relative to bonds to hold equities).

93. Perhaps the most telling reason to reject the use of surveys is the one offered by Dr Lally to explain why he has changed methodology between his 2014 and 2015 reports in using the median instead of the mean.

> *Furthermore, one could reasonably suspect that some of the respondents to this survey have offered frivolous responses or responses calculated to affect the result in a particular direction because they are aware of the use of the survey*

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48 Fernandex, Oritz, and Acin Discount Rate (Risk-Free Rate and Market Risk Premium) used for 41 countries in 2015: a survey, November 2015, p.13.

49 Ibid, footnote 1 on page 2.

results by regulators. For example, at least one Australian respondent to the 2015 survey has provided an estimate of 19% (ibid, Table 2), which is implausibly high. Even more implausible is the 25% response offered by at least one Australian respondent in 2013 (Fernandez et al, 2013, Table 2), and this one response raised the mean Australian response from 5.7% to 6.8%. In light of this problem, I have recently switched to use of the median response (Lally, 2014a, section 3) and therefore adopt the same policy here.[50]

94. We note that switching from the mean to the median does not leave the results unaffected by ill-informed estimates. We also note that the "recent" change in policy to adopt the median that Dr Lally refers to in Australia actually occurred prior to his 2014 report in New Zealand. Dr Lally refers to his failure to use the median in his 2013 report as an 'oversight'.[51] We note that this oversight led to the survey estimate of the TAMRP being 0.40% lower.

95. In light of the Australian Competition Tribunal's findings described above, we also note that there were 22,500 potential respondents – of whom only 5,056 responded and only 4,573 of these responses included an MRP estimate.

4.3 Dr Lally suggestions that CEG rankings are not based on 'inherent methods'

96. Dr Lally also argues that CEG's preferred estimation techniques appear to be motivated by choosing the estimation technique that delivers the highest estimate of the TAMRP.

Eleventhly, amongst the methods that I draw upon to estimate the TAMRP, CEG ranks the DGM first, Siegel version 2 second, and Ibbotson ahead of Siegel version 1. This preference ranking corresponds exactly to the ranking in the TAMRP estimates that arise from these methods, and the probability of this arising by chance is only 2.5%. Thus, CEG's ranking of the methods would appear to be driven by their outcomes rather than their inherent methods [sic: attributes?].

97. In response we note that our position on this issue has been consistent over time and across jurisdictions.[52] Indeed, in the report Dr Lally is referring to we recommended that the survey estimate be given less weight than the Ibbotson estimate even though it was

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50 Lally, Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services, 13 October 2015, p. 34.

51 Lally, Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services, 13 October 2015, p. 34 (footnote 15).

52 For example, see Hird and Grundy, *Estimating the return on the market*, a report for the Australian ENA, 2013.

higher than the Ibbotson estimate.[53] We did so because we did not consider it was reliable (and could not be expected to be reliable) over time. Peculiarly, Dr Lally does not mention our rankings of the survey method in the above quote. Consequently, Dr Lally does not explain how our low ranking of the survey method, despite it having the third highest value, fits with the theme he is developing. One might reasonably have expected a more careful and fuller discussion of such facts prior to writing a paragraph such as the one above.

98. Moreover, even putting aside the failure to fully reflect our rankings, his calculation of probabilities assumes that there is no basis to prefer one method over another. If one make this assumption then any random ranking of the five methods is just as likely (and valid) as another. However, if this is not true then the probabilities calculated are simply invalid.[54]

4.4 Aligning with international precedent

99. Rather than implementing Dr Lally's proposed methodology or variations on it, we consider that the focus should be on aligning New Zealand practice with international precedent. There are two elements to international precedent should be the focus of reform in New Zealand:

    - more regard to historical average risk free rates. As noted by CEPA this is the dominant practice of UK regulators;55 and/or
    - where regard is had to prevailing risk free rates, these should be consistently matched with prevailing estimates of the TAMRP from the DGM or similar model. This is the practice of Australian regulators including the AER and the West Australian ERA, and is also the effective practice of US regulators.

100. In relation to the first dot point, we refer to the Oxera paper titled, "What WACC for a crisis?"[56], which included some empirical research on the real risk free rate and equity risk

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53 See: CEG, Response to the further draft determination, August 2015, Table 1 on page 7. We note that it was only after Dr Lally changed his methodology to adopt the median instead of the mean that his survey TAMRP (as reported I his subsequent report) fell below the Ibbotson estimate.

54 By way of illustration, consider a non-counterfeit $100 bill sitting on a table. Let one party value the bill at $100. Then, let a second party counter this valuation with five different valuations ($60/$70/$80/$90 or $100) each of which the second party claims has equal probability of being true and, therefore, the median estimate ($80) should be adopted. Let the first party express the view that $100 is the best estimate and the other estimates are increasingly worse the further that they are from $100. Clearly the first party is correct yet Dr Lally's assumption that all estimates are equally valid would put the probability of the first party's ranking at less than 1%.

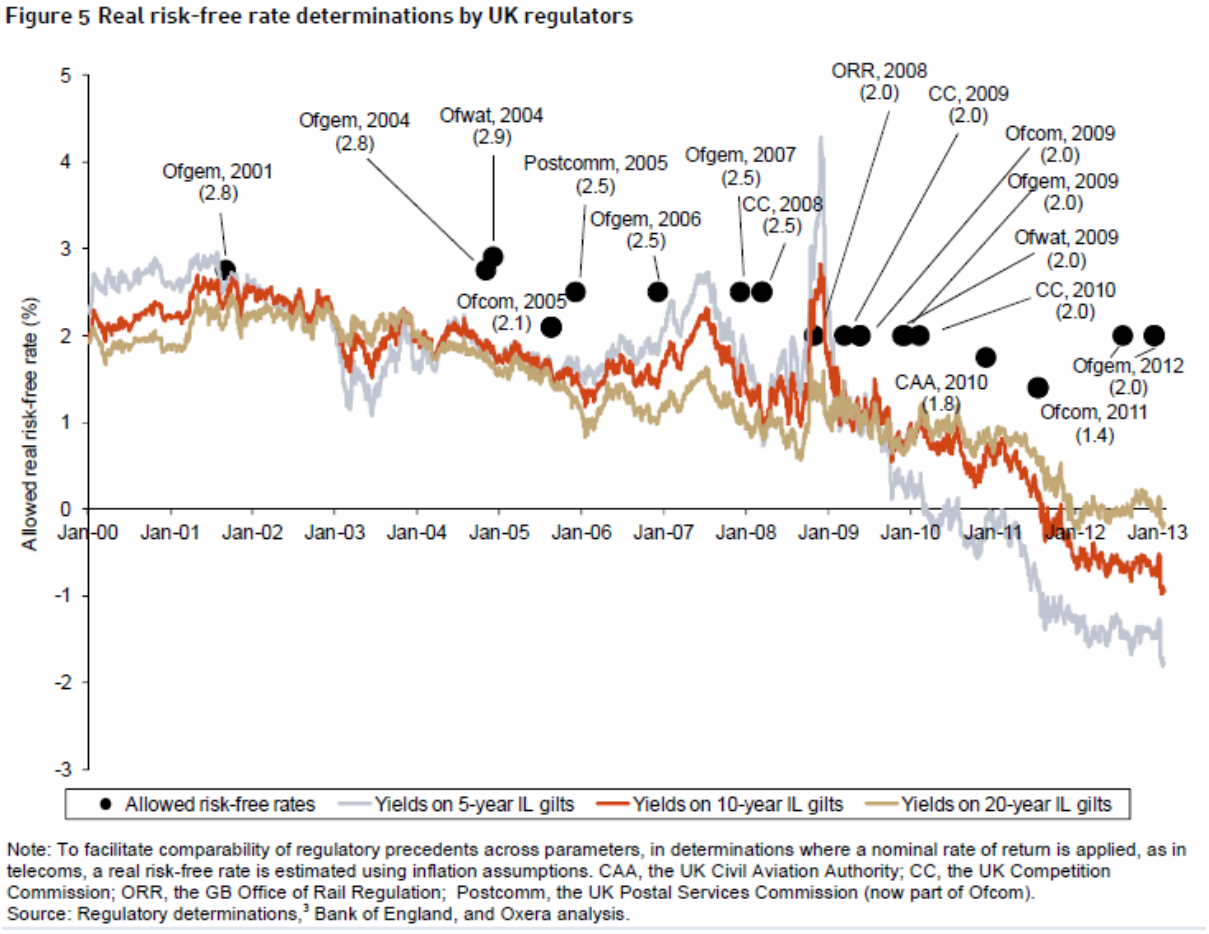
55 CEPA, International Comparison of Regulatory Precedent on The Weighted Average Cost of Capital , p. 13.

56 Oxera (2013), Agenda – Advancing economics in business - What WACC for a crisis?

premium determined by regulators in the United Kingdom over time. The findings of their research demonstrates empirically the views expressed by CEPA.

101. Oxera observed that, although there has been a decrease in the real risk free rate determined by regulators since the peak of the financial crisis (1.4 – 2.0% compared to 2.1 – 2.9% prior to late 2008), the gap between the determinations and the yields observed in the market has widened significantly. Oxera's presentation of this is reproduced in Figure 6 below.

Figure 6: Reproduction of Oxera Figure 5: Real risk free rate determination by UK regulators

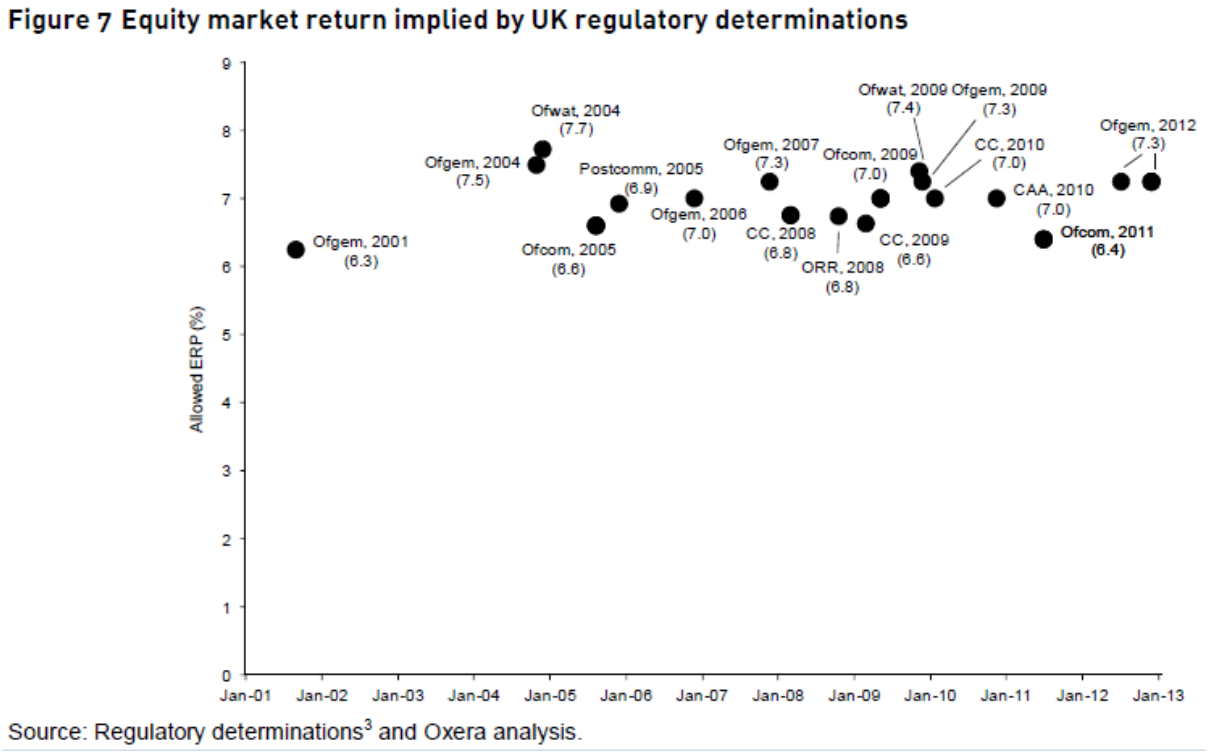


Source: Oxera analysis

102. Further, and consistent with the above, Oxera observed that the regulators' estimates of the market cost of equity have not fallen despite falling risk free rates. This, they note, is consistent with an investor perception that equity has become less attractive relative to debt since the financial crisis. Taken together, this fall in the prevailing real risk free rate in determinations after late 2008 has been offset by an increase in the equity risk

premium (ERP). Since the overall cost of equity is the sum of the risk free rate and the ERP, it has, as a consequence, remained relatively stable over time (Figure 7).

Figure 7: Reproduction of Oxera figure 7: Equity market return implied by UK regulatory determinations



Source: Oxera analysis. Note that the labelling of the y-axis by Oxera is a typographical error and should refer to the equity market return – as per the title of the figure.

103. Ofgem has explicitly adopted an approach in which the market risk premium varies inversely to the prevailing risk free rate. For example, in an annexure report entitled "Decision on strategy for the next transmission and gas distribution price controls - RIIO-T1 and GD1 Financial issues" Ofgem adopted the following approach, in March 2011:[57]

> *3.69. Market measures of the real risk-free rate, such as the yield on ILGs, have risen slightly since the data cut-off point for EE's December report. However, they remain near historical lows, partly due to the Bank of England's official interest rate being held at 0.5 per cent and the impact of Quantitative Easing. We, therefore, do not consider it appropriate to rely on spot rates or short-term averages to set the risk-free rate.*

[57] Ofgem (2011), Decision on strategy for the next transmission and gas distribution price controls – RIIO-T1 and GD1 Financial issues, p. 33

3.70. Our revised range for the risk-free rate is, therefore, 1.7-2.0 per cent. The lower bound matches the 10-year average yield on 10-year ILGs, while the upper bound corresponds to regulatory precedent in the UK.

104. The market level of the ILG's (Index Linked Gilts) reported in the EE report (and referred to above) were around 0.4%. Consequently, Ofgem's decision involved an increase of between 1.3% and 1.6% relative to the prevailing rates.

105. Ofgem reviewed this approach in a consultation process ending in a decision in February 2014 in relation to the cost of equity for RIIO-ED1. Ofgem sought advice from Professors Wright and Smithers, who reiterated support for a countercyclical equity premium on the basis that it:[58]

…is consistent with some more recent academic research, and with recent patterns in observable proxies for risk premia such as corporate bond spreads. It also has the advantage of providing stability in the regulatory process.

We conclude that there is no plausible case for any further downward adjustment in the assumed market cost of equity based on recent movements in risk-free rates (or indeed any other "recent market evidence") [Emphasis in original.]

106. Ofgem's practice is also the dominant practice amongst regulators in continental Europe. We have surveyed energy and telecommunications regulators in continental Europe and find that it is a near universal fact that the allowed risk free rate used in the CAPM is above the prevailing rate for post GFC decisions.

107. Table 3 shows the allowed risk free rate for each surveyed country, as well as the prevailing risk free rate at the time of the decision and the difference between these two numbers. It can be seen that regulators have, notwithstanding material falls in prevailing risk free rates, tended to adopt a stable estimate of the risk free rate.

[58] Wright and Smithers, The Cost of Equity Capital for Regulated Companies: A Review for Ofgem, Ofgem accepted this advice and set a cost of equity for a regulated businesses of 6.0% (post tax, real). Ofgem did not disclose its estimated ERP for the market in that decision. However, index linked gilt yields were negative at the time of this decision (5 year yields were -0.9% in February 2014). Consequently, the implied risk premium for the business itself (as opposed to the market) was around 6.9% (6.0%- - 0.9%). With an equity beta of less than 1.0, this implies an even higher market return on equity. Referring back to Figure 7 it can be seen that the most recent 2014 Ofgem precedent is consistent with the 2012 precedent captured by Oxera. That is, Ofgem continues to set the cost of capital in the manner advised by Wright and Smithers.

Table 3: Allowed vs prevailing risk free rates in continental Europe

Country	Decision	Allowed R_f – Prevailing R_f
Energy		
Estonia	2013	2.81% + 1.51% - 0.63% = 3.69%
France	Mar 2015	4.00% - (-0.08%) = 4.08%
Ireland	Jan 2014	2.00% - 0.83% = 1.17%
Italy	Jan 2012	5.24% - 0.81% = 4.43%
Portugal	Jun 2013	4.90% - 0.65% = 4.25%
Portugal	Dec 2011	3.41% - 0.92% = 2.49%
Telecoms*		
Belgium	May 2014	2.63% - 1.40% = 0.54%
Denmark	Dec 2014	2.08% - 0.93% = 1.15%
Finland	May 2014	0.96% - 0.58% = 0.38%
France	Jan 2013	3.70% - 1.56% = 2.14%
Ireland	Apr 2014	3.63% - 0.60% = 3.03%
Italy	Apr 2010	3.90% - 2.11% = 1.79%
Netherlands	Mar 2012	2.60% - 0.88% = 1.72%
Norway	Dec 2014	4.50% - 1.19% = 3.31%
Portugal	Dec 2013	3.96% - 0.84% = 3.12%
Spain	Sep 2013	6.02% - 0.95% = 5.07%
Sweden	Dec 2013	3.07% - 1.69% = 1.38%

**Sourced from CEG reports for Chorus. WACC parameters in the UCLL and UBA draft decision, February 2015 and Response to the further draft determination, August 2015. Further information on sources shown in Appendix B.*

108. The Commission has, to date, rejected this approach. It is therefore relevant to look at the practice of foreign regulators who set the risk free rate based on prevailing rates. The important question becomes how these regulators set the market risk premium.

109. Moreover, this approach is also consistent with the practices of the survey respondents that Dr Lally relies on to estimate the TAMRP. That survey reports:[59]

> *Table 8 shows that most of the respondents use for US, Europe and UK a Risk-Free Rate (R_F) higher than the yield of the 10-year Government bonds.*

110. By contrast, Dr Lally's approach is to apply the estimated MRP from this survey to the prevailing risk free rate – which is inconsistent with the reported practice of the survey respondents. Moreover, the Dr Lally's approach is to use the prevailing *five* year risk free rate for this purpose which he reports as 2.74% for the month of August 2015. The median risk free rate actually reported by survey respondents is 3.2% - more than[60] 40bp higher.

59 Fernandex, Oritz, and Acin Discount Rate (Risk-Free Rate and Market Risk Premium) used for 41 countries in 2015: a survey, November 2015, p.11.

60 The survey results are only reported to two decimal places. However, Table 5 reports a median return on the market of 6.0% plus 3.2% sums to 9.3% suggesting that rounding is reducing the New Zealand estimates in the survey.

This means that if median survey estimates of TAMRP are to be used with prevailing risk free rates then 40bp must be added to Dr Lally's TAMRP estimate or the resulting estimate of the market cost of equity will be less than the estimate of the survey respondents. This would raise Dr Lally's survey estimate to 7.2%. We also note that the authors clearly consider that the 10 year yield is the correct/standard term for the risk free rate because it is this yield that they compare their respondents risk free rate to in order to report that the latter is higher.

111. There are only two energy regulators in Australia – the ERA and the AER – both of whom set the risk free rate equal to the prevailing rate. The ERA has set its estimate of the market risk premium 1.5% (150 bppa) above its estimate of the historical average of excess returns on the following basis:[61]

> *Most significantly, the Authority has now concluded that it is not reasonable to constrain the MRP to a fixed range over time. The erratic behaviour of the risk free rate in Australia to date, and more particularly, its pronounced decline in the current economic environment, leads to a situation where the combination of a fixed range for the MRP and prevailing risk free rate may not result in an outcome which is consistent with the achievement of the average market return on equity over the long run.*
>
> *Specifically, the estimate of the upper bound for the forward looking MRP of 7.5 per cent that was based on the DGM will fluctuate in line with the risk free rate. So for example, at times when the risk free rate is low, as it currently is, the upper bound for the MRP should be higher. There will be times – such as during the GFC – when the Authority would be more likely to select a point estimate of the MRP which is close to the upper bound. The resulting required return on the market in that type of situation could possibly exceed the long run average return on equity indicated by the historical data.*
>
> *For this reason the Authority considers it appropriate to determine a range for the MRP at the time of each decision.*

112. The AER has made a similar, if smaller adjustment to its estimate of the MRP for the same reasons.[62]

> *As at December 2013, our market risk premium (MRP) point estimate is 6.5, chosen from within a range of 5 to 7.5 per cent. The MRP compensates an investor for the systematic risk of investing in a broad market portfolio. Analysis of historical estimates of the MRP show a long term average of about 6 per cent. We also have regard to another financial model, the dividend growth model, to*

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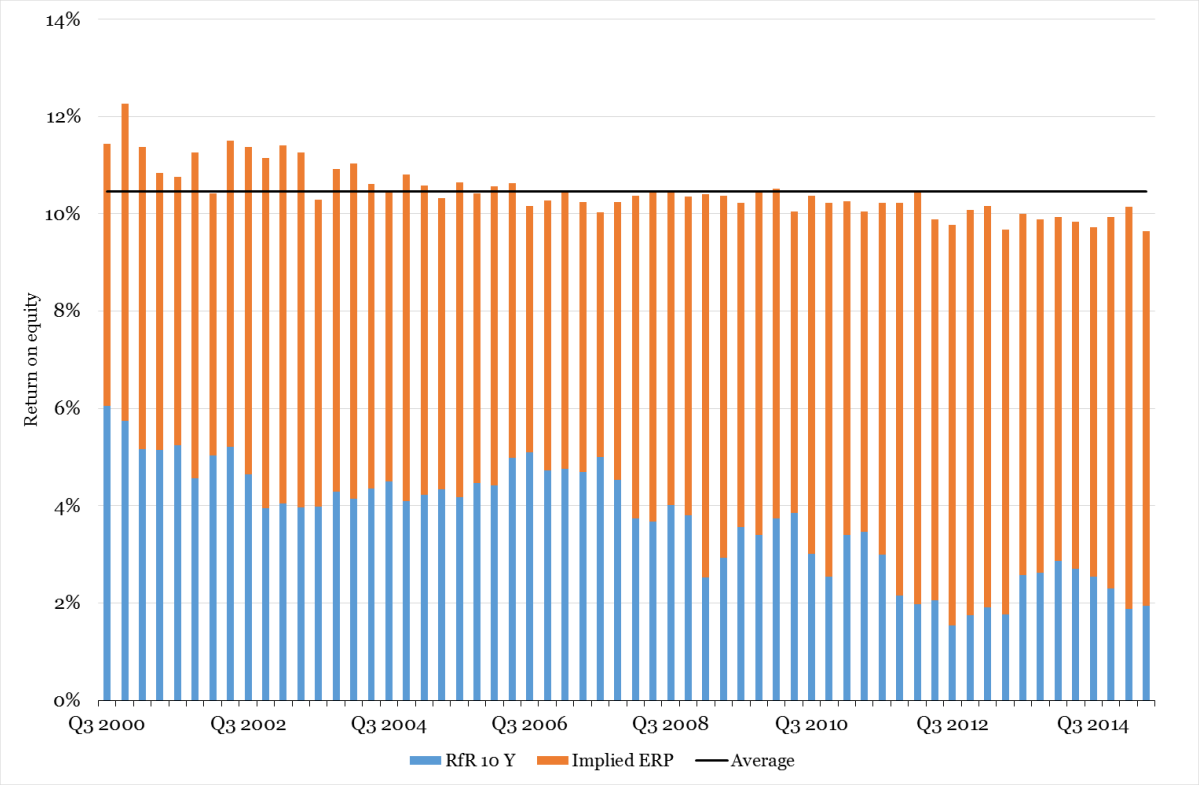
61 Economic Regulatory Authority (2015), Final Decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution Systems, p. 249

62 AER, Fact sheet for the rate of return guideline, December 2013, p.2.

determine whether we should adopt an estimate above, below or consistent with the historical estimate. This is a symmetric consideration. As at December 2013, the dividend growth model is above the historical average—leading to an estimate above 6 per cent.

113. Similarly, while US regulators do not tend to use the CAPM, they too have reduced the allowed cost of equity by much less than the fall in the risk free rate.

Figure 8: Cost of equity in US regulatory decisions over time



Source: CEG, Response to the further draft determination, August 2015, p.6.

114. The Commission's current practice of maintaining a constant 7.0% TAMRP in the face of historic low risk free rates is, highly unusual amongst regulators internationally. International regulatory precedent arrives at essentially the same conclusion (stable market cost of equity) in two different ways:

- by holding the equity premium constant at historical average levels but setting a risk free rate based on historical average risk free rates (above prevailing historically low risk free rates); or
- by adopting the prevailing risk free rate but pairing this with a prevailing equity risk premium (at above historical average levels).

115. We note as well that the approach of the Belgian telecommunications regulator (BIPT), highlighted by CEPA,[63] involves an internally consistent combination of these two approaches. Similarly, the approach of IPART[64] in Australia is also comparable to that of the BIPT.

[63] CEPA, op, cit., p. 13.

[64] CEPA, op, cit., p. 13.

5 Term of the risk free rate for equity

116. The CAPM requires that the risk free rate and MRP estimates are internally consistent with each other. When determining the cost of equity, the Commission prefers to use a TAMRP estimated relative to the five year risk free rate rather than the standard international regulatory and commercial precedent of using a longer term estimate of the risk free rate.[65]

117. The choice of a short or long term risk free rate (and corresponding internally consistent TAMRP) should have little or no impact on the expected return investors expect on risky equities. This will be the case so long as investor's expected return on the market is based on a long term perception of expected returns. Only if investors have specific/different expectations for the market return in each of the future years can choosing a specific time horizon make any difference to the estimate of the market return.

118. This can be illustrated by an example. Imagine that:

- investors expect a 10% return on the market and this is true in both the short-term (5 years) and long-term (10 years); and
- the 5/10 year risk free rates are 3%/4%.

119. The resulting estimates of the 5/10 year horizon TAMRP will be 7%/6% which is simply the 10% return on the market less the 3%/4% risk free rate.

120. That is, by definition, choosing a shorter investment horizon has no effect on the market level cost of equity. It will, however, have some smaller effect on the cost of equity for an individual asset with a beta of less than one.[66] In this context, the selection of the investment horizon should not have a material effect on the ultimate estimate of the cost of equity.

121. This is the case for 2 out of 5 of Dr Lally's proposed measures of TAMRP. Specifically, DGM and "Siegel version 2" and survey estimates. For each of these methods Dr Lally assumes that there is a single expected return on the market and that this is invariant to time horizon being examined. We consider that this is the most reasonable approach to take because we simply have no basis on which to either:

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65 See CEPA, op. cit., Table 2.5 on page 18. Only two out of 12 regulators have regard to the 5 year risk free rate to the exclusion of the 10 year rate. The remaining 10 have regard to the 10 year rate or higher and 7 of these have no regard to the 5 year risk free rate. See also discussion of commercial practice as represented by the Fernandez survey at paragraphs 109 to 110.

66 For example, if beta is 0.7 then a 8bp lower risk free rate (8bp is Dr Lally's estimate of the historical average difference between 10 and 5 year risk free rates in NZ) will result in a 2bp lower cost of equity. This is because the 8bp lower risk free rate is offset by a 8bp higher TAMRP but only 70% of the higher TAMRP is reflected in higher cost of equity while 100% of the lower risk free rate is reflected in a lower cost of equity.

- conclude that investors, at a specific point in time, have a required return on the market is different in each of the future years; and
- estimate what these different required returns on the market are.

122. Therefore, if one were to attempt to estimate a TAMRP relative to the 5 year risk free rate this should be done by subtracting the prevailing 5 year risk free rate from the estimate of the long horizon expected market return on equity. (This is what Dr Lally does in his DGM and Siegel version 1 estimates).

123. However, Dr Lally makes a different assumption when estimating the survey, Ibbotson and "Siegel version 1" TAMRP. Why Dr Lally makes two inconsistent assumptions when estimating TAMRP across his five TAMRP estimates is not explained. In our view, the correct approach is the approach that Dr Lally takes when estimating TAMRP using the DGM and Siegel version 1 approach. We have already noted that the standard regulatory practice and the practice of survey respondents is to use a 10 year risk free rate or something higher. We further note that adopting a 10 year term for the risk free rate will:

- be consistent with standard commercial and regulatory practice;67
- give the same estimate of the market cost of equity as Dr Lally's approach to DGM and Siegel version 2 (as described in paragraphs 116 to 120 above); and
- correct critical internal inconsistencies between the way that Dr Lally's Survey, Ibbotson and Siegel version 2 estimates have been estimated (relative to the 10 year risk free rate) and the way that Dr Lally uses these (relative to the 5 year rate). This is discussed further in section 5.1 below.

124. I therefore support the use of a 10 year risk free rate.[68] In the remainder of this section We discuss the problems and inconsistencies with Dr Lally's approach to deriving a 5 year TAMRP from what are 10 year TAMRP estimates using Ibbotson and Siegel version 1 estimates (and almost certainly survey estimates) of TAMRP

5.1 Inconsistencies between term of risk free rate and TAMRP (survey, Ibbotson and Siegel version 1)

125. As already noted the survey estimates of TAMRP appear to be based on a 10 year risk free rate (or, at least, a risk free rate above the 5 year risk free rate). Similarly, the only reliable

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67 See CEPA, op. cit., Table 2.5 on page 18. Only two out of 12 regulators have regard to the 5 year risk free rate to the exclusion of the 10 year rate. The remaining 10 have regard to the 10 year rate or higher and 7 of these have no regard to the 5 year risk free rate. See also discussion of commercial practice as represented by the Fernandez survey at paragraphs 109 to 110.

68 However, even if a 5 year risk free rate were to be used the resulting market cost of equity should not be affected by this change. This means that, in relation to the term premium in the TAMRP, this should be set as the inverse to the term premium in the risk free rate (as Dr Lally's currently does for DGM and Siegel version 2 but not for the Survey, Ibbotson and Siegel version 1 TAMRP estimates).

estimate of the historical average excess returns are relative to returns on 10 year New Zealand Government bonds. There is no such estimate available relative to 5 year bond returns because there is no long run historical series of 5 year bond returns.

126. Dr Lally makes no adjustment for at all when converting the survey estimates of TAMRP from a 10 year term to a 5 year term. Dr Lally provides no rationale for not making an adjustment. Dr Lally does make an adjustment in relation to the Ibbotson and Siegel version 1 estimates. Dr Lally's approach is to, in essence, assume that there is a term structure in TAMRP that is the same as the historical average term structure in risk free yields (which we consider has been unreliably estimated from foreign data).

127. On this basis Dr Lally concludes that the historical average term premium between 5 and 10 year risk rates in New Zealand is 8bp - such that the 5 year TAMRP is hardly above the 10 year TAMRP. This is despite the fact that the 5 year risk free rate is materially below (60bp) the 10 year risk free rate in the August 2015 period over which Dr Lally estimated the prevailing risk free rate.

128. We do not consider that this is a reasonable way in which to arrive at a forward looking TAMRP estimate for the following reasons:

- Historical excess returns are measured at a one year horizon relative to the yield on a 10 year bond. If investors believe that the average excess return relative to 10 year rates in the past is a guide to the future (the premise underlying the use of excess returns) then the best estimate of the expected return in a given year is equal to the 10 year risk free rate in that year plus the estimated historical average excess return relative to 10 year risk free rates.
- Dr Lally (for his Ibbotson and Siegel version 1 estimates) assumes that in periods when the term structure of risk free rates is more positive than the historical average then the term structure of the TAMRP will be flat (such that investors expected return on the market will have approximately the same term structure as risk free rates). Dr Lally provides no evidence for this and the best evidences is for the opposite conclusion – that short term excess returns tend to be higher when the term structure of risk free rates is strongly positive.
- Dr Lally does not have a reliable estimate of the historical average term premium in New Zealand. That is, even if it was accepted that the assumption outlined above was correct, Dr Lally has no reliable basis on which to implement this approach;
- Dr Lally's proposed approach can be shown to be internally inconsistent – giving rise to multiple predictions of the term premium in the cost of equity that are mutually exclusive.

129. All of these factors, separately and together, lead to the conclusion that the only reliable estimate of the historical average excess returns is relative to long term (10 year) rates and that, therefore, the risk free rate should also be a 10 year rate.

5.1.1 Excess returns are already measured at a one year horizon (albeit relative to the yield on a 10 year bond)

130. Dr Lally's "Ibbotson" and "Siegel (version 1)" estimates are constructed by measuring the difference between the return on the market portfolio over a given year and the 10 year bond rate prevailing in that year and then averaging these single year 'excess returns' over a long time horizon. The historical estimates have a horizon of 1 year notwithstanding that the ten year risk free rate is used. This is because the return on the market is estimated over a single year and compared to the return on a ten year bond in that same year. In our view, consistent with the construction of the estimate, if investors use past excess returns as a guide to the future then an historical average 7.1% excess *return* on stocks per year will reflect investors' expectation of the market return relative to the return on 10 year bonds *in that year*. It will not reflect the average expected return on equities relative to 10 year bond yields over the next 10 years because this is not how the excess return series has been constructed.

131. There is no basis to interpret the average excess return series have having a 10 year horizon – it is measured at a one year horizon. Therefore, there is no basis to assume that investors with a 5 year horizon will demand a lower excess return than has been estimated from the average annual (not 10 yearly) excess returns on the stock market.

132. By way of concrete example let us take Dr Lally's Ibbotson estimate of the TAMRP of 7.1%. This is constructed as the average annual difference between market returns and 10 year risk free rates over 80 odd years. If it is the case that this is a good estimate of the expected difference between market return and 10 year risk free rates over the current year then the expected market return is 7.1% plus the prevailing 10 year risk free rate.

5.1.2 Dr Lally's assumption is at odds with the literature

133. Dr Lally treats the historical average estimate of the excess returns relative to the (annual) return on 10 year bonds as if it has a 10 year horizon. As discussed in the previous section this is not the case. However, even if we accepted that this was a correct interpretation of this historical data, Dr Lally's further assumption is that the TAMRP relative to a 5 year horizon would be higher by the historical average difference in 5 and 10 year risk free rates. Dr Lally estimates this to be trivial at 0.08bp and, on this basis, Dr Lally concludes that the term structure in the TAMRP is flat – even if the prevailing term structure in interest rates is strongly positive.

134. Dr Lally provides no evidence for this and the best evidences is for the opposite conclusion – that short term excess returns tend to be higher when the term structure of risk free rates is strongly positive. This is because there is an empirical regularity, documented in the finance literature, such that the excess return relative to short term interest rates is higher when the term structure of interest rates is positively sloped. Early papers in this field are Campbell (1988)[69] and Chen (1991)[70] both point out the empirical regularity that

[69] Campbell, The real term structure and consumption growth, Journal of Financial Economics, V. 22, 1988.

the term structure of interest rates can be used to predict economic activity. The Federal Reserve Bank of New York maintains a web page devoted to this topic entitled "The Yield Curve as a Leading Indicator" which begins with the statement

> *Research beginning in the late 1980s documents the empirical regularity that the slope of the yield curve is a reliable predictor of future real economic activity.*[71]

135. Fama and French (1989)[72] report that a higher term spread[73] predicts higher excess returns relative to short term interest rates over horizons of between one month and four years. That is, the excess return relative to short term interest rates is higher when long term interest rates are above short term interest rates. This result has been confirmed by subsequent researchers most recently by Rapach, Strauss and Zhou (20120)[74] and Dangl and Halling (2012).[75] This and other relevant literature is discussed in Hird and Grundy (2013).[76]

136. In summary, estimating a term structure for the TAMRP based on the historical average risk free rate term structure cannot be reliably applied in circumstances where the prevailing term structure of interest rates is different to the historical average. Moreover, the best estimate, consistent with the finance literature, is that, when the risk free rate yield curve is upward sloping, as it is at the moment, the TAMRP relative to the five year rate will be more than the TAMRP relative to the ten year rate.

137. This is why we consider that the 10 year risk free rate should be combined with historical average excess returns measured relative to the 10 year risk free rate. This obviates any need to make assumptions about the term structure of TAMRP.

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70 Chen (1991), Financial investment opportunities and the macroeconomy. Working paper no. 266 (Center for Research in Security Prices. University of Chicago. Chicago. IL).

71 http://www.newyorkfed.org/research/capital_markets/ycfaq.html

72 Fama and French (1989), Business conditions and expected returns on stocks and bonds, Journal of Financial Economics, v. 25 1989.

73 The difference between the long term (10 years or greater) and short term (one-month) AAA rated yields.

74 Rapach, David E., Jack K. Strauss and Guofu Zhou, 2010, *Out-of-sample equity premium prediction: Combination forecasts and links to the real econoour*, Review of Financial Studies 23, 821-862. The authors document the statistical and economically significant predictability of excess returns based on the term spread amongst other variables.

75 Dangl, Thomas and Michael Halling, 2012, *Predictive regressions with time-varying coefficients*, *Journal of Financial Economics* 106, 157–181. The authors focus on what they see as flaw in a critique of other studies that concluded that excess returns could not be reliably predicted. The failure to impose a structure on the time-varying relation between predictor variables and the expected excess return in those studies meant that the authors were unable to reject the null of no predictability. Dangl and Halling explicitly model the time-varying relation and thereby document statistically significant predictability of the E[MRP]. Echoing the results in Fama and French (1989), Dangl and Halling document that the relation between the E[MRP] and predictor variables, such as interest rates, spreads and yields, varies across the business cycle.

76 Hird and Grundy, *Estimating the return on the market*, a report for the Australian ENA, 2013.

138. However, the Commission were to continue to attempt to estimate a 5 year TAMRP it is our view that the best method for arriving at a TAMRP relative to the five year risk free rate that is consistent with the historical average estimate of the excess return relative to the ten year rate is to add prevailing term spread between ten and five year risk free rates. In our view simply ignoring the prevailing term structure of interest rates when arriving at a term structure for the TAMRP is not reasonable.

139. Dr Lally has responded to similar points made in the past in the following manner:[77]

> *CEG refers to some empirical literature that concludes that excess returns relative to the short term risk-free rate are positively related to the slope of the term structure of interest rates, and therefore argues that the estimate of the TAMRP relative to the five-year risk-free rate should be raised because the current term structure of interest rates is unusually highly sloped. In particular, CEG argues that the estimate of the TAMRP relative to the five-year yield should be raised by the current term spread between five and ten year risk-free rates. However, at best, CEG's argument would involve some increment to the five-year TAMRP based upon the current term spread relative to the historical average rather than the current spread itself. Furthermore, CEG fails to link the size of the effect detected in the empirical literature to the size of the adjustment that they propose to the five-year TAMRP.*
>
> *Furthermore, such empirical results do not necessarily imply anything about the TAMRP because the predictive power may simply arise from market informational inefficiency. Even Campbell and Thompson (2008, page 1511), who conclude that various predictors are useful, imply that these prediction gains are a manifestation of market inefficiency rather than changes in the MRP: "We show that…investors could have profited by using market timing strategies." Clearly one cannot profit from investing in equities if the MRP is expected to be higher, because the higher risk premium would simply be compensation for greater risk. So the reference to "profit" implies market informational inefficiency.*

140. We reject this response on the following basis:

- We do not propose an adjustment to the TAMRP, it is Dr Lally who proposes an adjustment to the TAMRP to convert it from (what he incorrectly) infers is a 10 year term. It is incumbent on him to perform any adjustment correctly. Dr Lally's adjustment is made purely on the basis of an assumption he has made without reference to any theoretical or empirical literature;
- Dr Lally appears to be rejecting the use of historical regularities identified in the literature on the basis that these might reflect market imperfections (relative to some

[77] Lally, Review of Submissions on the risk free rate and the TAMRP for UCLL and UBA services, October 2015, p. 19.

idealised zero transaction cost and perfect information counterfactual). If this were accepted as a reasonable position it would also imply not having regard to the historical excess return data that underpins the Ibbotson and Siegel version 1 (and version 2) data. Indeed, the 'equity premium puzzle' (why excess returns are higher than most models of rational behaviour would predict) is commonly explained in term of market imperfections/irrational investor behaviour.

141. In our view Dr Lally's response simply fails to address the points that we made.

5.1.3 Unreliable estimate of the term premium in risk free rates

142. Dr Lally's basis for estimating a 0.08% historical average difference between five and ten year yields is unreliable. The historical average TAMRP estimate is measured relative to ten year New Zealand risk free yields over the period 1931 to 2013. However, Dr Lally only has data for both the five and ten year yields over the period 1985 to 2013 (where the difference is 0.07%). This represents only 29 out of the total 83 years (around one third). Dr Lally attempts to augment his estimate by adding the average spread between US 10 and 5 year government bond yields over 1953-1985 which was 0.08%. However, this still leaves 22 years of data unaccounted for (1931 to 1952 inclusive) which Dr Lally assumes to be the same as for the US over the period 1953-1985.

143. The way in which Dr Lally's has used US data to infer a New Zealand historical average is, in our view, highly problematic. First, over the period since 1985 the spread between ten and five year US risk free rates has averaged 0.54%. That is, the spread has been very strongly positive and much more positive than in New Zealand over that period. Dr Lally does not disclose, and so gives no weight, to this evidence.

144. This demonstrates that the term structure of interest rates, unlike the level of interest rates in general, is not strongly linked internationally. Over the period post 1985 New Zealand had strong positive as well as negative term premiums, resulting in an apparent flat yield curve with average spread close to 0%; which appears to be unusual not just relative to the US but also relative to Australia and the UK (as illustrated in Table 4 below). There is no reason to believe that the US experience over the period 1953 to 1985 was the same as the New Zealand experience and there is no reason to believe that the term structure in either the US or NZ pre 1953 was the same as the average term structure in the period 1953 to 1985.[78]

[78] If an assumption was to be made it would appear a more reasonable assumption would be that the term structure pre 1953 was the same on average as the term structure post 1953 – including the year after 1985.

Table 4: Average 10- to 5-year spreads post May 1985

Country	Start date	End date	Total Obs	Average spread (%)
US	1 May 1985	21 Jul 2015	7821	0.54
UK	1 May 1985	21 Jul 2015	6099	0.33
NZ	1 May 1985	21 Jul 2015	7714	0.08
AU	1 May 1985	21 Jul 2015	7227	0.27

Source: Bloomberg, CEG analysis

145. The simple fact is that there is not sufficient historical data on five year rates in New Zealand to estimate the historical average excess return relative to five year rates. Notably, Dr Lally recently estimated the historical average term premium between 5 and 10 year rates in Australia to be at least 28bp using Australian data from 1998 to 2014. Dr Lally did not go back in time using US data as he has done in New Zealand.[79] This illustrates the arbitrary nature of the approach taken by Dr Lally to adjusting the 10 year TAMRP.

146. In summary, not only is the conceptual basis for adjusting the 10 year TAMRP flawed, the empirical basis of the adjustment is unsound. These problems can best be avoided by adopting a 10 year term for the risk free rate and, thereby, obviating any need to adjust the 10 year TAMRP.

5.1.4 Internally inconsistent predictions

147. Dr Lally assumes that the historical average data defines a series of different excess returns for each maturity of the risk free rate and that these can be used to estimate investors' prevailing TAMRP over the same horizon. Moreover, Dr Lally assumes that this can be done even if the prevailing term structure of interest rates is different to the historical average term structure of risk free interest rates. This allows Dr Lally to ignore the prevailing term structure or risk free rates when arriving at an estimate of both the ten and five year TAMRP.

148. It is relatively easy to demonstrate by way of example that this cannot be correct in general. Imagine that the historical average term structure was upward sloping such that the 1 year risk free rate was 1% below the 2 year risk free rate on average. Consequently, the historical average excess return relative to the one year rate would be 1% higher than the historical average excess return relative to the two year rate. Let the latter be 7% and the former be 8%. Dr Lally's methodology would results in the one year horizon market cost of equity being estimated as the one year risk free rate plus 8% while the two year horizon market cost of equity would be the two year risk free rate plus 7%.

149. Now, let the prevailing term structure of interest rates vary from its historical average and be perfectly flat at 4%. That is, short and long term interest rates are identical due to the

[79] Lally, Transitional arrangements for the cost of debt, November 2014, FN 10, p. 27.

fact that investors expect short term interest rates to be maintained at their current levels indefinitely. That is, the one year risk free rate is 4%, the one year risk free rate expected in 1 years' time is 4% which means that the two year risk free rate demanded today is also 4%. Applying Dr Lally's methodology will give rise to:

- A one year cost of equity of 12% for the first year (4% plus 8%);
- A one year cost of equity of 12% for the second year (4% plus 8%); and
- A two year cost of equity of 11% (4% plus 7%).

150. However, these estimates are clearly internally inconsistent. Investors' required return cannot simultaneously be 8% for the first two years (based on prevailing and expected one year rate risk free rates (4%) plus one year TAMRP (6%)) while being 7% over the two year period (based on prevailing two year rate risk free rate (4%) plus two year TAMRP (7%)).

151. The problem is created because the term structure of the TAMRP estimated from the historical data reflects the historical average term structure of interest rates. Applying this to a prevailing term structure of interest rates that is different to the historical average will result in internally inconsistent predictions.

152. Dr Lally has responded to these points made in an earlier submission for Chorus. The basis for this response is for Dr Lally to demonstrate that:

- if he assumes that, despite a flat term structure of risk free rates at 4%, investors expect one year interest rates in year 1 to be 2%; then
- there is no inconsistency because under these assumptions the one year cost of equity because the cost of equity is:
- in year 1 given by 4% plus 8% (=12%); and
- in year 2 given by 2% plus 8% (=10%);
- such that the average of these is (with rounding) equal to 11% (the estimate arrived at by combining the 2 year risk free rate in year 1 with the 7% TAMRP estimate).

153. This is achieved by Dr Lally in his equation 5[80] where he inserts a 2% risk free rate as the best estimate of the one year risk free rate in year 2. We agree that if the best estimate of the one year risk free rate in year 2 was 2% then this would (with rounding) eliminate the internal inconsistency we identify in this specific example. Dr Lally motivates this expected halving in interest rates despite a flat term structure of interests by introducing the concept of a 'liquidity premium' that might explain such an expectation. In doing so, he introduces a number of equations but, in our view, fails to adequately convey the substance of the issue.

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80 Lally, Review of Submissions on the risk free rate and the TAMRP for UCLL and UBA services, October 2015, p. 18.

154. In our view, the mathematical manipulations by Dr Lally obscure rather than enlighten the issues. At its simplest, our scenario has a situation where, applying Dr Lally's method for estimating the TAMRP, the estimated cost of equity over the next 2 years is 11% while the estimated cost of equity over the first year is 12%. In order for this to be reconciled the cost of equity in the second year must be approximately 10% (so that the average of first and second years is equal to 12%). Given Dr Lally's one year TAMRP estimate is the same in both the first and second year all the work must be done by lower risk free rates in the second year – the expected one year risk free rate in that year must be 2% lower.

155. We implicitly assumed a flat term structure of risk free rates implied that the expected one year risk free rate in year 2 is the same as in year 1 (not 2% lower) and therefore an internal inconsistency exists. Dr Lally's 'resolution' to this internal inconsistency is to say that a liquidity premium may exist that would imply investors did expect one year rates in year 2 to fall by 2%. We agree that this is mathematically possible.

156. However, in order to achieve Dr Lally's resolution he has to assume a prevailing liquidity premium that is 1% more than the historical average.[81] This is needed to offset our assumption that the term premium is 1% flatter than the historical average.[82] What Dr Lally has shown is that if the liquidity premium moves in an exactly offsetting manner to any deviation from the historical average term structure then there is no internal inconsistency.

157. We accept that this is the case. However, there is no reason to believe that the liquidity premium does behave in this manner. Our original internal inconsistency remains valid with a simple alteration to the example to assume that the prevailing liquidity premium is the same as its historical average level. In which case, interest rates will be expected to fall by only 1% and not the required 2%.

158. In short, the general principle is the same as we set out. Provided prevailing market conditions (in terms of liquidity premium and/or interest rate expectations) differ from historical average conditions Dr Lally's method will give internally inconsistent results.

159. We simply repeat the conclusion at paragraph 151 above but, instead of referring to differences in the prevailing vs the historical average term structure of interest rates, we

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[81] Dr Lally assumes that the entire average slope of the yield curve in the past reflects a liquidity premium – which in our example is a 1% premium between 2 and 1 year risk free rates – such that the expected 1 year rate in 1 years' time is 1% lower than the current 2 year rate. However, in our example there is no prevailing premium between 2 and 1 year risk free rates so Dr Lally hypothesises a liquidity premium that would justify a 2% lower expected 1 year rate in 1 years' time. This is double the historical average.

[82] We originally couched our example in terms of showing that:

- if the term structure of the TAMRP estimated from the historical data reflects the historical average term structure of interest rates; and
- applying this to a prevailing term structure of interest rates that is different to the historical average will result in internally inconsistent predictions.

amend the terminology to refer to differences in the prevailing historical average term structure of interest rates *caused by* variations in expected interest rate movements from the historical average (i.e., holding liquidity premiums and any other factors that might impact term structures constant at their historical average levels).

5.2 CPP TAMRP must match term of risk free rate

160. In the case of a business applying for a CPP the current IMs set the risk free rate term equal to the term of the CPP (shorter than 5 years). However, the TAMRP applied is the same irrespective, of the term used for the risk free rate. This is clearly an error and inconsistent with Dr Lally's estimates of a TAMRP to be applied with a 5 year risk free rate – which he sets higher than the TAMRP he estimates should be applied to a 10 year risk free rate (see section 5 below). We consider that 10 year risk free rate should be combined with the consistently estimated TAMRP in all circumstances (see section 5 below). However, were the Commission to persist in applying multiple risk free rate terms in different circumstances the matching TAMRP would need to be set differently in each circumstance.

6 Return on debt

6.1.1 Guiding principle

161. In our view, the Commerce Commission needs to adopt a guiding principle when considering revisions to the elements of the IMs that relate to the cost of debt. That guiding principle is that the compensation for the cost of debt should reflect a specific and transparent debt management strategy that the Commission determines as efficient. Specifically, we suggest that the IMs reflect a two-step process:

    - First, define a benchmark debt management strategy that the Commerce Commission considers efficient; and
    - Second, estimate the cost of debt that a business following that debt management strategy would have and provide compensation based on that estimate.

162. A key advantage of adopting this guiding principle is that it will allow a regulated business to, if it so chooses, adopt that debt management strategy and, in doing so, align its actual costs with the allowance set under the IMs. We consider that this would be promote the objectives set out in Section 52A(1) (the purpose statement) of Part 4 of the Commerce Act. Specifically, so long as the debt management strategy adopted by the Commission reflects an efficient debt management strategy that would be observed in competitive markets, it would promote outcomes that are consistent with outcomes produced in competitive markets.

163. Suppliers of regulated goods or services will have the ability to adopt that debt management strategy themselves and, therefore, be able to form an expectation that they will be adequately compensated for the costs of that strategy. This will provide them with an incentive to innovate and invest in order to deliver the benefits perceived in Section 52A(1)(a) and (b) in the knowledge that they can expect to recover the costs of that investment while still being limited in the ability to extract excessive profits (as per 52A(1)(d). To the extent that business debt management practice evolves over time in a manner that reveals a more efficient benchmark, the Commission will be able to adapt its benchmark[83] and pass onto customers any benefits that flow from adopting a more efficient benchmark (consistent with 52A(1)(c)).

164. The adoption of the proposed guiding principle can be used to inform the Commission's approach to the issues that it has raised in its cost of capital update paper. The remainer of this subsection is used to illustrate the role that a well-defined debt management benchmark can play in determining the appropriate regulatory policy.

[83] In an internally consistent manner.

165. In particular, the Commission has raised the option of using a trailing average of the risk free rate and/or the debt risk premium (DRP).[84] The answer to this question depends on whether the benchmark efficient debt management strategy is assumed to involve:[85]

    i. **Option 1**: maintaining a staggered issuance and maturity profile of fixed rate debt without the use of interest rate swaps to reset the cost of debt at the beginning of each DPP. If this is the benchmark strategy, then a trailing average of both the base ('risk free') rate and DRP is appropriate;

    ii. **Option 2**: maintaining a staggered issuance and maturity profile of fixed rate debt with the use of interest rate swaps to reset the cost of debt at the beginning of each DPP. If this is the benchmark strategy, then a prevailing estimate of the base ('risk free') rate and trailing average DRP is appropriate;

    iii. **Option 3**: maintaining a portfolio of 5 year debt that matures at the beginning of each 5 year DPP and is refinanced with new debt at then prevailing rates. If this is the benchmark strategy, then a prevailing estimate of the corporate interest rate (base ('risk free') rate and DRP) at the start of the DPP is appropriate.

166. The Commission has raised the option of implementing an annual updating of the cost of debt.[86] If the assumed efficient benchmark debt strategy involves issuing new debt in every year (as it does in Option 1 or Option 2, then some form of annual updating (of either the total cost of debt (Option 1) or the DRP (Option 2)) is required to compensate for annual changes in benchmark costs as they change). If the efficient benchmark is assumed to involve the issuance of debt only once every 5 years, then no annual updating of the cost of debt is required. Annual updating is considered further in section 6.3 below.

167. The Commission has raised the option of using swap rates as the base (risk free) rate of interest rather than Government bond rates[87] and asked about the merits of providing compensation for swap execution costs[88] Under either Option 1 or Option 3 then the benchmark debt management strategy does not involve engaging in interest rate swap contracts (at least not to reset the base rate of interest for each DPP) and therefore there is

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84 Commerce Commission update paper on the cost of capital, § 1.14.1.

85 We have previously conducted a study on this issue, and determined that the benchmark efficient debt management strategy, for a firm subject to a regulatory regime where the WACC is reset every five years at prevailing rates, is for a firm to hedge approximately 1/3 of its total debt. See: CEG, Efficient use of interest rate swaps to manage interest rate risk, June 2015.

86 Commerce Commission update paper on the cost of capital, § 3.35.

87 Commerce Commission update paper on the cost of capital, § 2.30. The Commission does not explicitly consider the issue of using a different measure of the risk free rate for the cost of debt calculation to that for the cost of equity. We note that there is no reason for these to be the same.

88 Commerce Commission update paper on the cost of capital, § 3.63.1.

no need to express the cost of debt as a 5 year swap rate plus a DRP[89] and no need to allow for swap execution costs (at least not for swaps entered into with the aim of resetting base rates every 5 years).

168. If the benchmark debt management strategy is as defined in Option 2 above then this involves entering into swap contracts and the base rate of interest will be equal to the 5 year swap rate. In this context it is appropriate for the IM's to estimate the cost of debt allowance as the 5 year swap rate plus a DRP measured relative to swap rates. [90]

169. The Commission has raised the option of reform to the TCSD allowance.[91] The Commission's stated intention for the TCSD was to provide an allowance that reflected the costs of issuing debt at terms longer than 5 years should firms actually do so in order to manage refinance risk. However, there is no need for a TCSD if the Commission estimates the efficient tenor of debt and sets compensation based on the costs of issuing at this tenor within a given debt management strategy (including the potential benchmark strategies set out in a. above). By adopting a tenor of 7 years (and not including any TCSD) in its recent Chorus decision the Commission appears to have accepted, at least in part, this logic.

170. The Commission has raised the option of applying a "split WACC" approach allowing for a different WACC for existing assets and new assets included in the CPP price path.[92] However, in relation to the cost of debt, the only justification for a different cost of debt to be applied to assets under a CPP, compared to that which would have applied under a DPP, is if the efficient debt management strategy changed under the CPP. We see no reason why this would be the case. This is discussed further in section 7.

171. The Commission has raised the issue of how to most appropriately compensate for the effects of inflation.[93] With regards to the portion of the RAB that is financed using debt, the appropriate treatment depends on whether the Commission concludes that the efficient benchmark debt management strategy is to issue nominal debt or inflation indexed debt. If issuing nominal debt is efficient then the IM compensation should deliver

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89 Equally there is no need to express the cost of debt as a 5 year government bond rate plus a DRP. The cost of debt can simply be estimated as the cost of corporate debt estimated from corporate bond yields. (That said, under different methodologies and where there is a need to derive a yield at a specific tenor from corporate debt yields with other tenors it may be useful to decompose individual bonds into spreads (DRP) and base rates of interest. However, this is an issue of estimation technique and either swaps or government bond rates could be used (although use of swap rates would be consistent with standard practice).)

90 The DRP would be defined relative to the swap curve at whatever term of debt is assumed to be efficient and at the time that the debt was assumed to be efficiently issued.

91 Commerce Commission update paper on the cost of capital, § 3.5.8.

92 Ibid § 3.72.

93 Ibid § 3.53 and Commerce Commission, *Invitation to contribute to problem definition*, June 2015 § 122 to § 125.

a target nominal return which would require amendments to the current IM.[94] By contrast, if issuing inflation indexed debt is efficient then the IM compensation should deliver a real return – which is what it currently does. This is discussed further in section 8.

6.2 Tenor and transaction costs should reflect efficient practice

172. One important dimension of any potential benchmark debt management strategy that the Commission might determine to be efficient is the tenor of debt issued. The available evidence suggests that a tenor of at least 10 years represents efficient practice in the electricity and gas transport sectors.[95]

6.2.1 Dr Lally's advice to the Commission

173. Dr Lally advised the Commission that it should set the term of debt based on the efficient practice of regulated businesses, and not the term of the regulatory period plus a TCSD adjustment.[96]

> *In summary,* ***I do not support use of a firm-specific TCSD*** *because it encourages firms to lengthen their average debt term without consideration of the cost of doing so. In addition, even if firms borrow for a term that equals the regulatory cycle,* ***an allowance for the transactions costs on interest rate swap contracts is warranted because firms stagger their borrowing arrangements****. In addition, the available evidence suggests that* ***regulated firms in New Zealand*** *have an average debt term* ***of about seven years rather than the ten years claimed by CEG****. Finally, CEG's criteria for selecting the appropriate regulatory debt policy are too narrow and recourse to a more comprehensive set of tests leads to the conclusion that the best policy is to invoke the* ***risk free rate at the beginning of the regulatory cycle (with a term matching the regulatory cycle****) coupled with a* ***DRP at the beginning of the regulatory cycle (with a term matching the average term for which firms borrow****), plus* ***the transactions costs of interest rate swap contracts*** *to align the risk-free rate component of the firm's staggered debt with the regulatory cycle. This is*

94 To either remove revaluations (in both financial model and RAB roll forward) or to apply the same revaluations in the roll forward as were assumed (forecast) to occur in the financial model.

95 In Australia, the AER and IPART adopt a 10 year debt term for estimating the return on debt, and ERA adopts a 10 year term for the DRP. See: AER, CitiPower determination 2016 to 2020, Preliminary Decision, Attachment 3 – Rate of Return, October 2015, pg 3-29; IPART, WACC – IPART's New Approach to Estimating the Cost of Debt, April 2014, pg 1; ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution Systems, as amended on 10 September 2015, pg 323.

96 Lally, Review of submissions on the cost of debt and the TAMRP for UCLL and UBA services, June 2014, p. 19.

similar to the current regime (but without the TCSD and with the transactions cost of interest rate swaps).

174. We consider that this advice is, in large part, consistent with the proposed guiding principles. Specifically, Dr Lally's advice involves:

- First, defining a clear and transparent debt management strategy which Dr Lally regards as efficient. Namely, staggered debt issuance with a term of 7 (seven) years plus an interest rate swap overlay that that resets base interest rates every 5 (five) years at the 5 year swap rate;
- Second, setting compensation that is based on the aforementioned strategy:
- The DRP is based on the cost of issuing 7 year debt;
- The base rate of interest is set based on a tenor of 5 years; and
- Swap transaction costs are included.

175. Dr Lally's recommendations involve a departure from the current IMs in that the term of debt issuance is not tied to the term of the regulatory period and, therefore, no TCSD allowance and swap transaction costs are allowed. In this regard, Dr Lally's approach is superior to the approach that was followed in developing the current IMs. While there are still some areas of Dr Lally's recommendations that we find concerning, we consider that it represents a more internally consistent approach.

6.2.2 Practice of regulated energy firms

176. Dr Lally does not provide a reference for his estimate of a 7 year average tenor for New Zealand regulated businesses. However, it appears to be based on the following passage from the 2010 IM reasons paper.

> *H5.10 CEG (for Vector) provided evidence from other countries of the original maturity of debt issued by regulated electricity suppliers. Since these suppliers issue debt for periods longer than five years, CEG submitted that the Commission should use a term for the debt premium longer than the regulatory period.*
>
> *H5.11 In 2009 and 2010 the Commission surveyed suppliers of services regulated under Part 4. In 2010 (2009), only five (four) of 29 (31) regulated suppliers which responded to the Commission's request advised that the actual weighted average original period to maturity of their debt was greater than five years - and only one was greater than ten years. Their responses are shown in Figure H4. Large suppliers generally issued longer-maturity debt, while (the more numerous) smaller suppliers did not. In the 2010 survey, the value-weighted average original period to maturity of the regulated suppliers who responded was 7.4 years (in 2009 it was 7.3 years).*[974]

> [974] *For suppliers of airports services the weighted average original period was approximately five years in 2009 and 2010.*
>
> *The weighted average original period for suppliers of electricity distribution services was 7.8 years. However, if the suppliers that are also suppliers of gas pipeline services are removed the weighted average original period falls to approximately two years.*

177. In actual fact, this evidence suggests that the value weighted average tenor of debt issued by EDBs was 7.8 years in 2009/2010. It may be that Dr Lally considered that it was unclear what domestic industry Chorus should be compared to but no such ambiguity exists in the case of EDBs.

178. To the extent that that Airports tend to have lower average tenor of debt issued than EDBs, then this should be reflected in an Airport specific tenor assumption – just as the IMs currently assume Airports benchmark debt management strategy involves lower gearing and higher credit rating (and higher assumed asset beta). Such observed differences may derive from differences in operating environment; e.g., potentially relating to the higher proportion of shorter lived retail assets that Airports fund. Certainly, foreign EDBs provide a more relevant comparator to New Zealand EDBs than New Zealand airports do.

179. The Commission has requested updated data from New Zealand energy infrastructure businesses, including the tenor of debt issued. This will allow the Commission to perform a similar analysis to that which was undertaken previously. However, the Commission will need to interpret this data carefully and in a manner that is internally consistent. It is likely that the Commission will once more find that those smaller New Zealand entities with low levels of debt will typically have low average tenor of debt at issue. This reflects the fact that a minimum scale is required for businesses to issue long term debt in bond markets. The great majority of New Zealand entities providing regulated energy transport services do not have sufficient scale to sustain multiple issues in bond markets and, consequently, must rely more heavily on short term bank debt.

180. In our view, the Commission should, as it does in the current IMs,[97] adopt a benchmark debt management strategy that involves the issuance of debt into publicly traded bond markets. This delivers the lowest interest cost and allows the most efficient management of refinance risk by locking in finance for longer terms and at lower rates than available relying on bank debt. This is borne out by the fact that large regulated energy infrastructure (who have material debt funding and have the scale to access bond markets) rely on bond markets in preference to bank debt.

181. However, in order to be consistent with this aspect of the current IMs, the Commission must also define a benchmark debt management strategy to be one carried out by a firm with a sufficient scale of debt funding requirement, such that they would rationally issue

97 The IM's currently estimate the cost of debt based on estimated yields for publicly traded corporate bonds.

publicly traded debt.[98] The issue of precisely where this line is drawn is a matter for further consideration but would involve a minimum debt funding requirement of around $1.0bn. (The Commission could use the debt information provided by the industry to do so. For example, by examining at what total debt funding level corporate bond issuance exceeds 75% of all debt.)

182. In this regard, we favour the Commission's approach in the Chorus UBA/UCLL decision, where it rejected evidence submitted by Network Strategies that, because many New Zealand firms were funded with floating rate bank debt, they would only require one set of interest rate swap transaction[99] to align their base interest costs with the regulatory allowance reset every 5 years. The Commission rejected this conclusion on the following basis:[100]

> *Our approach to estimating a debt premium has been to focus on corporate bond yields, rather than bank finance. The PwC survey covers companies for whom corporate bonds represent less than 10% of their debt portfolio.* ***The survey includes a number of smaller companies who may not be able to efficiently access bond markets, and are not representative of the hypothetical efficient operator****. No information is provided on the split of corporate bonds using fixed rate and floating rate debt.*
>
> *Therefore, we have placed limited weight on this survey evidence, and have continued to assume that two swaps will be required. Furthermore, we consider that it remains appropriate to focus on corporate bonds for our analysis of the cost of debt. This is because corporate bonds are publicly-traded, transparent and used by regulators in setting price control determinations internationally. [Emphasis added.]*

183. It is likely that this will mean that there are only a handful of New Zealand energy sector comparators with the relevant scale to fund themselves predominantly via public bond issuance. However, the Commerce Commission should also have regard to foreign regulated energy businesses. If the tenor of debt issued by foreign regulated energy businesses with the relevant scale is materially higher/lower than that for New Zealand businesses (also with the relevant scale) then, relative to the average tenor of the New

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98 The Commission could, of course, determine that the benchmark efficient debt management strategy should be set to mimic the practice of smaller businesses without the requisite scale advantages necessary to issue into public debt markets. However, were it to do so the Commission's cost of debt estimate, factoring all the costs of such a strategy, should ultimately be higher. This is because we observe that when firms have the scale to eschew bank intermediaries and issue directly to investors they do so – strongly suggesting a cost advantage in doing so.

99 Specifically, one transaction to convert from floating to fixed rather than two transactions (to convert from fixed to floating at the time of debt issuance and another to convert from floating to fixed at the beginning of each regulatory period).

100 Commerce Commission, Cost of capital for the UCLL and UBA pricing reviews, pp. 30-31

Zealand businesses, the Commission should consider increasing/reducing its estimate of efficient tenor.

184. By way of example, based on the foreign comparators surveyed below, it can be seen that the average tenor of debt issued by 5 Australian comparators is around 10 years or more, while the average tenor of debt issued by the 56/34 mostly/highly regulated US comparators is around 18 years. If the small number of New Zealand firms with debt on issue of the relevant scale (e.g., around $1bn or more in debt) have an average tenor of debt at issue that falls between this range (10 to 18 years) then the Commission could reasonably adopt the New Zealand average knowing that it was consistent with comparable international observations. By contrast, if the New Zealand average tenor at issue fell outside this range then the Commission would have to carefully consider adopting a different value that is more consistent with the larger set of international observations.

6.2.3 Foreign comparators

185. In 2013, the Australian ENA submitted a survey by CEG of international practice amongst utility firms.[101] High level findings of this study in relation to the tenor of debt issued is summarised in the Table 3 of that report reproduced below.

Table 5: Weighted average debt term at issuance (reproduced from Table 3 of CEG 2013)

Years (# businesses)	AU	New Zealand	GB	US	AVERAGE
Electric Utilities	8.1 (2)	8.7 (3)	15.9 (2)	18.1 (31)	17.6 (38)
Gas Utilities	14.4 (2)	N/A	N/A	15.1 (22)	14.9 (24)
Multi Utilities	9.2 (3)	7.6 (1)	18.3 (2)	18.9 (21)	18.3 (27)
Water Utilities	N/A	N/A	22.5 (4)	21.5 (10)	22.2 (14)
Highways & Rail-tracks	13.1 (3)	N/A	N/A	N/A	13.1 (3)
Airport Services	11.9 (1)	6.5 (1)	N/A	6.2 (2)	10.5 (4)
Marine Ports & Services	N/A	6.4 (1)	N/A	N/A	6.4 (1)
AVERAGE	11.4 (11)	8.1 (6)	19.1 (8)	18.2 (86)	17.7 (111)

Source: Bloomberg, CEG analysis

186. The firms included in the calculations underpinning this table are defined as 'utilities' under the Global Industry Classification System (GICS) and are not limited to regulated energy transport utilities (e.g., they include some unregulated generation businesses in the 'electric utilities' classification).[102] However, we separately identified Australian and US

[101] CEG, Debt strategies of utility businesses, June 2013.

[102] Ibid, § 19 and Appendix A.

regulated energy transport businesses. The Australian data was summarised in Table 4 from the CEG report reproduced below.

Table 6 CEG findings on Australian term of debt issuance – March 2013 (reproduced from Table 4 of CEG 2013)

Company	Industry	Total debt issued (AUD millions)	Weighted average term at issuance
Envestra	Elect./Gas	1,081.0	16.9
APA Group	Gas	4,810.9	13.8
DUET	Elect./Gas	4,590.3	7.1
SP AusNet	Elect./Gas	5,161.3	7.7
Spark Infr.	Elect.	1,844.1	9.3
Simple Average			11.0
Weighted Average			9.9

Source: Bloomberg, CEG analysis

187. We also identified 56/34 US corporations with more than 50%/80% of total assets being regulated energy assets. CEG found that[103]

> *The weighted average debt term of the 56 companies in the 'mostly regulated' sample is **18.0 years** ($US 337,119 million outstanding). The weighted average debt term of the 34 companies in the 'highly regulated' sample is **18.3 years** ($US 143,207 million outstanding). [Emphasis added.]*

188. Subsequently, CEG was engaged by the Australian ENA to collect confidential data on the average tenor of debt at issue for privately owned Australian ENA members even if they were not publicly listed (CEG's June 2013 report was restricted to publicly listed businesses). The results are summarised in a letter to the AER from Dr Tom Hird.[104] The conclusion of that analysis was

> *"…the simple/weighted average of term to maturity at issue of all drawn debt is:*
>
> *11.4/10.8 years for the original CEG sample of privately owned listed regulated energy companies; and*
>
> *11.0/10.7 years for the original CEG sample plus ElectraNet.*
>
> …

[103] Ibid, § 41 and Appendix A.

[104] Letter of 11 November 2013 entitled *Response to AER criticisms of estimates of average term of debt at issue*. Available at this link.

This data strongly supports the original conclusion by CEG that the benchmark term of debt at issuance should be at least 10 years and also supports the 10 year term of debt determined by the AER in the 2009 WACC Review."

189. The AER used different assumptions to CEG's, and reached a conclusion that the average debt term was 8.7 years. In particular, the AER appears to have treated callable debt as having an effective maturity equal to its first call date - an approach that we advised was incorrect.[105] In any event, the AER subsequently concluded that it would assume a benchmark term of debt issuance of 10 years.

6.2.4 A 10 year term is standard international regulatory practice

190. Using a 10 year or more term for the assumed issuance of the cost of debt appears to be standard regulatory practice internationally. In this regard, we note the advice to the Commission by CEPA, who confirm that this is indeed the standard practice.[106] However, we also note that CEPA either makes an error or uses ambiguous language in describing the practice of the West Australian ERA as being an exception to this. CEPA states:[107]

With the exception of the ERA, the debt premium (or all-in cost of debt for ESCOSA) is based on ten year term to maturity bonds in the considered Australian regulatory precedent. ERA was one of the two regulators who term matched for the risk-free rate. The other was the QCA, who use a ten year term for the debt premium.

191. For the purpose of clarity, we note that the ERA's position in its 2013 rate of return Guideline was to adopt an approach similar to the current New Zealand IMs – with a term of the issuance of debt equal to the term of the regulatory period. However, it has since departed from that approach in its decisions for ATCO gas and Dampier to Bunbury gas pipeline (DBGP). The ERA's current policy is summarised in the below quote from its ATCO final decision.[108]

The annually updated hybrid trailing average approach will have a number of features that remain the same as the approach set out in the Authority's Draft Decision. An estimate of the return on debt based on a hybrid trailing average will:

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105 See footnote 10 of CEG's letter of 11 November 2013 entitled *Response to AER criticisms of estimates of average term of debt at issue*. Available at this link. Similarly, the AER failed to include cash and cash equivalents as negative bank debt as CEG advised was appropriate.

106 CEPA, International Comparison of Regulatory Precedent on The Weighted Average Cost of Capital, p. 27

107 Ibid, p. 27

108 ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-WestGas Distribution Systems, June 2015, p. 321.

- *be comprised of the sum of a debt risk premium and a base risk free rate, combined with a margin for administrative and hedging costs:*
- *Return on Debt = Risk Free Rate + Debt Risk Premium + Debt raising costs + Hedging costs*
- *estimate the risk free rate once, based on an averaging period at the start of the regulatory period (implying the 'on the day' approach for the risk free rate);*
- *adopt a 10 year term for the DRP – following Lally's recommendations with regard to achieving the present value principle (or NPV=0 condition), estimate the DRP consistent with the average term at issuance, which the Authority in the Draft Decision determined was 10 years;*
- *continue to annually update the estimate of the DRP, just prior to the start of each regulatory year, but now based on the updated hybrid trailing average estimate of the DRP;*
  - *the annually updated hybrid trailing average will feed through into each annual tariff variation;*
  - *such that the 'true up' mechanism for the DRP included in the Draft Decision – which was to occur at each regulatory reset – is no longer required.*

192. The Commission appears to have made an error in describing regulatory precedent in the use of swap rates as the base rate of interest. In its update paper, the Commission states:[109]

> *However, although swaps appear to be a widely used tool, we are not aware of any regulator that uses swap rates in place of government securities and it has not gained any widespread consensus in academia.*

193. In actual fact, the ERA does use swap rates as the base 'risk free' rate when estimating the cost of debt. In the same decision quoted from above the ERA states:[110]

> *Third, with regard to the estimate of the return on debt, the Authority has determined to:*

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109 Commerce Commission, Cost of capital update paper, November 2015, pp. 11

110 ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-WestGas Distribution Systems, June 2015, p. 186.

- *continue to estimate the cost of debt as the sum of the risk free rate, relevant debt risk premium, and relevant debt raising and hedging transactions costs;*
- *estimate the risk free rate from the bank bill swap rate with the same term as the regulatory period, that is, 5 years;*

…

194. We further note that only a very small number of regulators set the cost of debt based on a benchmark debt management strategy that assumes that interest rate swaps are used to reset base rates every regulatory period (the only other two being the QCA and the Commerce Commission). The ERA precedent represents a significant proportion of all such regulators.

6.2.5 Impact of the global financial crisis on observed tenor

195. The Commission's 2009 and 2010 studies, as well as CEG's 2013 study, are very likely to be affected by the effective closure of long term debt markets over 2008/09. This means that firms were forced to refinance debt falling due in that period with shorter term debt than they otherwise would have. However, by mid-2015, any 6-year or shorter debt raised in 2008/2009 will have already matured and be replaced by debt with a term more in line with the businesses' desired tenor.

196. On this basis, we expect to find that the average tenor of debt issued by EDBs has risen since the Commission's 2009/10 survey.

6.3 Trailing average

197. In our view the benchmark debt management strategy will inevitably involve staggering debt maturity and issuance in order to manage refinance risk. This appears to be a view shared by all experts including Dr Lally who states that a staggered issuance program implies that efficient costs will reflect a trailing average of debt risk premiums at the time debt is issued.[111]

> *All viable debt policies require staggering of the borrowing (to reduce refinancing risk to an acceptable level) and therefore the DRP incurred by a firm would be the trailing average rather than the DRP at the beginning of the regulatory cycle.*

198. In this quote Dr Lally refers to a trailing average DRP because he assumes that the benchmark debt management strategy will involve the use swap contracts will be used to reset the base rate of interest every five years. The use of interest rate swap contracts is

[111] Lally, Review of submissions on the cost of debt and the TAMRP for UCLL and UBA services, June 2014, p. 15.

the most contentious aspect of the definition of a benchmark efficient debt management strategy.

199. In our view, the benchmark efficient debt management strategy should not include the use of interest rate swaps used in this manner. We set out the reasoning behind this recommendation in section 6.3.1. However, we recognise that an alternative benchmark does include some use of interest rate swaps in this manner. We discuss how such a benchmark could be implemented in section 6.3.2.

6.3.1 Simple trailing average (no use of interest rate swaps)

200. We have previously set out five criteria that we consider a benchmark debt management strategy should be assessed against.[112] (Much of the below discussion is also contained in the same reports.) These are set out below.

    i. It should be hedgeable/replicable in the sense that it is able to be implemented by the benchmark efficient entity – the strategy must be feasible for a business to implement.

    ii. Implementation of the strategy involves low transaction costs for the business – if there are two equally implementable debt raising strategies, the strategy that involves the lowest transaction costs (direct and indirect) should be preferred.

    iii. It minimises the prospect and consequences of estimation error – a business should be able to be confident that, if it manages to the benchmark strategy, its cost of debt will move with the regulator's estimate of costs.

    iv. It gives rise to relatively low price volatility for customers. Customers are not well placed to hedge against the volatility in network prices and especially do not want to be facing higher prices when they are facing broader budgetary pressures, e.g., due to a financial crisis and/or unusually high interest rates.

    v. The benchmark debt management strategy should reflect the standard practice of businesses operating in similar environments to network energy businesses.

201. Setting a cost of debt allowance based on a 10 year trailing average of fixed interest rates on 10 year debt performs well against each of these criteria. This approach would result in a stable cost of debt allowance that was simple and low cost for a business to hedge to. The stability of a trailing average allowance would be in customers' and businesses' mutual interests.

202. Assessment against each criteria is discussed below.

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[112] For example: CEG, Cost of debt consistent with the NGR and NGL, a report for ATCO, March 2014. And CEG, Response to Commerce Commission UCLL/UBA WACC consultation paper, March 2014.

i. It is hedgeable/implementable. In order to implement this benchmark all a business must do is engage in staggered issuance of 10 year debt so that it is refinancing around 10% of its portfolio each year. (Alternatively, a trailing average could be weighted by historic growth in the RAB which would potentially make hedging to the benchmark easier);

ii. It is low transaction cost for the business. The business must simply issue staggered debt at a rate of about one 10th of their portfolio every year. Similarly, by spreading refinancing over 10 years this will prudently manage refinancing risk and minimise the associated transaction costs.

iii. The potential cost of estimation error is low. A business can be confident that, if it issues staggered 10 year debt its costs will move with the regulator's estimate of costs. An error in one period's estimate will not have a significant impact on the overall allowance. Only if the cost of debt was repeatedly mis-estimated, and in the same direction each time, would the benchmark estimate depart materially away from the actual market cost of debt associated with that benchmark.

iv. It gives rise to relatively low price volatility and does not result in higher prices when customer budgets are under stress. The gradual updating of a trailing average means that it is relatively stable. This stability has the effect of preventing cost of debt allowances materially contributing to network price increases at precisely the time that customers would most value lower prices (and vice-versa with respect to cost of debt reductions contributing to price reductions when these are less important to customers).

v. A 10 year trailing average is consistent with standard business practice. It is standard practice for infrastructure businesses to engage in staggered issuance of long term debt. This suggests that this approach is likely to minimise transaction costs.

203. Imposing a swap overlay (to the effect that base interest rates are reset at the beginning of each regulatory period) will retain many of the characteristics of a simple staggered debt portfolio. As already described, under this approach the cost of debt would (assuming a 5 year regulatory period) be equal to:

- the prevailing 5 year fixed swap rate at that time; plus
- a historical average of the debt risk premium calculated over the period that the entity raised its existing debt instruments (say, 10 years).

204. However, this potential benchmark performs worse against the five criteria for the reasons we set out below.

i. It is hedgeable/implementable to the extent that the business in question has ready access to swap markets, the counterparties to the swap contracts do not default over the course of the contract and the regulator accurately estimates the cost of arranging and entering into the swap contracts.

ii. It is higher transaction cost for the business than a trailing average. The business must, in addition to arranging its staggered debt portfolio, arrange a swap portfolio that changes the interest rate properties of that portfolio fundamentally.

iii. The potential cost of estimation error will be raised to some degree because the relevant swap rates and transaction costs will be measured imperfectly.

iv. The volatility of debt costs and therefor prices would be increased materially – with 100% of the variation in prevailing interest rates at the beginning of each regulatory period being passed onto end customers. This compares with a simple trailing average where the cost of debt changes gradually as the trailing average updates gradually overtime. Not only does this make budgeting more difficult for end users, because this volatility is driven by the level of prevailing interest rates it would mean that utility prices are strongly correlated with the level of stress on end user budgets. That is, when households are paying higher interest rates on their debt they will also be paying higher prices for their utility services.

v. We are aware from Australian experience that there is some evidence of some regulated energy infrastructure businesses, who until recently were subject to a regime that reset the cost of debt allowance every 5 years, using swaps to effectively reset the base interest rate on at least part of their debt portfolios at the same time. However, not all businesses pursued this strategy and there was broad support for the regulator moving to a trailing average so that the need for a swap overlay did not exist.

205. In addition to the above we note that a simple trailing average (without the use of interest rate swaps) is amenable to being combined with a DPP/CPP framework. A simple trailing average cost of debt (with annual updates or with a true up at the end of a regulatory period) is the same for all businesses – whether or not they apply for a CPP. The cost of debt in each year simply reflects a trailing average of debt issuance in the past.

206. Similarly, if the benchmark is assumed to involve the use of interest rate swaps to reset base rates every five years at the beginning of the DPP period then it will be internally inconsistent to assume that a firm has the ability to lock in prevailing swap rates n<5 years later if they apply for a CPP. Having locked in swap rates for a 5 year period they remain 'locked in' for 5 years (see discussion in section 7). The DRP would also (with annual updates or with a true up at the end of a regulatory period) be the same whether or not a DPP or a CPP was applied for.

6.3.2 Trailing average with the use of interest rate swaps

207. Dr Lally has previously argued that the benchmark debt management strategy should include the use of swaps. In doing so he argues that our five criteria should be reworded and augmented as follows:[113]

> *(1) It should satisfy the NPV = 0 principle, i.e., there is a viable debt policy (feasible and not so inefficient that firms would avoid it) that in conjunction with the regulatory policy will satisfy the NPV = 0 principle.*
>
> *(2) It should not give rise to undesirable incentives, most particularly in respect of capex and new entrants to the regulated sector.*
>
> *(3) It should be possible, and simple, to implement it.*
>
> *(4) It should minimise bankruptcy risk for the firm.*
>
> *(5) It should give rise to a low average output price to consumers.*
>
> *(6) It should give rise to low volatility in the output price to consumers.*
>
> *(7) If a change in regime occurs, any transitional process used should be simple and minimise the one-off gains or losses experienced by firms as a result of the regime change.*
>
> *Compared to CEG's criteria, there is agreement on (6). In addition, CEG's criterion of low transactions costs is subsumed within criteria (5) above, i.e., low transactions costs are not important per se but only as a contributor to low prices to consumers. In addition, CEG's criteria relating to being consistent with the way in which firms behave and the ability of firms to replicate the regulatory approach is subsumed within (1) above. Thus, I agree with the individual criteria proposed by CEG but add several more considerations.*

208. Dr Lally argues that:

- The use of prevailing rates promotes efficient investment incentives while the use of historical data does not although Dr Lally argues that a trailing average that is weighted to growth in the RAB will resolve any incentive problems but would be more complicated to administer;[114]
  - We do not agree with Dr Lally's logic in this regard for reasons set out in our 2014 reports for ATCO[115] and Chorus.[116] However, we note that Dr Lally has provided

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113 Lally, Review Of Submissions On The Cost Of Debt And The TAMRP For UCLL And UBA Services, June 2014, pp. 14-15

114 Ibid, p.16

115 CEG, Cost of debt consistent with the NGR and NGL, November 2014, see section 4.2.2. This section deals with a proposal to annually update the DRP (so that the cost of debt in that year was based 100% on the prevailing

his own solution to the imagined problem which amounts to implementing a weighted trailing average – the 'complexity' of which could easily be accommodated in a few lines of spread-sheeting.

- Dr Lally makes the claim that a simple trailing average is impossible to implement because it would involve use of swap contracts in a manner that is unobservable by the regulator. [117]
  - We consider that this is a non-sequitur. The simple trailing average does not involve the use of swap contracts. Dr Lally's argument is, in reality, an argument that implementing a benchmark that involves the use of swaps is problematic. Dr Lally concedes this point in a subsequent paper[118] but argues that a benchmark should efficiently include the use of swaps because this lowers interest rate costs (see next point);[119]
- Dr Lally argues that a benchmark that does not include the use of interest rate swaps "…will yield higher average prices to the extent that the average debt term of firms exceeds the five-year regulatory term (and therefore the average risk-free rate used is higher) net of the transactions costs of the interest rate swaps".[120]
  - It is important to note that the use of the phrase "to the extent" in the above quote is a very strong caveat. In this regard, we not that Dr Lally puts the historical average term premium between 10 and 5 years risk free rates at only 0.08 when adjusting the TAMRP from a 10 to a 5 year estimate (see section 5 above). On this basis transaction costs would only have to be 8bp (which is the Commission's estimate) for there to be zero reduction in costs from using interest rate swaps. Moreover, Dr Lally's own estimates have tended to use a 10bp estimate for the transaction cost of swaps. In addition, the 0.08bp term premium is between 5 and 10 years while Dr Lally was recommending a benchmark term of 7 years – suggesting a much smaller term premium in base rates than 0.08bp. When these facts are considered it is not clear why Dr Lally argued that the use of swaps will lower costs. On the basis of his own published estimates the opposite would appear more likely to be the case. Notwithstanding this Dr Lally subsequently makes statements such as:[121]

DRP). However, the same logic applies to an argument that basing the cost of debt on prevailing risk free rates and/or DRP improves investment incentives relative to a trailing average.

116 CEG, Review of Lally and Oxera reports on the cost of capital, section 5.

117 Lally, Review Of Submissions On The Cost Of Debt And The TAMRP For UCLL And UBA Services, June 2014., p.17

118 Lally, Review of responses to review of submissions, August 2014, p. 23

119 Lally, ibid, p.23.

120 Lally, Review of submissions, June 2014, p. 17-18.

121 Lally, Review of responses, August 2014, p. 23.

> ...benchmark firms would be likely to use interest rate swap contracts to shorten the effective term of the risk-free rate component of the cost of debt. The consequence of this regulatory policy would then be to grant an excessive cost of debt allowance to regulated firms.

Dr Lally presents no evidence for such conclusions and these conclusions are at odds with his estimates of the average term premium in New Zealand. Dr Lally, might respond that he is assuming that businesses would use swap contracts to reduce their base rate term by more than 5 years (e.g., from his assumed 7 years to 1 year). Again, no evidence is provided to suggest that this would reduce (risk adjusted) interest costs and, if it did, then it is not clear why Dr Lally does not simply advocate that approach as the benchmark.

- Dr Lally accepts that a simple trailing average results in the least volatility in prices for consumers;[122]

> *one might expect that Option C [historical average cost of debt] would yield the lowest price volatility because it uses historical averages rather than prevailing rates and it applies the same averaging process to both the risk free rate and the DRP (thereby gaining risk reduction from the negative correlation between these two parameters). However this is an empirical question and Appendix 2 assesses it. Using data from 2003 to 2014, output prices would have exhibited similar variation under Options A and B and substantially less under Option C*

- Dr Lally appears to argue that a transition is required if a trailing average is introduced. [123] However, given that it is agreed that the benchmark efficient debt management strategy already has an element of trailing average we do not agree. It is arguable that the current benchmark strategy should be interpreted to involve some use of swaps because that is how a business would respond to the current regulatory regime. [124] This is an argument for some form of transition being applied to the base rate if a simple trailing average is adopted as the benchmark. However, there is no reason to apply a transition to the DRP.

209. In addition to the above problems with Dr Lally's conclusions, we also consider that insufficient weight has been given to the benefits of creating a stable cost of debt allowance and, therefore, stable prices for consumers. Even if interest rate swaps could be used to perfectly manage the risks for a business (i.e., even if CEG criteria i, ii, iii and v) were met perfectly. Imposing a swap overlay creates volatility in prices faced by customers (and

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122 Lally, Review of submissions, June 2014, p. 18.

123 Lally, Review of submissions, June 2014, p. 18.

124 We have previously conducted a study on this issue, and determined that the benchmark efficient debt management strategy, for a firm subject to a regulatory regime where the WACC is reset every five years at prevailing rates, is for a firm to hedge approximately 1/3 of its total debt. See: CEG, Efficient use of interest rate swaps to manage interest rate risk, June 2015.

ultimately end users). There is ultimately no reason why customers should have to deal with such volatility and the best evidence is that customers actively dislike such volatility.

210. In the recent review of how the rate of return for energy businesses is set in Australia, customer groups were strongly supportive of the adoption of a trailing average approach largely on the grounds that this would reduce volatility in prices relative to an approach that resets the cost of debt allowance based on prevailing interest rates at the beginning of each regulatory period. This is illustrated in the following quotes from submissions (all emphasise is added):

> Public Interest Advocacy Centre.[125]
>
> *Of particular concern is the current regulatory practice to assume (from a methodology point of view) that all debt for the 5-year determination period is raised over a short period of time close to the determination itself.*
>
> *This is highly problematic and is not supported by observation of private sector network reports.*
>
> *To the extent that a portfolio approach using historical averaging* ***provides more stability in the cost of debt****,* ***while not exposing networks to unhedgeable risks****, then this approach is to be preferred as consistent with the overall objectives.*
>
> *Major Energy Users*[126]
>
> *The recognition of the need for the return on equity component to be* ***less volatile*** *over time and the introduction of a trailing average approach to developing the allowance for the return on debt are welcome changes…*
>
> *The Energy Users Association of Australia*[127]
>
> *We support the AER's proposals on the use of a simple trailing average…*
>
> *Council of Small Business Australia*[128]
>
> *COSBOA is supportive of the AER's proposed use of a simple trailing average approach to establishing the return on debt and of annual updating of this. We believe this is … a better representation of the actual debt financing practices of*

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125 PIAC, *Reasonably rated: submission to the AER's Draft Rate of return Guideline*, 15 February 2013, p.25. Available at http://www.aer.gov.au/node/18859

126 MEU, Comments on the draft guideline, October 2013, p.3. Available at http://www.aer.gov.au/node/18859

127 EUAA, Letter to Warwick Anderson, dated 11 October 2013. Available at http://www.aer.gov.au/node/18859

128 COSBOA, Australian Energy Regulator – better regulation program, comments, October 2013. Available at http://www.aer.gov.au/node/18859

> *NSPs and other firms than the existing AER approach. We also note the AER's comment that it* ***would smooth movements in the return on debt over time and so price volatility, which we recognise is consistent with the long term interests of consumers, other things being equal.***

211. I draw particular attention to the first quote from the Public Interest Advocacy Centre. I regard this quote as an excellent summary of how a regulator should approach defining benchmark efficient debt management strategy.

212. The assessment against CEG criteria iv) alone would, in my view, be sufficient to justify not imposing a swap overlay on the definition of the benchmark debt management strategy. However, imposing a swap overlay tends to worsen the assessment against criteria i), ii), iii) and v) also.

213. In this regard I note that I am aware that large businesses operating in Australia have argued that attempting to reset the entirety of their swap contracts at the beginning of the regulatory period would result in them creating significant pricing pressure – essentially straining swap markets in that period. Advice to this affect from UBS was provided to the AER on a confidential basis.[129]

214. This is consistent with the submission from the Australian Financial Markets Association to the AER that incorporating a swap overlay into the benchmark efficient debt management strategy would raise rather than lower the cost of debt.

> *AFMA submitted that due to recent international regulatory developments it considers that interest rate swaps are likely to increase the cost of debt rather than reduce the cost of debt.*[130]

215. Under the current IMs in New Zealand all EDBs share the same averaging period such that it is reasonable to conclude that the pressure on swap markets would be even greater than in Australia (see also section 6.5 below).

216. In relation to points i, ii, and iii above we note that any swap contract involves contracting with a less than perfectly safe counterparty. Thus, these contracts are not perfectly guaranteed to alter interest rate exposure – especially if there is a systemic crisis in the financial sector. Also, consistent with the advice provided by UBS, to the extent that swap markets are not perfectly liquid, this approach can be expected to give rise to transaction costs – especially if the size of the portfolio that needs to be "swapped" at the beginning of the regulatory period is large relative to the ordinary volumes of the interest rate swap market over that period.

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[129] See Ausgrid, Transition Regulatory Proposal, January 2014, p. 21. Available at http://www.aer.gov.au/sites/default/files/Ausgrid%20-%20Transitional%20regulatory%20proposal%20-%2031%20January%202014.PDF

[130] AER, *Explanatory Statement to the Rate of Return Guidelines*, p. 140. Available at http://www.aer.gov.au/node/18859

217. In terms of measurement issues, it is relevant to note that swap contracts are bilaterally negotiated derivative contracts and are not exchange traded. It is, therefore, not possible to observe a traded price for swap rates. Rather, the swap rates quoted by the NZ Financial Markets Association (NZFMA) are based on the average of self-reported yields from a range of different contributors reflecting the fixed rates that they would be prepared trade at with a particular type of counterparty.[131] The resulting published rate is not necessarily the rate at which any contracts have been negotiated that day and is not necessarily the rate that a service provider could actually contract with its bank(s). See further discussion at section 6.6.1.

218. For all of these reasons I consider that, when defining the benchmark debt management strategy, adding a swap overlay onto a staggered debt issuance program is unlikely to be inappropriate.

6.3.3 Need for transition

219. In his advice during the Chorus proceedings, Dr Lally recommends that the Commission adopt a benchmark debt management strategy that involves staggered debt issuance and the use of interest rate swaps to reset the base rate of interest at the beginning of the regulatory period. Dr Lally states that a staggered issuance program implies that efficient costs will reflect a trailing average of debt risk premiums at the time debt is issued.[132]

> *All viable debt policies require staggering of the borrowing (to reduce refinancing risk to an acceptable level) and therefore the DRP incurred by a firm would be the trailing average rather than the DRP at the beginning of the regulatory cycle.*

220. Notwithstanding this, Dr Lally reached the conclusion that he favoured compensating based on the prevailing DRP ('Option A') rather than a trailing average DRP ('Option B') on the grounds that:[133]

> *In comparing Option A with B, Option A suffers from the disadvantage that there is no viable debt strategy that can be combined with it to satisfy the NPV = 0 principle, and it raises bankruptcy risk. However it is easier to implement, it has lesser incentive problems for capex and new entrants (or less complexity if these incentive problems are addressed), and the transitional process from the present regime is simpler. In respect of the greater bankruptcy risk, this has been examined in Appendix 2 using data from the GFC period and the increase would have been trivial. In respect of violations of the NPV = 0 principle, Lally*

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131 NZFMA describes its process in a document available here: http://www.nzfma.org/Site/practices_standards/reference_rate_rules.aspx

132 Lally, Review of submissions on the cost of debt and the TAMRP for UCLL and UBA services, June 2014, p. 15.

133 Lally, Review of submissions on the cost of debt and the TAMRP for UCLL and UBA services, June 2014, p. 19.

(2010, Appendix 1) analyses this issue and finds that the violations are not substantial. Furthermore, the CDS market is likely to continue to develop and may reach the point at which the DRP risk under the present regime can be better hedged by regulated businesses, in which case these three concerns would be further ameliorated. In view of all this, I favour Option A.

221. We do not consider that the reasons set out above are sound. In our view, the Commission needs to explain why there would be any need for a transition to a trailing average DRP given that it is accepted that the only feasible benchmark debt management strategy implemented by businesses involves incurring a trailing average DRP. If it is the actual and efficient practice of businesses to stagger their debt issues, then it is not obvious why any delay is appropriate in compensating on this basis.[134]

222. Moreover, we have previously conducted a study on this issue, and determined that the benchmark efficient debt management strategy, for a firm subject to a regulatory regime where the WACC is reset every five years at prevailing rates, is for a firm to hedge approximately 1/3 of its total debt.[135]

6.3.4 Annual updating

223. If a trailing average is adopted then the question arises as to whether annual updating should be applied. This would more accurately reflect efficient costs (which do vary depending on interest rates over time) and would result in smoother price profiles for consumers relative to a 'true up' mechanism at the beginning of each regulatory period. We do not see any material barrier to its implementation (which has been carried out in Australia and the UK).

6.4 Use of bonds (including other than New Zealand denominated bonds)

224. The Commission states:[136]

Given the limited number of appropriate corporate bonds, we plan to review the methodology to understand how to make the best of the shortage of corporate bonds for the estimation of the debt premium.

225. The reason for the limited number of corporate bonds available for analysis under the current IM's is, in large part, a reflection of the exclusion/de-weighting of bonds with the

134 We note that this issue is currently being considered by the Australian Competition Tribunal in Networks New South Wales' appeal. The Commission should therefore have regard to this decision when it is made.

135 See: CEG, Efficient use of interest rate swaps to manage interest rate risk, June 2015.

136 Commerce Commission update paper on the cost of capital, § 2.39

relevant credit rating. This includes bond issued in foreign currency and bonds issued by firms operating in another industry but with the relevant credit rating.

226. In our view, foreign currency bonds issued by New Zealand corporations and hedged back into NZD should be included in any analysis of the cost of debt. This is consistent with the practice of the West Australian Economic Regulation Authority (ERA), which collects this information on its own and provides a detailed description of how foreign currency bonds are converted into domestic currency using Bloomberg functionality.[137]

227. It has also previously been the past practice of IPART - prior to its adoption of the Reserve Bank of Australia's (RBA's) corporate credit curves - to set its own cost of debt. However, it is noted that the RBA's bond sample selection is dominated by foreign currency bonds issued by Australian corporations and, consequently, those Australian regulators having regard to the RBA curve (which include the AER) are also relying on foreign currency bond issues.

228. The proposed inclusion of foreign currency bonds in part reflects the fact that this will increase the sample size and robustness of the Commission's estimation. However, equally importantly, it is likely that the Commission's survey of debt issuance by New Zealand EDBs will also find that a significant proportion, if not the majority, of corporate bond issuance takes place in foreign currency and/or in foreign jurisdictions. This finding would be consistent with recent evidence from CEG regarding the practice of Australian regulated businesses, who issue less than half of their debt in AUD, with less than 20% of bonds with maturity of around 10 years being issued in AUD.[138]

229. In this regard we note that this is inconsistent with the reporting by CEPA of conclusions reporting on the results of a PwC report for the QCA:[139]

> *Although only 50% of debt issuance was found to be using domestic bonds (27% being bank debt, 23% being foreign denominated debt), this was retained as the sole source due to transparency and complexity considerations. A broad sample of companies were considered if they met the criteria, not solely regulated entities. This increased the sample size and statistical precision of estimates.*

230. We have addressed this inconsistency in our report, noting errors and omissions in the PwC estimates that cause material underestimation of foreign currency issues.[140]

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137 See Appendix 5 of ERA, Final Decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution Systems Submitted by ATCO Gas Australia Pty Ltd 30 June 2015 As amended on 10 September 2015.

138 See CEG, Criteria for assessing fair value curves, January 2016, p. 20, para 57.c.

139 CEPA, op. cit., p.20.

140 CEG, op. cit., p. 22.

231. It is also our view that the Commerce Commission should reconsider its approach of focusing on debt issued by regulated EDBs. Such an approach materially reduces the number of observations available in a context where it is not obvious that there is any advantage from doing so. This is because the riskiness of debt is already accounted for in the benchmark credit rating. Excluding observations with the relevant credit rating is more likely to reduce the accuracy of the ultimate estimates instead of improving it.

232. With an expanded bond set, the Commerce Commission should also consider curve fitting and other statistical techniques that would allow more intensive and efficient extraction of information from a sample of bonds. This appears to be consistent with the Commission's intention when it states.[141]

> *Given the limited number of appropriate corporate bonds, we plan to review the methodology to understand how to make the best of the shortage of corporate bonds for the estimation of the debt premium.*

6.5 Averaging period should be proposed by individual businesses rather than specifying this in IMs

233. The current IMs involve the cost of debt allowance being reset using market interest rates over a one month period 9 months prior to the beginning of the DPP and using the same averaging period for all EDBs. Any business wishing to use swap rates to hedge its cost of debt over this period must enter into swap contracts over the same period. The implications of this include:

- All EDBs must enter New Zealand swap markets with a demand for the exact same type of hedging instruments for the entirety of their debt portfolio over the same short 1 month window. It is almost certain that this would cause a material uncompensated[142] increase in swap rates paid by these businesses compared to a scenario where different businesses have different averaging periods;
- New Zealand banks know this to be the case because the regulatory averaging period is public. This has the potential to create competition concerns that may exacerbate the above effects;
- Moreover, having the averaging period 9 months from the beginning of the DPP creates a need to engage in forward start swap contracts which are likely to be even less liquid and more costly than straight interest rate swap contracts.

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141 Commerce Commission, Cost of capital update paper, paragraph 2.39.

142 Unless the Commission also set the base rate for the cost of debt equal to the swap rates.

234. In light of this, we recommend that the Commerce Commission allow individual businesses to nominate their own averaging periods (at least for the base rate of interest used to calculate the cost of debt)[143] and for these to be kept confidential.

6.6 Transaction costs

235. We consider that compensation should be provided for the full set of transaction costs associated with the deemed efficient benchmark debt management strategy.

6.6.1 Reflecting the cost of swap transactions

236. If the debt management strategy involves an assumption that base interest rates are reset every 5 years using interest rate swaps, then the cost of those swaps should be included. This is also Dr Lally's view, as noted at paragraph 173 above. Similarly, the Commission has, in the UBA/UCLL decision, set this level of compensation for swap transaction costs at 8bppa (assuming a 4bp cost for each of the two swap transactions).[144]

237. This is at the low end of the available evidence. In particular, Chorus submitted evidence from CEG on swap transaction costs in Australia. Following the method adopted by the Queensland Competition Authority (QCA) as set out by the QCA's consultant (Evans and Peck), CEG estimated:[145]

> *Following the methodology set out in the Evans and Peck report, for a debt term of 10 years and a regulatory period of 5 years, the costs for a BBB+ entity would be:*
>
> - *execution spread of 4.0 basis points and a credit spread of 4.5 basis points for the 10 year fixed-to-floating leg; and*
> - *execution spread of 3.0 basis points and a credit spread of 3.0 basis points for the 5 year floating-to-fixed leg.*
>
> *The total cost of swap transactions for this purpose is 14.5 basis points.*

238. The CEG report also referenced analysis by UBS suggesting a swap transaction cost of between 10bppa and 23bppa depending on whether debt was issued internationally or domestically (with the former requiring more expensive cross currency swaps). We were

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143 The Commission could potentially continue to have a common period for estimating the DRP which would be added to the base rate of interest (if this was considered to be more practical).

144 Commerce Commission, Cost of capital for the UCLL and UBA pricing reviews, p. 31

145 CEG, WACC parameters in the UCLL and UBA draft decision, p.34.

also critical of the way in which the Commission had arrived at its then 4bbpa estimate of costs.[146]

> *The Commission estimates swap costs as the difference between the bid and ask prices for a 7 year swap as reported by Bloomberg on a single day (1 August 2014). The Bloomberg formulae used to generate the bid and ask prices are:*[147]
>
> - *=BDH("NDSWAP" & C12 & " INDEX","ASK",C11,C11,"Dts=H"); and*
> - *=BDH("NDSWAP" & C12 & " INDEX","BID",C11,C11,"Dts=H").*
>
> *The Commission estimates this difference at 8 basis points and then divides this by 2 to get 4 basis points which is its estimates of costs.*
>
> *We do not consider that this is a reasonable approach to estimating the transaction costs associated with the relevant swap strategy. We understand that interest rate swaps are priced by banks as a spread to the mid-point a to cover credit & execution costs as per the UBS and Evans and Peck approaches.*
>
> *In practice, the quoted bid/offer spread is not relevant to the transaction costs of swaps. Swaps are generally quoted to a customer as 'x' number of basis points over/under the mid rate. The above Bloomberg data recovered by the above formulae is simply the best bid/offer at the end of day. The correct approach is to build up transaction costs as: 'x' for credit costs + 'y' for liquidity/execution costs = 'z' swap transaction cost.*

239. In its final decision, the Commission did not address the points we raised and, rather, simply states:[148]

> *Network Strategies also previously noted that CEG's swap costs estimate of 10 to 13 basis points was based on Australian data, but ideally any estimate for this parameter should be based on New Zealand data.64 We agree that New Zealand specific evidence regarding observed swap costs would be more persuasive – however, no such evidence has been provided by either Chorus or CEG.*
>
> *…*
>
> *No new evidence has been presented on the costs of an individual swap, so we have continued to assume a cost of four basis points for one swap. This results in*

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146 CEG, WACC parameters in the UCLL and UBA draft decision, p.36.

147 These can be used to download the prices into excel – where the C12 reference is 7 years and the C11 reference is 1/09/2014

148 Commerce Commission, Cost of capital for the UCLL and UBA pricing reviews, pp. 30-31

an allowance of eight basis points in total on the cost of debt, based on the use of two swaps.

240. In our view, the Commission should seek its own expert advice from banking practitioners on the cost of swap transactions including an assessment of our proposed methodology. We do not consider that it is likely that swap transaction costs in New Zealand will be lower than in Australia.

241. The Commission has requested data from businesses that may shed some light on this issue. However, it should be noted that bank pricing of interest rate swap transactions can, on a case by case basis, recover transaction costs explicitly in fees or implicitly in the form of a margin built into the fixed leg of the swap (higher/lower fixed rate for pay/receive fixed rate swaps). Therefore, the explicitly reported swap transaction costs should be regarded as a minimum estimate with the actual costs paid (relative to mid-market swap rates) potentially being materially higher.

6.6.2 Issuance costs

242. We note the Commission's statement that it plans to revisit debt transaction costs.[149]

The cost of capital IMs recognises that fees and costs associated with prudent debt issuance and refinancing are legitimate expenses that should be compensated for, and currently provides a 35 basis points p.a. allowance.

When the IMs were originally set we requested confidential details of costs incurred by regulated suppliers with respect to raising debt capital.[54] We intend to request this information in December from suppliers again to assist with estimating debt issuance costs.

6.6.2.1 Amortisation of upfront costs

243. We consider that, when the Commission performs any analysis, it will need to amortise upfront (non-recurring) the debt issuance costs over time.[150] This is also consistent with the advice of the Commission's advisor on cost of capital issues, Professor Martin Dr Lally, as we discuss further below.

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149 Commerce Commission update paper on the cost of capital, § 2.41 to § 2.42

150 This amortisation uses a simple annuity formula, expressed in the following formula where A is an annuity and C is the present value (or upfront) cost:

$$A = C\frac{r(1+r)^T}{(1+r)^T - r}$$

244. By way of example, PwC in its 2010 report for the ENA,[151] shows that across a number of New Zealand issues, mean issuance costs as a percentage of the issue amount were 1.97%. The median was 2.00%. This evidence was considered by the Commission in coming to its Input Methodologies estimate for debt issuance costs of 0.35%.

245. If we assume that all issuance costs are upfront (as noted below, a conservative assumption) then at a 10% cost of capital, the mean issue amount of 1.97% gives rise to an amortised 0.32% per annum over 10 years.

246. Amortising using a cost of capital is also consistent with the advice of Dr Lally that the Commission has regard to in the Input Methodologies Reasons paper. Dr Lally states:[152]

> *Lee et al (1996, Table 2) suggests an average issue cost for utilities of about 1.3% (by averaging over issues of at least US$40m). Discussion with New Zealand investment bankers indicates similar figures here. Annualisation of this figure requires a bond term. Using a ten year bond term, the equivalent annual figure would be about .20%. If a three year term was used, to match the assumed frequency of price resetting, then the equivalent annual figure would rise to .50%. However, triennial refinancing is likely to be inferior to longer-term debt coupled with a swap contract to ensure exposure to triennial interest rate movements (with swap costs added to the issue costs). This suggests an allowance of about .30%.*

247. Dr Lally is clearly using a cost of capital to annualise debt issuance costs, since without a cost of capital he could not annualise 1.30% over three years to 0.50%, or the same amount recovered over 10 years to 0.20%.[153]

6.6.2.2 New Issue Premium

248. Firms typically issue corporate debt at a discount to the prevailing rates in secondary bonds markets. This 'new issue premium' has been documented in other markets including in Australia and the US, with the discount to secondary market rates in the vicinity of 27bp.[154] To the best of our knowledge, there is no similar study of bond

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151 PwC, Submission on the Cost of Capital Material in the Commerce Commission's Draft Input Methodologies Determinations and Reasons Papers, August 2010, p. 34

152 Lally, *The Weighted Average Cost of Capital for Gas Pipeline Businesses*, 28 October 2008, p. 87. We note that Dr Lally's debt issuance assumption of 1.30% is different from the recent New Zealand evidence presented by PwC. However, we consider that PwC's estimates are preferable on account of being more recent and more relevant to the New Zealand regulatory context.

153 The quote above also reveals that Dr Lally considers swap costs to be about 10 bppa – the difference between his suggested allowance of 0.30% (inclusive of swap costs) and his calculated allowance on 10 year debt term of 0.20%. This is germane to our discussion of the transactions costs of swaps at section 3.4 below.

154 See, CEG, The New Issue Premium, December 2014. Section 4 of this report provides a literature survey and section 5 provides Australian empirical estimates of around 27bp.

issuance by New Zealand firms, but there is no reason why the same forces that lead to a new issue premium for foreign issuers would not apply for New Zealand issuers.

249. The Commission should thus include an analysis of, and allowance for, the new issue premium in the benchmark cost of debt.

7 Use of split WACC

250. The Commission has raised the option of applying a "split WACC" approach allowing for a different WACC for existing assets and new assets included in the CPP price path.[155] However, the only justification for applying a different cost of capital to:

- assets invested under a CPP; vs
- assets being simultaneously invested in by other firms under a DPP (or that same firm if they did not apply for a CPP);

is if the act of applying for a CPP changes the cost of capital. We do not believe that this is the case, and are unaware of any view to the contrary.

251. To the extent that the CPP and DPP WACC diverge under the current IMs, this is evidence that the IMs are not accurately estimating the cost of capital. In this regard, we refer back to the analysis made:

- in section 4, where we note that holding the TAMRP fixed at 7.0% while allowing the risk free rate to vary - sometimes wildly - with prevailing rates causes the allowed cost of equity to vary much more than the actual cost of capital. This approach also causes the allowed cost of equity to vary much more in New Zealand than it would under standard international regulatory policy; and
- in section 6 (especially sections 6.1.1 and 6.3), where we note that, under a benchmark efficient debt management strategy, the cost of debt would be relatively stable over a five year period from the start of a DPP. This reflects the fact that, under the three candidates for a benchmark debt management strategy described at paragraph 165 above, the cost of debt (and therefore the allowance for the cost of debt) would be very stable over the 5 years from the start of a DPP.

252. The above observations suggest that the WACC, when accurately measured, should be stable over the period of the DPP. If the DPP WACC is estimated accurately then there is little need for a different WACC to be applied in a CPP. The fact that a very different WACC would be applied today under the current IMs is evidence that the current IM WACC calculation is not accurate.

253. By way of example, the current IM DPP allowance for the cost of debt is, at least implicitly, based on an assumed use of interest rate swaps to lock in base rates of interest at the beginning of a DPP for the subsequent 5 years. If a firm actually followed this DPP benchmark strategy, its base rates of interest would be locked in for the next five years. However, the current IMs would (unamended) assume that the firm was able to reset interest rates to reflect prevailing rates at the time of applying for a CPP. In the current context this is a lower interest rate than at the beginning of the DPP. There is, of course,

[155] Commerce Commission update paper on the cost of capital § 3.72.

no method to allow a firm to do this – if it locks in base rates of interest for 5 years, those contracts are binding and cannot simply be dishonoured just because a firm is applying for a CPP.

254. The fundamental problem with the divergence between IM DPP and CPP cost of debt allowance lies with the fact that the IMs were not structured with a clear and internally consistent link back to a well-defined debt management strategy. If they had been structured in a manner consistent with an actual debt management strategy, then the kind of tension that we are observing at the moment would not exist because the DPP and CPP cost of debt would align to a single well defined debt management strategy and would, therefore, deliver the same cost estimate/allowance.

255. In short, for the reasons set out in section 4 (equity) and section 6 (debt), we consider that the rapid reduction in the IM cost of equity and IM cost of debt over the last 2 years has resulted in the prospective allowance for a firm considering a CPP being materially less than their actual costs of both equity and debt.

256. In light of this conclusion, we consider that the Commerce Commission should adopt a policy of:

- setting the CPP WACC equal to the DPP WACC; and
- focusing all reform efforts on establishing a process for estimating the DPP WACC that is as accurate as possible.

257. The first policy will make the CPP and DPP WACC the same. The second policy will mean that the DPP WACC will also be much more stable over time than the current IM WACC.

8 Inflation

258. This section examines what the objective(s) of inflation indexation should be (section 8.1) and how to most accurately forecast inflation (section 8.2). This drafting summarises more detailed findings in a companion paper solely addressing these issues.

8.1 Targeting a nominal vs a real return

259. The Commission states in its problem definition paper that:

> *124. 2015, Vector questioned the principle of indexing the RAB in general, which is also relevant in the changing technological environment, as mentioned in the emerging technologies chapter. We therefore welcome views on the merits of RAB indexation in general, and the specific rules for doing so in particular, as part of the IM review.*
>
> *However, we consider it is important to point out to interested parties the* ***natural hedge inherent in the current approach****. For example, if forecast inflation is higher than actual, then the RAB revaluation (based on forecast inflation) will be higher than if actual inflation was used, which would depress allowed revenue (since we subtract revaluation amounts from allowed revenue). Conversely, the return on capital will be higher (since a higher nominal WACC based on forecast inflation is applied to the RAB), which increases allowed revenue. Since these effects go in opposite directions, the disparity between forecast and actual inflation should not have a major impact, and suppliers are arguably left largely whole. [****Emphasis added.****]*

260. The Commission repeats a similar sentiment in its cost of capital update paper:

> *We also note the interactions that annual updating of the cost of capital will have on the RAB indexation rules. The problem definition paper noted the* ***existence of a natural hedge*** *in the current approach which uses a nominal WACC based on prevailing rates prior to the start of the price path. The interactions of the WACC with the rules for RAB indexation would therefore need to be considered in the event of any change in approach for setting the WACC.*

261. The ENA asked us to examine the issue of inflation compensation, and we have concluded that the natural hedge referred to above does not exist – at least in relation to the cost of debt. To see this, observe that if a business issues plain nominal debt at the nominal rate determined by the Commission at the beginning of a DPP, then that will be their nominal cost of debt regardless of the actual CPI inflation that is subsequently observed.

262. By way of example, if the prevailing cost of debt is 5% in nominal terms at the beginning of a DPP and a business borrows (enters into interest rate swap contracts) at this rate then

the business is bound to pay its lenders (counterparties) 5%. However, the current IMs do not provide a 5% return in cash-flows. Rather the current IMs provide:

- a 5-X% return in cash-flows - where "X"% is the Commission's forecast of inflation; plus
- a "Y"% indexation of the RAB at the time of the next DPP – where "Y"% is actual inflation.

263. The business will consequently receive actual nominal compensation that is equal to 5% plus Y%-X% - where Y%-X% is the Commission's inflation forecast error. For example, if inflation is forecast to be 2%, but is actually 0%, then the business will only receive a nominal return of 3% - despite having nominal contracts that require it to pay 5%.

264. This inflation forecast error can be eliminated by simply setting both X and Y to be equal to zero. That is, removing revaluations for the RAB in both the Commission's financial model and the RAB roll forward. However, this is not the only way to remove inflation forecast error. So long as the rate of revaluation provided in the RAB roll-forward is the same as that assumed in the Commission's financial model inflation forecasting will be removed.

265. We consider that removing inflation forecasting error is unambiguously the correct approach for that portion of the RAB which is debt funded - assuming that businesses fund themselves with nominal debt. In addition, funding with nominal debt appears to be the standard practice of businesses and, therefore, can be assumed to be efficient. On this basis, we recommend that inflation forecast error should be removed from the RAB.

266. We also note that the case for eliminating inflation forecast error is more ambiguous for that portion of the RAB that is equity funded. Equity contracts do not promise either a real or a nominal return and, consequently, do not provide guidance as to what the regulatory policy should be.

8.2 Correct measure of forecast inflation

267. The assumption in the IMs that inflation will return to the midpoint of the RBNZs target range over the short term is fairly problematic. Since the global financial crisis, actual inflation in developed countries have been below central bank targets. With monetary policy rates at historic lows, there is a heightened perception amongst investors of the potential for the economy to fall into a deflationary trap.

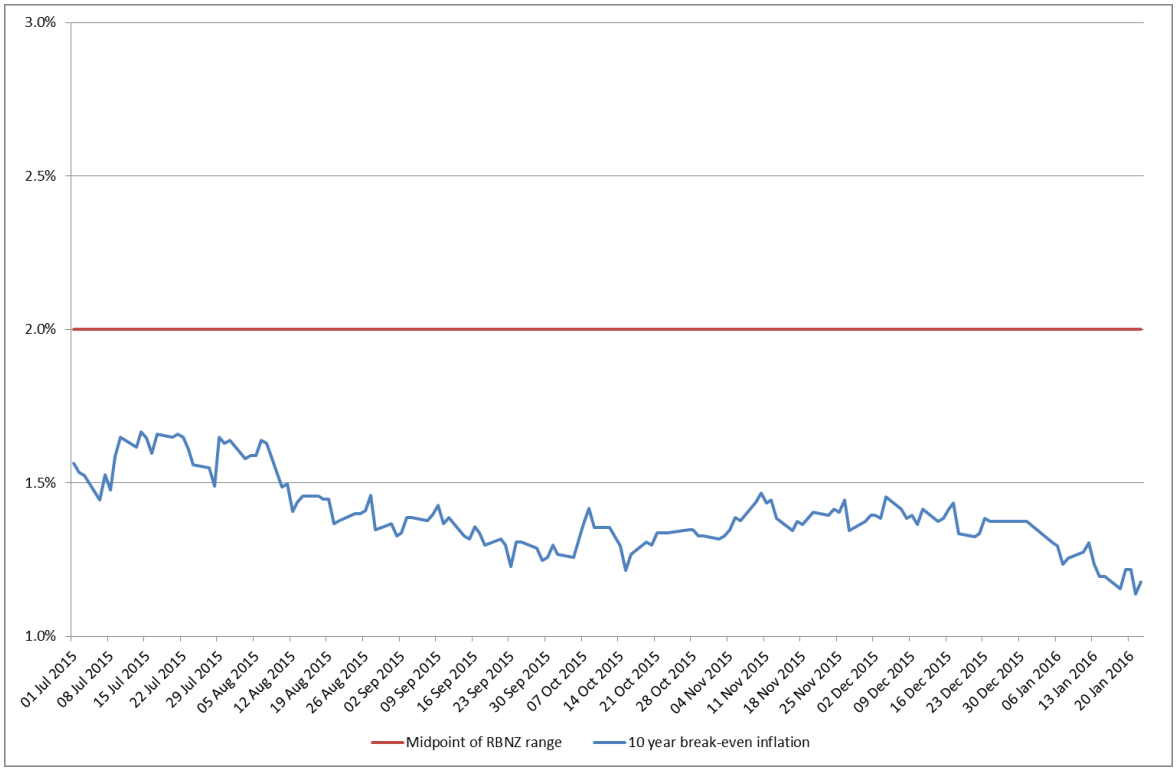
268. This is also consistent with market-based estimates of expected inflation derived from the difference between the yield on nominal and inflation indexed debt issued by the New Zealand Government.

269. This difference is a measure of investors' inflation expectations because, if investors believed that inflation would be higher/lower than this difference, they would rationally sell/buy nominal debt and buy/sell inflation indexed debt. For this reason, the difference

between nominal and CPI indexed debt is known as the 'break even' inflation rate - the rate at which there is no difference between a strategy of holding nominal as opposed to CPI indexed debt.

270. Consistent with the discussion above, break-even inflation rates are well below the mid-point of central bank target ranges globally, and New Zealand is no exception. Figure 9 below shows the break-even inflation rate over a 10 year horizon implied by New Zealand Government bond yields. This is compared to the midpoint of the RBNZ range.

Figure 9: Break even inflation vs midpoint of RBNZ target range



Source: RBNZ hb2 daily publication, CEG analysis.

271. Based on the break-even inflation rate shown above, it appears that investors in bond markets do not expect inflation to return to the midpoint of the RBNZ even over 10 years (let alone 5 years). This suggests that the application of the IMs in the current environment would result in an inflation forecast that is materially below market expectations. Assuming that market expectations are accurate, applying a higher IM based inflation forecast will lead to lower compensation than is appropriate (in both real and nominal terms).

272. There currently is no 5-year CPI indexed NZGB (NZ Government bond), this makes it difficult to arrive perfectly accurately a break-even inflation rate at a 5-year horizon. However, even with no new issuance, at the time of the next DPP, the 2025 CPI indexed NZGB will have an approximately 5-year remaining term. We therefore consider that the

Commission should revise the IMs to state that, if an inflation forecast is still required, the Commission will have regard to breakeven inflation rates at the time of the next DPP.

Appendix A Evidence from other models

A.1 Low beta bias in the simplified Brennan-Lally CAPM (SBL-CAPM)

273. We are cognisant of the Commission's view that the simplified Brennan-Lally CAPM (SBL-CAPM) has an important and ongoing role to play in the estimation of the rate of return.

274. The Sharpe CAPM, from which the SBL-CAPM is derived, is also commonly used in other infrastructure revenue regulatory frameworks. SIRCA states that:

> *"With regard to the CAPM, its efficacy comes from the test of time. This model has been around for in excess of half a century and has become the standard workhorse model of modern finance both in theory and practice. The CAPM's place as the foundation model is justifiable in terms of its simple theoretical underpinnings and relative ease of application. The competing alternatives, which build upon the CAPM, serve to add a level of complexity to the analysis. It remains that case that the majority of international regulators currently base their decisions primarily on the CAPM framework"*[156].

275. However, the model has theoretical weaknesses – most notably the unrealistic assumption that investors can borrow and lend at the risk free rate in the quantities in which they wish to engage.

276. In arriving at an estimate of the cost of equity using the capital asset pricing model (CAPM) it is necessary to populate the below equation:

Equation 1

277. $E[R_i] = E[R_{\beta=0}] + \beta_i \cdot (E[R_m] - E[R_{\beta=0}])$,

278. where $E[R_i]$ is the expected return on the benchmark firm, $E[R_{\beta=0}]$ is the expected return on zero beta equity (the 'risk free' rate of return), β_i is the beta for the asset and $E[R_m]$ is the expected return on the market portfolio.

279. Given the unrealistic nature of the assumptions underpinning equation (1) (especially if implemented with the government bond rate as the proxy for $E[R_{\beta=0}]$), it is prudent to have regard to empirical evidence of its performance in explaining observed returns in asset markets. This has been done in different countries at different times and a near universal finding of these tests is that:

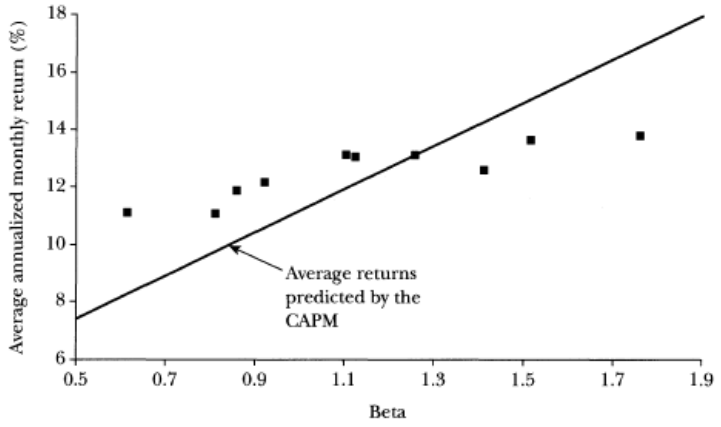
156 McKenzie M and G Partington Report to the AER; Part A: Return on Equity, *T*he *Securities Industry Re*search *C*entre of *A*sia-*Pa*cific *(SIRCA) Limited*, October, 2014 page 9.

- If $E[R_{\beta=0}]$ is set equal to the government bond rate; and
- if regression estimates of beta are used; then
- the estimated cost of equity tends to under/over-estimate the actual returns for assets that have regression betas of less/more than 1.0.

280. This is depicted in the figure below from Fama and French (2004).[157] The figure shows clearly the difference between the actual relation between a stock's regression based beta and its return compared to the relation predicted by the Sharpe CAPM (analogous to the SB-L CAPM)[158] if the regression beta was truly equal to investors' perceived beta.

Figure 10: Average annualised monthly return versus beta

Figure 2
Average Annualized Monthly Return versus Beta for Value Weight Portfolios Formed on Prior Beta, 1928–2003



Source: Fama and French (2004)

281. In Figure 10, the Government bond rate defines the intercept of the CAPM security market line (SML = the upward-sloping line) based on regression betas (i.e., this is the line that should exist if the government bond rate was the best proxy for $E[R_{\beta=0}]$). The slope of the line is defined by the market risk premium measured relative to the Government bond rate.

282. It is clear from Figure 10 that the actual relationship between beta and market returns is much flatter than that predicted by Equation 1 implemented using regression based betas

157 Fama, Eugene F. and Kenneth R. French, 2004, "The capital asset pricing model: Theory and evidence," The Journal of Economic Perspectives 18, pp. 25-46.

158 As noted previously the predicted relationship between beta and returns is steeper still in the SB-LCAPM because the tax adjusted risk free rate is lower and the TAMRP higher.

as the proxy for investors' perceived beta and government bond rates as the proxy for $E[R_{\beta=0}]$.

283. Precisely the same relationship was found in each of the studies that were reviewed by Professor Bruce Grundy in a report prepared for Envestra (2011)[159]. The seminal studies of this kind were performed by Fama and Macbeth (1973)[160] and Black, Jensen and Scholes (1972)[161]. In relation to more recent tests, Fama and French (2004) state:

> *Fama and French (1992) also confirm the evidence (Reinganum, 1981; Stambaugh, 1982; Lakonishok and Shapiro, 1986) that the relation between average return and beta for common stocks is even flatter after the sample periods used in the early empirical work on the CAPM. [Note that in this quote the reference to 'beta' is a reference to beta estimated using regression techniques]*

284. This is a general finding of the empirical tests of the CAPM as described by Fama and French (2004):

> *The Sharpe-Lintner CAPM predicts that the portfolios plot along a straight line, with an intercept equal to the risk-free rate, Rf, and a slope equal to the expected excess return on the market, E(RM)- Rf. We use the average one-month Treasury bill rate and the average excess CRSP market return for 1928-2003 to estimate the predicted line in Figure 2. Confirming earlier evidence, the relation between beta and average return for the ten portfolios is much flatter than the Sharpe-Lintner CAPM predicts. The returns on the low beta portfolios are too high, and the returns on the high beta portfolios are too low. For example, the predicted return on the portfolio with the lowest beta is 8.3 percent per year; the actual return is 11.1 percent. The predicted return on the portfolio with the highest beta is 16.8 percent per year; the actual is 13.7 percent.*

285. More recently, Campbell and Vuolteenaho (2004)[162] have estimated that the return on zero beta equity is above not only the government bond rate, but also above the market return. That is, lower equity betas are actually associated with higher returns rather than the opposite as predicted by the single period CAPM models (Sharpe and Black).

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159 Grundy, Calculation of the Cost of Capital - A Report for Envestra, February 2011.

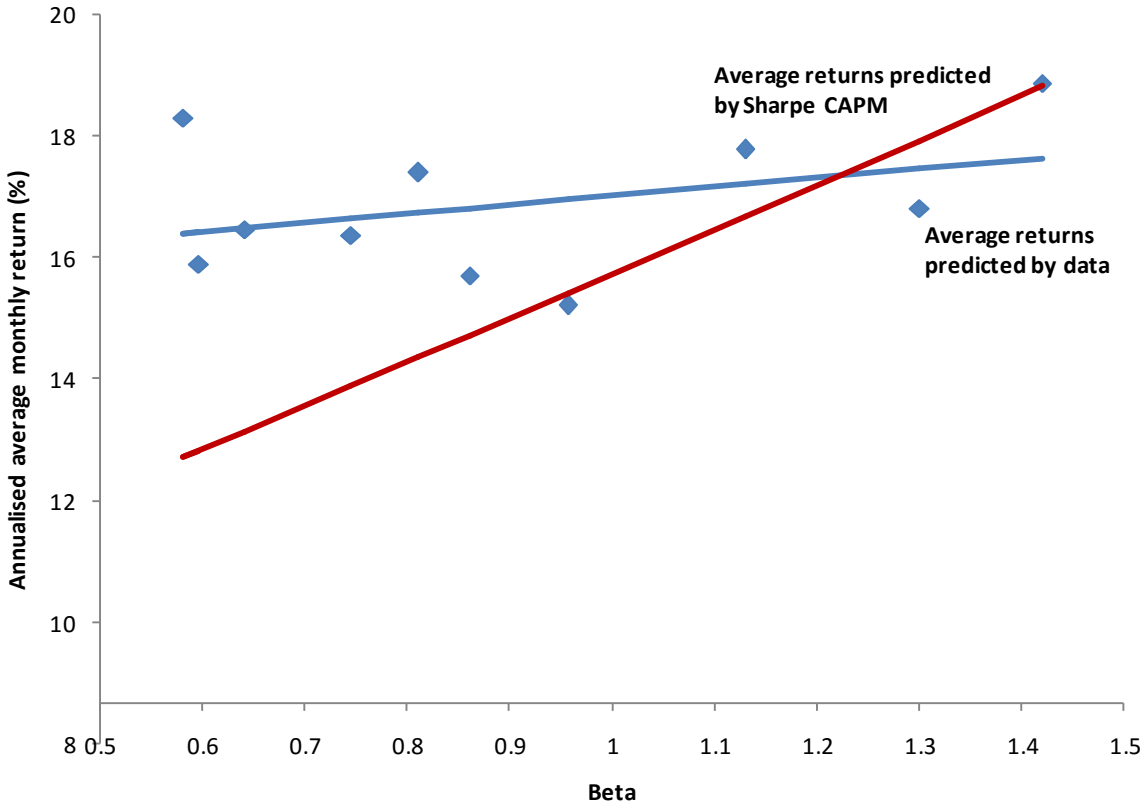
160 Fama, Eugene F. and James D. MacBeth, (1973), "Risk, Return, and Equilibrium: Empirical Tests," Journal of Political Econoour, 81 (3), 607–636.

161 Black, Fischer, Michael C. Jensen and Ourron Scholes, (1972), "The Capital Asset Pricing Model: Some Empirical Tests," in Studies in the Theory of Capital Markets, Michael C. Jensen, ed., New York: Praeger, 79-121.

162 Campbell, John Y. and Tuomo Vuolteenaho, 2004, "Bad beta, good beta," American Economic Review 94, pp. 1249-1275.

286. In 2008, CEG replicated the Fama and Macbeth study using 44 years of monthly Australian return data from 1964 to 2007.[163] We found the same results as other researchers. Figure 11 below summarises the key empirical results of our study.

Figure 11: Reproduction of Figure 1 from CEG 2008: Sharpe-Lintner CAPM Predictions vs Actual Relationship in Australian Capital Markets



Source: CEG analysis

287. The flatter (blue) line in Figure 11 is the actual relationship between beta and stock returns in the Australian market. The steeper (red) line is the relationship predicted by the Sharpe-CAPM using the Government debt as the proxy for the risk free rate. The flatter actual relationship is consistent with the findings of other researchers in other markets, namely, that a model which estimates $E[R_{\beta=0}]$ as including a premium to the return on Government debt is more accurate than one which assumes that $E[R_{\beta=0}]$ is equal to the return on government debt.

288. This is a robust statistical result: The expected return on zero beta equity is statistically significantly greater than the rate on government bonds at the 99.7% confidence level[164].

[163] Hird, Grundy, and Young, *Estimation of, and correction for, biases inherent in the Sharpe CAPM formula*, Competition Economists Group, A report for the Energy Networks Association Grid Australia and APIA, 2008.

289. As described in the body of the 2008 CEG report, these results are not sensitive to the use of only the 300 largest stocks in the data set. That is, no matter how one 'cuts the data' the same result is found – zero beta equity earn significantly more than the government bond rate. This result is a direct contravention of the Sharpe-Lintner CAPM formula when assuming the risk free rate is proxied by the government bond rate.

290. In essence, stocks with low beta estimates earn higher returns than are predicted by the Sharpe CAPM, and stocks with high beta estimates earn lower returns than have been predicted by the Sharpe CAPM. The poor empirical performance of the Sharpe CAPM likely occurs for two reasons. First, risks other than systematic risk are incorporated into share prices (in particular, stocks with a high book-to-market ratio persistently earn higher returns than stocks with a low book- to-market ratio). Second, the common measurement of systematic risk – the regression coefficient of excess stock returns on market returns – is an imprecise measure of risk.

291. In his separate survey of the finance literature, (attached at Appendix C), Professor Grundy concludes that[165]:

> *I know of no published study that has empirically tested the Sharpe CAPM and failed to reject the Sharpe CAPM.*

292. It, it is important to note that the context of this quote is that the implementation of the Sharpe CAPM using *regression betas* and the government bond rate as the proxy for $E[R_{\beta=0}]$ is rejected.

A.2 Correcting for low beta bias using the Black CAPM

293. In the same paper from which the above quote is taken, Professor Grundy surveys the empirical literature, including the full set of papers the AER[166] referred to in support of the use of the CAPM rather than the Fama French model. In addition to Fama and Macbeth (1973) and Black, Jensen and Scholes (1972) already referenced, the papers surveyed by Grundy (and relied on by the AER to reject the use of the Fama French model) are:

    i. Ferson, Sarkissian and Simin, 1999, "The alpha factor asset pricing model: A parable," Journal of Financial Markets 2, pp. 49-68

    ii. Lo, Andrew W. and A. Craig MacKinlay, 1990, "Data-snooping biases in tests of financial asset pricing models," Review of Financial Studies 3(3), pp. 431-467.

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164 That is, based on the Australian data for the 300 largest firms we can be 99.7% certain that zero beta equity will earn more than the risk free rate. That is, we can be 99.7% confident that the Black CAPM is a better description of reality than the Sharpe CAPM implemented assuming $E[R_{\beta=0}]$ equals the government bond rate.

165 Grundy, Calculation of the Cost of Capital - A Report for Envestra, February 2011.

166 AER, Jemena Gas Networks, Access arrangement proposal for the NSW gas networks 1 July 2010 to 30 June 2015, Draft and Final Decisions

iii. Roll, Richard, 1977, "A critique of the asset pricing theory's tests Part I: On past and potential testability of the theory," Journal of Financial Economics 4(2), pp. 129–176.

iv. Roll, Richard and Stephen A. Ross, 1994, "On the cross-sectional relation between expected returns and betas," Journal of Finance 49(1), pp. 101-121.

v. Schrimpf, Andreas, Michael Schroder and Richard Stehle, 2007, "Cross-sectional tests of conditional asset pricing models: Evidence from the German stock market," European Financial Management 13(5), pp. 880–907.

vi. Ang, Andrew and Joseph Chen, 2007, "CAPM over the long run: 1926–2001," Journal of Empirical Finance 14, pp. 1–40.

vii. Grauer, Robert R. and Johannus A. Janmaat, 2010, "Cross-sectional tests of the CAPM and Fama–French three-factor model," Journal of Banking & Finance 34, pp. 457–470.

viii. Gregory, Alan and Maria Michou, 2009, "Industry cost of equity capital: UK evidence," Journal of Business Finance & Accounting 36(5) & (6), pp. 679–704.

ix. Black, Fischer, 1993, "Beta and return," Journal of Portfolio Management, 1993, 20(1), pp. 8–18.

x. Schwert,G. William, 2003, "Anomalies and market efficiency," in Handbook of the Economics of Finance, editors G. Constantinides, M. Harris and R. Stulz, Elsevier Science, ch. 15, pp. 937–972.

xi. Morana, Claudio, 2009, "Realized betas and the cross-section of expected returns," Applied Financial Economics, 19, pp. 1371-138.

xii. Daniel, Kent, Sheridan Titman and K.C. John Wei, 2001, "Explaining the cross-section of stock returns in Japan: factors or characteristics', Journal of Finance, 56(2), pp. 743–767

xiii. Da, Zhi, Re-Jin Guo and Ravi Jagannathan, 2009, "CAPM: Interpreting the evidence," NBER working paper 14889.

xiv. Kothari, S., Jay Shanken and Richard G. Sloan, 1995, "Another look at the cross-section of expected returns," Journal of Finance, 50(1), pp. 185–224;

294. Professor Grundy concludes that, all of these papers support the use of the "Black CAPM' and that the average estimate in the empirical literature is that the 'zero beta premium' is around half of $E[R_m]$ less the government bond rate. That is, the "MRP" measured relative to the required return on zero beta equity is around half the MRP measured relative government bond rates. Specifically, Professor Grundy's review of the finance literature suggests that, on average:

Equation 2

$$\frac{E[R_m] - E[R_{\beta=0}]}{E[R_m] - Govt.\,bond\ rate} = 0.511$$

295. More recently, other researchers have examined Australian stock market data and reached broadly similar conclusions. In particular, SFG (2014) estimated that $\frac{E[R_m]-E[R_{\beta=0}]}{E[R_m]-Govt.bond\ rate} = 0.48$ – very similar to the average of Grundy's survey of the literature.[167]

296. On this basis, and consistent with Equation 2 above, we consider that the best estimate of the relationship between $E[R_{\beta=0}]$, the government bond rate and $E[R_m]$ is given by:

Equation 2

$$\frac{E[R_m] - E[R_{\beta=0}]}{E[R_m] - Govt.\,bond\ rate} = 0.5$$

297. Rearranging this equation so that $E\left[R_{\beta=0}\right]$ is on the left hand-side and $E\left[R_{\beta=0}\right]$ is expressed as a premium above the government bond rate gives:

Equation 2 (rearranged)

$$E\left[R_{\beta=0}\right] = \text{Govt. bond rate} + 0.5 * (E[R_m] - \text{Govt. bond rate})$$

298. This states that $E\left[R_{\beta=0}\right]$ is equal to the government bond rate plus half of the difference between $E[R_m]$ and the government bond rate. Substituting Equation 2 into Equation 1 (the CAPM formula) gives the 'Black CAPM' equation:

Equation 3

$$E[R_i] = \text{Govt. bond rate} + 0.5 * (E[R_m] - \text{Govt. bond rate}) * (1 + \beta_i)$$

299. The effect of this, relative to simply setting $E\left[R_{\beta=0}\right]$ equal to the government bond rate in equation (1), is to reduce the weight given to β_i by increasing the risk free rate ($E\left[R_{\beta=0}\right]$) and reducing the MRP ($E[R_m] - E\left[R_{\beta=0}\right]$) by the same amount.

300. Thus, in implementing the Black CAPM, we had regard to the empirical finance literature and has concluded that the best estimate of the zero beta rate of return is above the government bond rate by around half of the difference between the government bond rate and $E[R_m]$.

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167 SFG, Cost of equity in the Black Capital Asset Pricing Model, May 2014. See paragraph 102 for source of the numbers in the calculation = (12.40-9.36)/(12.40-6.02)=3.34%/6.38%=0.48.

301. Our analysis suggests that the results from the Black CAPM should be used to determine an adjustment factor that can then be used to correct for the biases inherent in the SBL-CAPM. In addition, we consider that appropriate regard should be had for the recent evidence, from Australia, about the empirical performance of the Sharpe CAPM and the Black CAPM.

A.2.1 Recent Australian empirical evidence on the Black CAPM

302. Stocks with low beta estimates earn higher returns than are predicted by the Sharpe CAPM, and stocks with high beta estimates earn lower returns than are predicted by the Sharpe CAPM. This empirical result has been documented in the literature for over 50 years. The Sharpe CAPM also tends to underestimate the mean returns to low-beta assets, value stocks and, in the US and some other countries, low-cap stocks. A value stock is a stock that has a high book value relative to its market value or, identically, a low market value relative to its book value. A growth stock is a stock that has a low book value relative to its market value or, identically, a high market value relative to its book value.

303. NERA Economic Consulting investigated the empirical performance of the SL-CAPM and the Black CAPM models, applying both in-sample and out-of-sample tests. In relation to the in-sample tests, NERA reported that[168]:

> *"The data indicate that there is a negative rather than a positive relation between returns and estimates of beta. As a result, the evidence indicates that the SL-CAPM significantly underestimates the returns generated by low-beta portfolios and overestimates the returns generated by high-beta portfolios. In other words, the model has a low-beta bias. The extent to which the SL-CAPM underestimates returns to low-beta portfolios is both statistically and economically significant.*
>
> *As an example, we estimate that the lowest-beta portfolio of the 10 portfolios that we construct to have a beta of 0.54 – marginally below the midpoint of the AER's range for the equity beta of a regulated energy utility of 0.4 to 0.7. Our in-sample results suggest that the SL-CAPM underestimates the return to the portfolio by* ***4.90 per cent per annum.****" (Emphasis added)*

304. Similar results were found by NERA in relation to its out-of-sample tests. NERA reported that the Black CAPM corrects for the low beta bias that is intrinsic to the SL-CAPM. Specifically, one cannot reject the hypothesis that the Black CAPM and the naïve model generate estimates of the return on equity that are unbiased. The naïve model was formed by setting the equity beta equal to one in the SL-CAPM.

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168 NERA; Empirical Performance of the Sharpe-Lintner and Black CAPM, A Report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, AusNet Services, Citipower, Energex, Ergon Energy, Powercor, SA Power Networks and United Energy; February 2015, page 54.

A.3 Implementation of the Fama-French model

305. This model provides separately for additional returns caused by exposure to the value premium and the size premium. The value premium is measured by the difference between the return to a portfolio of high book-to-market stocks and the return to a portfolio of low book-to-market stocks (HML). The size premium is assessed as the difference between the return to a portfolio of small-cap stocks and the return to a portfolio of large-cap stocks (SMB).

306. Empirical studies in the US and Australia have confirmed that:

> *"The Fama-French model has the advantage of providing an unambiguously better fit to the data than the Sharpe-Lintner CAPM."*[169]

307. This model, in relation to which a Nobel prize[170] has been awarded, is newer than the other two CAPM models. Despite being the newer model, since the turn of the century the Fama French Three Factor model has been part of the evidence in a number of state regulatory proceedings in the United States. By way of example, an affidavit from Mr Ronald L. Knecht, the State Controller (chief fiscal officer) of the State of Nevada, provides relevant commentary as follows[171]:

> *While there is still some apprehension about the use of the FF3F [Fama French three factor] Model it has been recognised in at least three states, Massachusetts, Delaware and Nevada, when used in conjunction with other models to produce an arithmetic mean as an estimate. This approach ensures that factors that are ignored by one model are adequately addressed. Because the FF3F model is fairly new relative to other models I am not aware of any jurisdiction that has endorsed it exclusively or adopted allowed rates of return based expressly on it. Instead, the American tradition is for regulatory decisions to review (or even just list) all the evidence in the record and then, subjectively balancing the merits and results of all of it, to arrive at a final conclusion as either a range of reasonableness or a point estimate.*

308. The book-to-market factor has been, on average, over time and across markets persistently positive. It is an empirical fact that stocks with positive exposure to this factor have earned higher returns than stocks with negative exposure to this factor, even after

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169 SFG Consulting; The required return on equity for regulated gas and electricity network business, Report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks; 6 June 2014, page 9.

170 Eugene Fama is the 2013 recipient of the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel the Nobel Prize in Economics), Eugene F. Fama - Facts". *Nobelprize.org*. Nobel Media AB 2014. Web. 15 Mar 2015. <http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2013/fama-facts.html>

171 Witness statement, Ronald L. Knecht, 19th June 2015, paragraph 4.6, page 3.

controlling for systematic risk exposure[172]. This empirical fact could result from the HML factor being a proxy for a priced risk factor or a statistical anomaly.

309. As such, if the Commerce Commission determines that the SBL-CAPM will be used as the central model, then the Fama-French evidence, (and all evidence relevant to beta), should be used to determine the beta estimate which results in an allowed rate of return on equity that best meets the allowed rate of return objective. The input methodologies (IM) paper should explain what information was used to estimate beta, and how it was used. The final IM paper should also set out the reasons which underpin the relative weight that has been assigned to each piece of information.

A.4 Dividend discount model

310. The Dividend Discount Model (DDM) is also referred to as the Discounted Cash Flow (**DCF**) Model. The Federal Energy Regulatory Commission of the United States of America has noted that: [173]

> *"The DCF model is a well-established method of determining the equity cost of capital, (See Illinois Bell Telephone Co. v FCC, 988 F.2d 1254, 1259 n. 6 (D.C.Cir. 1993)"*

and

> *"The DCF method 'has become the most popular technique of estimating the cost of equity, and it is generally accepted by most commissions.* ***Virtually all cost of capital witnesses use this method, and most of them consider it their primary technique.****" Quoting J. Bonbright et al., Principles of Public Utility Regulation, and other methods such as the risk premium model have not been used by the Commission for almost two decades." (Emphasis added)*

311. The DCF model or DDM approaches the task of estimating the required rate of return in a different way:

> *"The dividend discount model approach has the advantage of not requiring any assumptions about what factors drive required returns – it simply equates the present value of future dividends to the current stock price. It is also commonly used in industry and regulatory practice. Whereas the Guideline materials identify some concerns with the dividend discount approach, the specification adopted in this report addresses most of those concerns. Consequently, our view*

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172 NERA Economic Consulting Review of cost of equity models: A report for the Energy Networks Association, June 2013, Section 4, p.20–26.

173 United States of America, Federal Energy Regulatory Commission, *Composition of Proxy Groups for Determining Gas and Oil Pipeline Return on Equity* 123 FERC ¶ 61,048 at [53].

is that the dividend discount estimate of the required return is relevant evidence and some regard should be given to it."[174]

312. A further advantage of the DDM is that it does not require an assumption to be made about whether the New Zealand economy is integrated or segmented. Additionally, financial analysts rely on the DCF model to assess the value of current listed entities.[175]

313. Regard should be given to the dividend discount model as a method to determine the overall rate of return on equity. It is possible to use the dividend discount model to inform estimates of the required return on equity for the market, and for the EDB.

314. An important issue to be addressed when applying the DDM is the long-term rate of growth of dividends per share (DPS). Models have been developed which solve endogenously for the long-term rate of increase of DPS by allowing for deviations, at a point in time, between the cost of equity and the return on equity. However, there are also other plausible and defensible methods for calculating exogenously the long term rate of growth of DPS.

315. The factors that should be considered when applying the DDM can be set out as follows:

- The length of the explicit forecast period and the timeframe for the transition to a long-term rate of growth in DPS.
- The use of market prices for shares, as compared to market prices and analyst estimates of value.

316. The objective underpinning the use of the DGM should be the preparation of cost of equity estimates which exhibit reasonable, but not excessive dispersion across firms at each point in time. The estimates should also not be subject to major variability over time for the same firms.

174 SFG Consulting; The required return on equity for regulated gas and electricity network business, Report for Jemena Gas Networks, ActewAGL, Distribution, Ergon, Transend and SA Power Networks; 6 June 2014, page 9.

175 JP Morgan: Asia-Pacific; Equity Research; Primary Healthcare Limited, 14 April 2015.

Appendix B Sources of risk free rates in continental Europe

Table 7: Allowed vs prevailing risk free rates in continental Europe

Country	Source
Energy	
Estonia	Estonian Competition Authority, 2013 Guidelines for the Determination of Weighted Average Cost of Capital, 2013. Available at: http://www.konkurentsiamet.ee/?id=11920 The Authority used the average interest rate of German bonds (2.81%) and added the Estonian country risk premium (1.51%).
France	Commission De Regulation DE L'Energie, Deliberation of the French Regulatory Commission of Energy of 19 March 2015 deciding on the evolution of the tariffs for the use of natural gas transmission networks as of 1 April 2015. Available at: http://www.cre.fr/en/documents/deliberations/decision/atrt5
Ireland	Commission for Energy Regulation, Mid-Term review of WACC applying to the Electricity TSO and TAO and ESB Networks Ltd for 2014 to 2015, 31 January 2014. Available at: http://www.cer.ie/docs/000801/CER14026%20WACC%20Review%20Decision%20Paper%20Final.pdf
Italy	Europe Economics, Technical Report, August 2013. Available at: http://www.cer.ie/docs/000801/cer13222b-mid-term-review-of-electricity-networks-wacc---cer-europe-economics-technical-report.pdf
Portugal	Europe Economics, Technical Report, August 2013. Available at: http://www.cer.ie/docs/000801/cer13222b-mid-term-review-of-electricity-networks-wacc---cer-europe-economics-technical-report.pdf
Portugal	Europe Economics, Technical Report, August 2013. Available at: http://www.cer.ie/docs/000801/cer13222b-mid-term-review-of-electricity-networks-wacc---cer-europe-economics-technical-report.pdf
Telecoms*	
Belgium	Institut Belge Des Services Postaux Et Des Telecommunications, Decision Du Conseil De L'Ibt Du 26 Fevrier 2015, February 2015 Available at: http://www.bipt.be/fr/operateurs/telecom/marches/controle-des-prix-et-des-couts/comptabilisation-des-couts/decision-du-conseil-de-libpt-du-26-fevrier-2015-concernant-le-cout-du-capital-pour-les-operateurs-disposant-dune-puissance-significative-en-belgique
Denmark	Erhvervsstyrelsen, Afgørelse om fastsættelse af maksimale netadgangspriser efter LRAICmetoden for 2015 – fastnet, December 2014 Available at: https://erhvervsstyrelsen.dk/sites/default/files/media/endelig_lraic-afgoerelse.pdf
Finland	Viestintävirasto, Kohtuullinen sitoutuneen pääoman tuotto kiinteässä televerkkotoiminnassa, matkaviestinverkkotoiminnassa ja digitaalisten televisiolähetyspalvelujen toiminnassa, May 2015 Available at:

	https://www.viestintavirasto.fi/attachments/toimialatieto/Sitoutuneen_paaoman_kohtuulliset_tuottoprosentit_4.5.2015.pdf
France	ARCEP, Décision n° 2013-0001 du 29 janvier 2013 fixant le taux de rémunération du capital employé pour la comptabilisation des coûts et le contrôle tarifaire des activités fixes régulées de France Télécom pour les années 2013 à 2015, January 2013 Available at: http://www.arcep.fr/uploads/tx_gsavis/13-0001.pdf
Ireland	Commission for Communications Regulation, Cost of Capital, December 2014, p. 32 Available at: http://www.comreg.ie/_fileupload/publications/ComReg14136.pdf
Italy	Europe Economics, Technical Report, August 2013. Available at: http://www.cer.ie/docs/000801/cer13222b-mid-term-review-of-electricity-networks-wacc--cer-europe-economics-technical-report.pdf
Netherlands	The Brattle Group, The WACC for mobile, fixed-line and cable termination rates, March 2012 Available at: http://www.brattle.com/system/publications/pdfs/000/004/822/original/The_WACC_for_mobile__fixed-line_and_cable_termination_rates_Harris_Stirzaker_Fischietti_Mar_15_2012.pdf?1378772132
Norway	Professor Thore Johnsen, Kapitalkostnad for norsk telekom fastlinjeviksomhet, December 2013 Available at: http://www.nkom.no/marked/markedsregulering-smp/kostnadsmodeller/lric-fastnett-kjerne/_attachment/11257?_download=true&_ts=14304ed6e74
Portugal	Anacom, Methodology for calculating the cost of capital rate of PT Comunicações, S.A., which applies from the 2012 accounting year, Final Decision, December 2013 Available at: http://www.anacom.pt/streaming/FinalDecision_5December2013.pdf?contentId=1190573&field=ATTACHED_FILE
Spain	Comision Nacional De Los Mercados Y La Competencia, RESOLUCIÓN RELATIVA A LA TASA ANUAL DE COSTE DE CAPITAL AAPLICAR EN LA CONTABILIDAD DE COSTES DE TESAU, TME, VODAFONE Y ORANGE DEL EJERCICIO 2013 (EXPEDIENTE AEM 2013/1631), December 2013 Available at: http://www.cnmc.es/Portals/0/Ficheros/Telecomunicaciones/Resoluciones/2013/noviembre/131114_AEM_2013_1631.pdf
Sweden	PTS, konsultationssvar på samråd om uppdaterad kalkylränta för det fasta nätet, December 2013 Available at: https://www.pts.se/upload/Ovrigt/Tele/Bransch/Kalkylarbete%20fasta%20n%C3%A4tet/Hybridmodell%202013/konsultationssvar-kalkylranta-20131213.pdf