



Response to cost of capital issues raised in Draft Input Methodologies

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Response to cost of capital issues raised in Draft Input Methodologies

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Executive summary

On 16 June 2016 the New Zealand Commerce Commission (the Commission) published its *Input methodologies review draft decisions* (the Draft IM decision), which invited submissions from interested parties on a range of issues. Frontier Economics (Frontier) has been asked by Transpower New Zealand (Transpower) to provide our views on a number of issues related to the estimation of the cost of capital canvassed in the Topic 4 paper of the Draft IM decision.

This report provides our views on four issues:

1. The Commission's conclusions on the benefits of the trailing average cost of debt (TACD) approach;
2. The Commission's conclusions on what it perceives to be disadvantages of the TACD approach;
3. The Commission's proposed approach to estimating the tax-adjusted market risk premium (TAMRP); and
4. Certain issues related to the Commission's proposed approach to the estimation of asset betas.

We summarise below our key conclusions on each of these issues.

1. Benefits of the TACD approach

The Commission accepts in its Draft IM decision that there are a several benefits associated with the TACD approach. Specifically, the TACD approach:

1. *Would reduce the need for suppliers to enter into swap market transactions as it is intended to mimic the debt issuance behaviour of prudent and efficient suppliers.*
 - a. Avoided swap costs would represent a direct saving to consumers.
 - b. Non-regulated infrastructure businesses do not need to use swaps to fix rates every five years. By aligning the regulatory allowance to the efficient debt management approach that would be adopted by efficient non-regulated businesses, the TACD approach satisfies the purpose of Part 4 of the Commerce Act, which is to promote the long-term benefit of consumers by “promoting outcomes that are consistent with outcomes produced in competitive markets”.
2. *Would reduce the chance of mismatches occurring between the efficient debt premium paid by suppliers issuing debt and that allowed in the WACC.*
 - a. The Commission argues that the scope for mismatches in relation to the debt premium is likely to be small because the debt

premium has tended to be quite stable historically. We show that this conclusion is an artefact of the relatively short and fortuitous time period the Commission has considered. We show using data from New Zealand, Australia and the UK that the debt premium (over a longer horizon) has been much more volatile than the Commission recognises. Under the rate-on-the-day (ROTD) approach, the scope for mismatches in the allowed and the efficient debt premium in some periods can be very significant. Contrary to the Commission's assumption, there is no surety that such mismatches will cancel out even over very long timescales. By contrast, the TACD approach would protect consumers and suppliers in all periods from mismatches of this kind.

- b. As the TACD approach would align the cost of debt allowance with the cost of debt faced by a supplier following an *efficient* debt strategy, it does not in any way represent a cost pass-through.
 - c. As the TACD approach will always produce an efficient cost of debt allowance, its adoption would not result in a redistribution of economic welfare from consumers to suppliers, or vice versa.
 - d. The reduction in the scope for mismatches between the efficient cost of debt and the regulatory allowances would enhance (rather than blunt) incentives for efficient investment.
3. *Would reduce the chance of significant changes in the WACC allowance from one regulatory period to another.* As well as providing for smoother price paths to consumers, the TACD approach would protect consumers and suppliers from undue exposure to spot market volatility.

Almost every Australian regulator that has considered the TACD approach in any meaningful way has recognised these substantial benefits and replaced the ROTD approach with the TACD approach.

2. The Commission's perceived disadvantages of the TACD approach

Whilst the Commission accepts that there would be benefits associated with the TACD approach, it considers that these would likely be outweighed by a number of perceived disadvantages. These perceived weaknesses are, in our view, overstated:

1. *Using historical rates could blunt capital market signals for new investment.*
 - a. When suppliers are contemplating long-lived investments, it is not at all clear that those investments are assessed on the assumption that prevailing rates will be representative of the cost of capital likely to be faced by suppliers over the lifetime of those

assets — especially when interest rates have a tendency to be volatile.

- b. A more important consideration to investors is whether, over the investment horizon, the revenues that those assets will generate will be adequate to cover their costs, including the cost of capital. The TACD approach would provide a much better match between the allowed cost of debt and the efficient debt costs than would the ROTD approach. As such, the TACD approach is more likely to promote efficient investment. Several regulators overseas have recognised precisely this.
 - c. We also note that whilst the Commission argues for the use of “prevailing rates” (i.e., the ROTD approach) when determining the cost of debt allowance, it argues that it is “inappropriate to give significant weight to short term movements in TAMRP”. This is inconsistent.
2. *The TACD approach increases the potential for violations of the NPV=0 principle.*
 - a. The NPV=0 principle simply means that, over the lifetime of the regulated assets, the expected present value of regulated revenues generated by those assets should just equal the expected present value of the efficient costs (including opportunity costs) associated with those assets.
 - b. To meet this objective, the Commission should strive to set revenue allowances each period on the basis of its best assessment of efficient practice, and efficient costs, over the forthcoming regulatory period.
 - c. The TACD approach offers the strongest prospects for aligning the allowed cost of debt to the expected efficient cost of debt in all periods. By contrast, the ROTD approach can produce large mismatches in individual periods. Therefore, the TACD approach is more likely to satisfy the NPV=0 principle than the ROTD approach.
 3. *Moving to a TACD approach could potentially impose large one-off administrative costs and regulatory uncertainty.*
 - a. The Commission has overstated the scope for large one-off administrative switching costs. It does not explain what these costs would entail. In Australia, these costs have been minimal.
 - b. As long as the Commission implements the TACD approach in a predictable way, and does not make unexpected changes to the approach once it has been rolled out, there is no reason why the TACD approach would increase regulatory uncertainty.

- c. By providing a closer match between the regulatory allowance and the efficient cost of debt than under the ROTD approach, the TACD approach would enhance certainty to consumers and suppliers.
- 4. *Moving to a TACD approach could impose one-off gains or losses on suppliers or consumers.*
 - a. Dr Lally, the Commission's adviser, argues that some suppliers would have executed swap contracts under the ROTD approach to align the base rate of their cost of debt to the risk-free rate allowance. Such arrangements would be unnecessary under the TACD approach. Some existing swaps may remain outstanding at the time the Commission switches approaches.
 - b. Precisely this concern was anticipated by the Australian Energy Markets Commission when it considered the TACD approach in 2012. It recommended that this problem could be dealt with by transitional arrangements that would allow the unwinding of any existing swaps in an orderly fashion, should that be necessary. There is no reason the Commission could not institute similar arrangements in New Zealand if required.
- 5. *Annual updating of allowed revenues under the TACD approach would be an additional administrative burden.*
 - a. The process of annual updates in Australia has been found to be very straightforward and has not been viewed as a major barrier to the adoption of the TACD approach.
 - b. We see no reason to why annual updating would be particularly burdensome to the Commission or suppliers in New Zealand. If the Commission considers that this is a major barrier to adoption of the TACD approach, it should explain clearly the nature of those additional burdens and demonstrate that they would in fact be material. The Commission has not done so to date.

3. Estimation of the TAMRP

We find that there are several flaws in the Commission's reasoning for maintaining its current approach to estimating the TAMRP:

1. *Weighting of estimates.* The Commission argues that the various methods it uses produce significantly different TAMRP estimates, no approach is generally accepted or free of methodological criticism, so all approaches should be weighted equally.
 - a. Whilst the Commission suggests that its preference is to place equal weight on all estimators, in fact its methodology will tend to

favour slow-moving estimators that will entrench a value of 7.0% irrespective of the cost of capital actually faced by suppliers in different market conditions. We have raised this concern previously but the Commission has offered no response to it.

- b. Dr Lally himself agrees that the true TAMRP has probably moved over time by more than the Commission's estimate.
 - c. Dr Lally also acknowledges that the Commission's TAMRP estimate of 7.0% will overstate the true TAMRP during some economic conditions and understate it during others. This is a direct outcome of the Commission's approach to weighting estimators.
 - d. We recommend that the Commission weight estimators according to their characteristics and also consider whether these weights should be varied according to prevailing market conditions.¹ We set out a possible weighting scheme that the Commission could employ, which makes use of a range of estimators, and is likely to produce more plausible estimates than the Commission's fixed estimate of 7.0%.
2. *Timing of estimates.* We also recommend that the Commission should not specify an estimate of the TAMRP in its IM, but rather, should set out a methodology, which it would then use to update its TAMRP estimate when it updates estimates of other WACC parameters, such as the risk-free rate and the debt premium.
 3. *Investment banks' views on the TAMRP.* The Commission presents some very limited evidence that its preferred estimate of the TAMRP, 7.0%, is consistent with estimates used by a number of investment banks in New Zealand. However, the Commission's survey of banks seems very incomplete. For instance, it fails to consider whether the banks make adjustments elsewhere in their cost of capital estimates (e.g., their risk-free rate estimates, or via other *ad hoc* premiums) to reflect the fact that the TAMRP probably varies significantly over time. We present evidence that Australian valuation experts have tended to do precisely that. We caution the Commission against drawing strong conclusions about the practices of banks in New Zealand without undertaking much more comprehensive and complete analysis.

¹ The Appendix to this report sets out in detail why the Siegel 1 estimator proposed by the Commission should not be used at all. In that Appendix, we respond in detail to Dr Lally's arguments in support of Siegel 1.

4. *The benefits of a stable and predictable TAMRP.* The Commission argues that its long-standing approach has produced stable and predictable estimates of the TAMRP, and that this has advantages for investors and consumers by enhancing certainty. Quite to the contrary, the Commission’s approach of applying a fixed TAMRP under all market conditions:
 - a. Exposes suppliers and consumers to unabated volatility in government bond yields, as the cost of equity allowance will tend to move in lock-step with prevailing yields.
 - b. Exposes suppliers and consumers to mismatches between the regulatory allowance and the TAMRP required by equity investors.

4. Estimation of asset betas

We agree with many aspects of the Commission’s approach to estimating asset betas. For instance, we think it is appropriate that:

1. *The Commission has proposed to continue using a large sample of comparators, drawn from a range of jurisdictions, rather than the much smaller comparator sample proposed by Contact Energy.*
2. *The Commission has decided to estimate weekly and four-weekly betas using every possible reference day and then average the results.*
3. *The Commission has decided to not adjust the estimated energy asset beta for differences in systematic risk between electricity and gas services.*

However, we disagree with the Commission’s proposal to not give significant weight to beta estimates based on daily returns data on the basis that such estimates are “noisy”. We show empirically, using the Commission’s own analysis, that estimated daily asset betas tend to have lower standard errors than weekly or four-weekly estimates. Hence, it is not correct to say that daily estimates are particularly noisy, or to imply that they are less reliable statistically than weekly or four-weekly estimates.

We acknowledge that daily asset betas can suffer from some statistical problems (as can weekly and four-weekly estimates). However, these statistical problems can be corrected as part of the estimation process.

1 Introduction

On 16 June 2016 the New Zealand Commerce Commission (the Commission) published its *Input methodologies review draft decisions* (the Draft IM decision), which invited submissions from interested parties on a range of issues. Frontier Economics (Frontier) has been asked by Transpower New Zealand (Transpower) to provide our views on a number of issues related to the estimation of the cost of capital canvassed in the Topic 4 paper of the Draft IM decision.

This report provides our views on:

- The Commission's conclusions on the benefits of the trailing average cost of debt approach (Section 2);
- The Commission's conclusions on what it perceives to be disadvantages of the trailing average cost of debt approach (Section 3).
- The Commission's proposed approach to estimating the tax-adjusted market risk premium (Section 4); and
- Certain issues related to the Commission's proposed approach to the estimation of asset betas (Section 5).

In a number of places in this report we refer to an earlier report we prepared for Transpower in February 2016 entitled *Cost of equity issues related to Input Methodologies review* (our February report), which the Commission cites in its Draft IM decision.

2 The benefits of the TACD approach

The Commission has rejected the use of the trailing average cost of debt (TACD) approach to determining the cost of debt allowance and has proposed instead to retain the existing rate-on-the-day (ROTD) approach. The Commission accepts that there are a number of benefits of the TACD approach, but considers that these benefits are not sufficiently large as to outweigh what it perceives to be weaknesses of the approach (which are discussed in section 3).

This section recaps and clarifies the main benefits of the TACD approach (vis-à-vis the ROTD approach), and explains why those benefits are likely to be much more significant than the Commission has accepted.

The Commission agrees that the TACD approach is likely to:²

1. *Reduce the need for firms to enter into swap market transactions as the trailing average approach is intended to mimic the debt issuance behaviour of a prudent and efficient firm.* To the extent that certain swap costs could be avoided by suppliers, the allowance to suppliers for such costs could be reduced. This would represent a direct saving to consumers. Since non-regulated firms do not need to use swaps to fix rates every five years, it is apparent that any such use of swaps by regulated firms is induced by the Commission's approach to setting the cost of debt allowance. That is, the ROTD approach may induce firms to deviate from the debt management strategy that they would otherwise implement. By contrast, the TACD approach is consistent with the prudent and efficient debt management strategy that is commonly adopted by infrastructure firms that are not affected by regulation. Swaps become unnecessary under the TACD approach. By aligning the regulatory allowance to the efficient debt management approach adopted by non-regulated infrastructure businesses, the TACD approach satisfies the purpose of Part 4 of the Commerce Act (the Act), which is to promote the long-term benefit of consumers by "promoting outcomes that are consistent with outcomes produced in competitive markets".
2. *Reduce the chance of mismatches occurring between the (efficient) debt premium paid by suppliers issuing debt and that allowed in the WACC.* It is important to recognise that the TACD approach aligns the cost of debt allowance with the cost of debt that would be faced by a supplier following an *efficient*, staggered debt management approach. This means that the TACD approach does not in any way represent a cost pass-through to suppliers. The TACD is an efficient benchmark cost of debt.

² Draft IM decision, para. 134.

Further, as the TACD approach aligns the regulatory allowance to an efficient cost of debt, its adoption would not result in a redistribution of economic welfare from consumers to suppliers, or vice versa.

Finally, the reduction in the scope for mismatches between the efficient cost of debt and the regulatory allowance enhances (rather than blunts) incentives for efficient investment by reducing suppliers' exposure to cash flow risk (see section 3.1 for further discussion on this point). This, in turn, would promote "incentives [for suppliers] to innovate and to invest, including in replacement, upgraded, and new assets."³

3. *Reduce the chance of significant changes in WACC from one regulatory period to another, as changes to the cost of debt are passed through more gradually through the annual updates.* As well as providing for smoother price paths to consumers (due to incremental, annual updating of the cost of debt allowance), the TACD approach would protect consumers and suppliers from undue exposure to spot market volatility (see section 2.2.2 for further discussion on this point). To illustrate how volatile cost of debt decisions can be under the ROTD approach, even within a relatively short timeframe, we note that the cost of debt allowance determined by the Commission recently for Chorus fell by 145 basis points between the first draft decision and the final decision — a period of just 12 months. This is demonstrated by Table 1 below.

Table 1: Volatility in Commission's cost of debt estimates for Chorus

Parameter	December 2014 Draft	July 2015 Further Draft	December 2015 Final
Risk-free rate	4.19%	3.26%	2.74%
Debt premium	1.85%	1.75%	1.85%
Cost of debt	6.04%	5.01%	4.59%

Source: Commission, *Cost of capital for the UCLL and UBA pricing reviews: Final Decision*, 15 December 2015, p.6; Frontier calculations

We agree with the Commission that these are all benefits associated with the TACD approach. It is important to recognise that the benefits enumerated by the Commission are simultaneously the disadvantages of the ROTD approach. Under the ROTD approach:

1. Suppliers are forced to enter into swap agreements if they seek to best align their cost of debt to the regulatory allowance, thereby incurring costs that could be avoided by adopting the TACD approach.

³ The Act, section 52A(1)(a).

2. There is no way for suppliers, even with the use of interest rate swaps, to align their actual debt premium to the debt premium allowed by the Commission. Whilst in some periods this mismatch may be modest, at other times the mismatch can be very large as we show in section 2.2.1. Thus, the ROTD approach exposes suppliers and consumers unnecessarily to the vagaries of debt markets.
3. The cost of debt allowance and, therefore, prices, will be more volatile than under the TACD approach.

2.1 Adoption of the TACD by Australian regulators

The Commission states in its Draft IM decision that:⁴

Some Australian regulators have moved to a trailing average methodology since the setting of the original IM.

This is an understatement of the trend by Australian regulators away from the ROTD approach that the Commission proposes to continue applying, in favour of the TACD approach.

In fact, almost every regulator in Australia that has considered the TACD approach in any meaningful way has decided to abandon the ROTD approach and to replace it with some version of the TACD approach. The only regulator that has not done so is the Queensland Competition Authority (the QCA) which, like the Commission, is advised by Dr Lally. On this issue, the QCA is an outlier amongst Australian regulators.

Very recently (June 2016), two more Australian regulators — the Essential Services Commission of South Australia (ESCOSA) and the Essential Services Commission of Victoria (the ESC) — have confirmed that they will apply the trailing average approach, and have actually done so in regulatory decisions (for SA Water and Melbourne Water, respectively).

The regulators in Australia that have replaced the ROTD approach with the TACD approach are:⁵

1. The Australian Energy Regulator (AER);
2. The Economic Regulation Authority of Western Australia;
3. ESCOSA; and

⁴ Draft IM decision, para. 128.

⁵ In addition, the Independent Pricing and Regulatory Tribunal (IPART) abandoned the pure ROTD approach in 2013 based on its considered view that it is inappropriate for the cost of debt allowance to be determined entirely by prevailing market rates. Under IPART's current approach, the cost of debt allowance is determined by averaging the ROTD estimate and a 10-year historical average estimate.

4. The ESC.

Every one of these regulators has accepted the ROTD approach suffers from shortcomings that can be addressed fully by the TACD approach. Below we review the reasons given by ESCOSA and the ESC in their recent decisions to adopt the TACD approach.

2.1.1 ESCOSA

On 6 June 2016, ESCOSA published its final regulatory pricing decision for SA Water.⁶ In that determination, ESCOSA applied for the first time the TACD approach, although it had signalled earlier its intention to do so.⁷

In its decision ESCOSA describe its new approach to the cost of debt as follows:

The Commission's longer term regulatory approach is based on a prudent debt financing strategy that assumes long term (10 year) bonds are issued and refinanced as and when they mature. The long term nature of the bonds reflects the long lives of regulated drinking water and sewerage assets. The cost of debt approach assumes that 10 percent of total debt is refinanced each year, and that the assumed cost of debt for a single year is the average of long term financing costs over that year and each of the preceding nine years. In a regulatory context, this approach is called the 10 year trailing average cost of debt.

ESCOSA went on to explain its reasons for replacing the ROTD approach with the TACD approach:

The 10 year trailing average cost of debt approach avoids over reliance on prevailing market rates, whereby the resultant cost of debt could be significantly different to the efficient costs that would form part of an ongoing business debt portfolio. The risk that the cost of debt is under or over stated during the regulatory period is reduced, providing a downward influence on the benchmark cost of equity.

It is worth noting that SA Water did not propose the use of the TACD approach by ESCOSA. The change of approach was initiated by ESCOSA because it recognised that the ROTD approach had the scope to produce undesirable regulatory outcomes, the most significant of which was the potential for significant mismatches between the regulatory allowance and the efficient cost of debt.

In a report to the South Australian Treasurer, ESCOSA made clear that the TACD was based on a benchmark efficient cost of debt, and would therefore not result in pass-throughs of inefficient costs:⁸

⁶ ESCOSA, SA Water Regulatory Determination 2016: Final determination, June 2016.

⁷ ESCOSA, SA Water Regulatory Rate of Return 2016 – 2020: Final Report to the Treasurer, March 2015.

⁸ ESCOSA (2015), pp. 3-4.

Importantly, the proposed [TACD] approach is based on an assessment of the actions of a benchmark prudent and efficient utility with the same obligations as SA Water. It does not look to the actual actions, costs or legal structure of SA Water itself.

The approach proposed will:

- protect consumers from any possible costs of poor financing decisions made by SA Water by providing a benchmark rate of return
- provide SA Water with a reasonable opportunity to earn sufficient revenue to attract equity and debt needed to finance regulated services, and
- incentivise SA Water to outperform the benchmark rate of return.

Finally, ESCOSA noted that the TACD approach is increasingly becoming standard regulatory practice in Australia.⁹

The proposed approach is also increasingly becoming standard regulatory practice within Australia for application in industries such as energy and water, where the regulated businesses generally have significant debt requirements, long-term supply obligations and long asset lives. It has been adopted or endorsed by other jurisdictional and national regulatory and policy bodies over the past three years.

2.1.2 ESC

On 16 June 2016, the ESC published its final decision on regulated prices for Melbourne Water.¹⁰ In that decision, like ESCOSA, the ESC determined to replace the ROTD approach with the TACD approach.

The reasons given by the ESC for adopting the trailing average approach were similar to those given by ESCOSA and other Australian regulators:¹¹

Moving to a trailing average approach to estimating the cost of debt and WACC reduces price volatility, aligns the regulatory allowance for financing costs with the actual costs faced by the water business, and reduces refinancing risks. We note that changing from the on-the-day approach to estimating the cost of debt, to a trailing average approach, does not materially impact on Melbourne Water's prices.

In our view, as so many Australian regulators have examined the choice between the ROTD and TACD approaches, and have almost universally adopted the latter, the Commission should give further consideration to its proposal to maintain the ROTD approach.

⁹ ESCOSA (2015), p. 3.

¹⁰ ESC, Melbourne Water Price Review 2016 — final decision, June 2016.

¹¹ ESC (2016), p.xii.

2.2 Alignment of the cost of debt allowance to the efficient cost of debt

One of the main benefits of the TACD approach is that it would align the cost of debt allowance to the efficient cost of debt that would be faced by a supplier following a staggered refinancing strategy, which Dr Lally describes as a “clearly efficient” strategy.¹² In this sense, the TACD approach is consistent with the purpose of Part 4 of the Act, which is to promote the long-term benefit of consumers by promoting “incentives to improve efficiency”.

As noted in section 2.1, the Commission agrees that alignment of the allowed cost of debt to the efficient cost of debt would be a benefit. However, the Commission argues that to the extent that the ROTD approach produces mismatches between the regulatory allowance and the efficient cost of debt, suppliers could use interest rate swaps to align the base rate component of the their borrowing costs to the risk-free rate. This is true, but would involve suppliers incurring swap costs (and inefficient effort) that would be unnecessary if the Commission were to adopt the TACD approach. These savings could, in turn, be passed through to consumers.

However, as the Commission accepts, there is no practical way for suppliers in New Zealand to hedge the debt premium.¹³ This is a conclusion that a number of regulators in Australia have also reached, and is a reason that has persuaded those regulators to adopt the TACD approach. However, unlike those regulators, the Commission argues that the potential mismatch between the efficient and the allowed debt premium is mitigated by a number of factors:¹⁴

1. The debt premium is relatively stable, which reduces the chance any mismatches will have a material impact on supplier revenues.
2. Any potential mismatches can take place in both directions. Therefore, over time mismatches are likely to even out over time. The Commission considers that regulated suppliers should be able to manage this risk.
3. Dr Lally has provided evidence that any mismatches in the debt premium are likely to be at least partially offset by mismatches between the Commission’s estimate of the MRP and its true value.

The Commission concludes that these mitigating factors would mean that the mismatch between the efficient and allowed debt premium is not significant enough to warrant the adoption of the TACD approach. We address below each of the factors considered by the Commission.

¹² Lally, M., Review of further WACC issues, 22 May 2016, p.8.

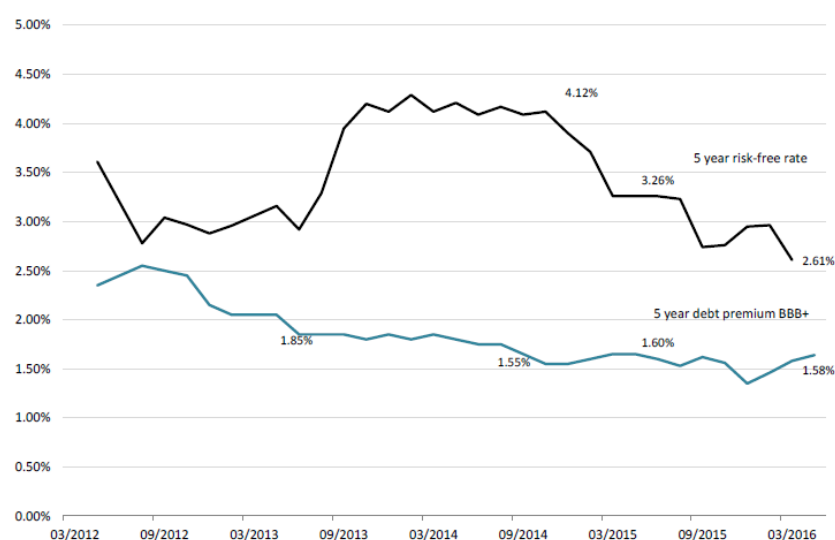
¹³ Draft IM decision, para. 104.

¹⁴ Draft IM decision, para. 108.

2.2.1 Stability of the debt premium

The Commission analyses the debt premium decisions it has made over the five-year period from March 2012 to March 2016 (plotted below in Figure 1) and concludes that “the debt premium is relatively stable”.

Figure 1: Commission estimates of risk-free rate and debt premium (BBB+)



Source: Figure 2, Draft IM decision

Further, the Commission argues that the average ROTD debt premium determined over the past five years (presumably an approximation of a five-year TACD) was ~1.85%. However, the debt premium allowed by the Commission in its August 2014 decision was just 20 basis points lower (i.e., 1.65%).¹⁵ This, suggests the Commission, is evidence that any mismatch is likely to be immaterial.

However, this conclusion is erroneous as the Commission has restricted its focus to a period during which financial markets and debt premiums were relatively stable. In other periods, debt premiums have not been as stable as indicated by the short period considered by the Commission.

Even during the period considered by the Commission, there is material variability in debt premiums – varying from over 2.5% to less than 1.5%. This difference would have a material impact on a supplier’s allowed revenues and on prices paid by consumers. By way of example, a difference in the debt premium of 1.0% would represent a possible difference in the overall cost of capital of $\pm 0.41\%$ (assuming a gearing level of 41% and all else remaining equal).¹⁶

¹⁵ Draft IM decision, paras. 106-107.

¹⁶ $0.41\% = 1.0\% \times 41\%$.

Transpower's regulatory asset base for 2015/16 is forecast to be \$4,610.2 million.¹⁷ This means that a difference in the cost of capital allowance of just $\pm 0.41\%$ would translate into a difference in allowed revenues of around $\pm \$18.9$ million per annum (or more than \$94.5 million over a five year regulatory period before accounting for the time value of money). The Commission has understated the variability inherent in the ROTD approach (and the potential revenue implications for suppliers) by considering the average debt premium over a period rather than the spot debt premiums at different points in time.

Evidence from other markets

During the peak of the global financial crisis (GFC), credit markets functioned poorly or closed altogether amidst fears of a collapse of the banking system. At that time, the supply of credit fell and lenders were willing to provide debt only at greatly increased rates, to compensate for concerns about heightened default risk. Contemporaneously, financial markets around the world experienced a flight to safety, where capital flowed away from risky assets and into safe assets such as highly-rated government bonds, thus depressing the yields on those assets. These well-documented events resulted in rising yields on corporate bonds combined with falling yields on government bonds, which, in turn, led to sharply-widening debt premiums in many economies.

The volatility in the debt premium over this time can be seen in Figure 2 (which plots debt premiums on 10-year BBB non-financial corporates in Australia) and Figure 3 (which plots debt premiums on 10-year BBB+ non-financial corporates in the UK).¹⁸ We note the following:

- In Australia
 - The average debt premium over the period we analysed (January 2005 to June 2016) was 2.78%.
 - In December 2008, around the peak of the GFC, the debt premium rose to 9.60% (i.e., 682 bps higher than the average premium).
 - In March 2005, during the pre-GFC boom in Australia, the debt premium was as low as just 0.69% (i.e., 209 bps lower than the average level).
 - Over the period analysed, the debt premium was either 50 bps greater than, or 50 bps less than, the average debt premium 64% of the time.

¹⁷ Commerce Commission, 2014. Companion paper to final determination of Transpower's individual price-quality path for 2015-2020, 28 November, Table 2.6, p.21.

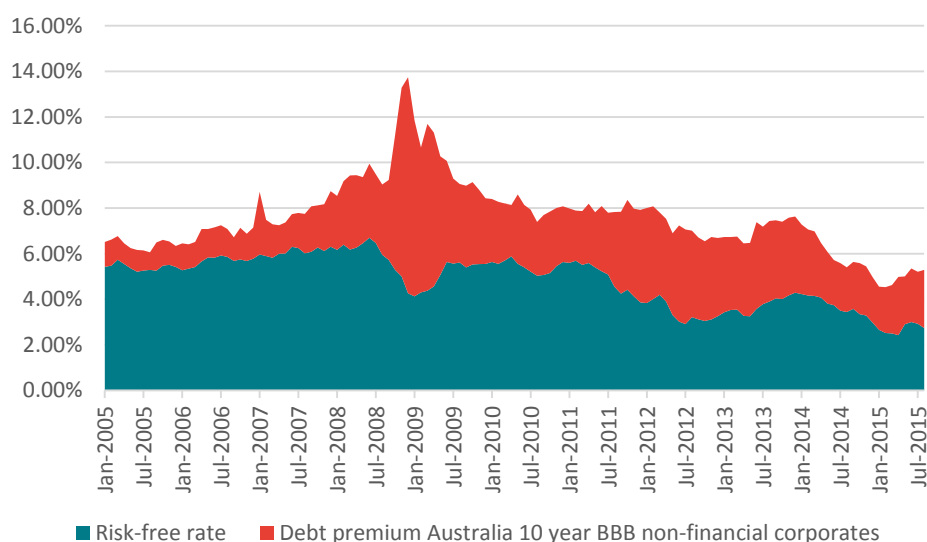
¹⁸ The Australian data are published by the RBA, which the AER uses in its cost of debt determinations. The UK data are Markit iBoxx data, which Ofgem uses in its cost of debt determinations.

- In the UK
 - The average debt premium over the period we analysed (January 2005 to October 2015, the last time Ofgem published these data) was 2.15%.
 - In January 2009, around the peak of the GFC, the debt premium rose to 5.47% (i.e., 333 bps higher than the average level).
 - In May 2007, debt premium was as low as just 0.88% (i.e., 126 bps lower than the average level).
 - Over the period analysed, the debt premium was either 50 bps greater than, or 50 bps less than, the average debt premium 95% of the time.

Our purpose in presenting this evidence from Australia and the UK is not to make comparisons between debt premium levels in the two countries. Direct comparisons are not possible in any case, given the differences in the ratings of the bonds considered in the two Figures, and also because of country-specific differences. However, it is clear from these data that, historically, the corporate debt premiums in these two countries have not been as stable as the Commission suggests is the case of New Zealand – based on the Commission’s consideration of a very short post-GFC period. This is particularly true when a sufficiently long time period (i.e., spanning the most recent major financial crisis) is considered.

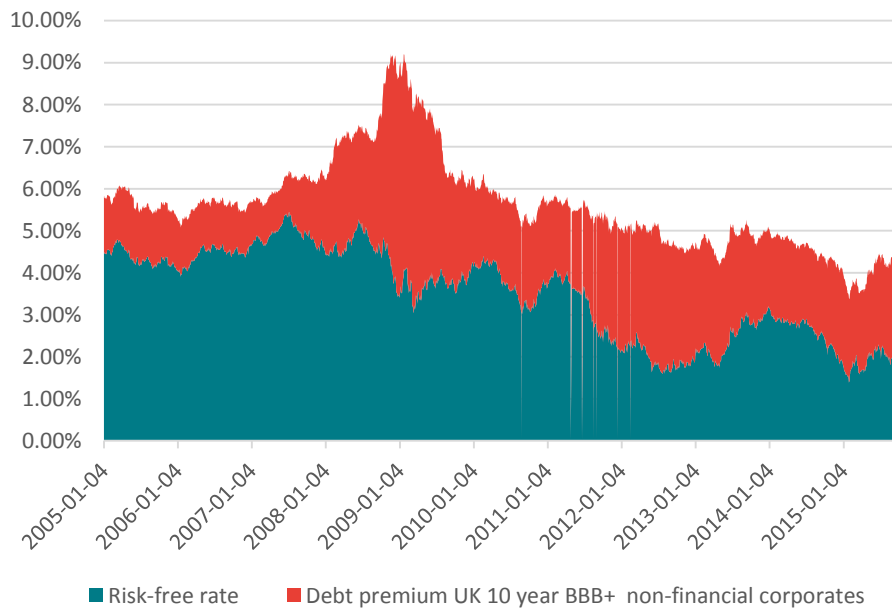
Given the interconnectedness of global financial markets, it would be quite remarkable if corporate debt premiums in New Zealand had historically remained stable, while they moved considerably over time in other countries — especially during periods of boom or bust.

Figure 2: Debt premium on BBB non-financial corporate bonds – Australia



Source: Data from Reserve Bank of Australia; Frontier analysis

Figure 3: Debt premium on BBB+ non-financial corporate bonds – UK



Source: Original data from Markit iBoxx, published by Ofgem; Frontier analysis

Evidence from New Zealand

Unfortunately, at present, there are no data series in New Zealand on the yields on BBB+ rated corporate bonds.¹⁹ However, until 2012, Bloomberg did publish a New Zealand A fair-value curve for a range of tenors.²⁰ Using the five-year A fair value curve, and yields on five-year government bond yields published by the RBNZ, we computed the debt premium on five-year A-rate corporate bonds in New Zealand (see Figure 4).

The debt premium series for A-rated bonds that we computed reaches back further than the Commission's BBB+ series presented in Figure 1 and, in particular, covers the period before, during and after the peak of the GFC. The series shows clearly that the debt premium for corporate bonds with an A-rating (which is significantly higher than the BBB+ rating assumed by the Commission) was as low as 0.76% in April 2005, and rose as high as 3.17% during the GFC in April 2009. This represents a range of $\pm 2.41\%$.

¹⁹ In principle, it would be possible to construct such series using curve-fitting techniques used by the RBA and others to produce yield curves. However, that exercise could not be completed within the timeframes the Commission has allowed for consultation on the IM.

²⁰ The Commission used to use the Bloomberg A fair value curve to compute the term credits spread differential until the curve was discontinued by Bloomberg in 2012.

Figure 4: Debt premium estimates for New Zealand five-year A-rated corporate bonds



Source: Bloomberg, RBNZ, Frontier calculations

Given the evidence above, the Commission's assertion that "the debt premium is relatively stable" is implausible. This implies that the scope for mismatches between the ROTD debt premium and the efficient trailing average debt premium could be much more material than the Commission acknowledges.

2.2.2 Symmetry of mismatches

Whilst the Commission acknowledges the scope for mismatches between the efficient and allowed debt premium, it provides no analysis of the consequences (to consumers or to suppliers) of any such mismatches.

Two essential features of the ROTD approach are that the debt premium determined by the Commission would:

- Be 'locked in' for the *whole* regulatory period, with no prospect of intraperiod adjustment.
- Apply to the *whole* of the supplier's debt portfolio, even if the supplier's debt management strategy is to stagger its refinancing by rolling over periodically only a portion of its debt.

This means that if the ROTD at the time the Commission makes its determination happens to be *above* the efficient TACD at which the supplier has financed itself, consumers would be forced to pay a premium above the efficient level. This situation would endure for the length of the regulatory period at least. This would clearly not be in consumers' long-term interests.

If, on the other hand, the ROTD at the time the Commission makes its determination happens to be *below* the efficient TACD at which the supplier has

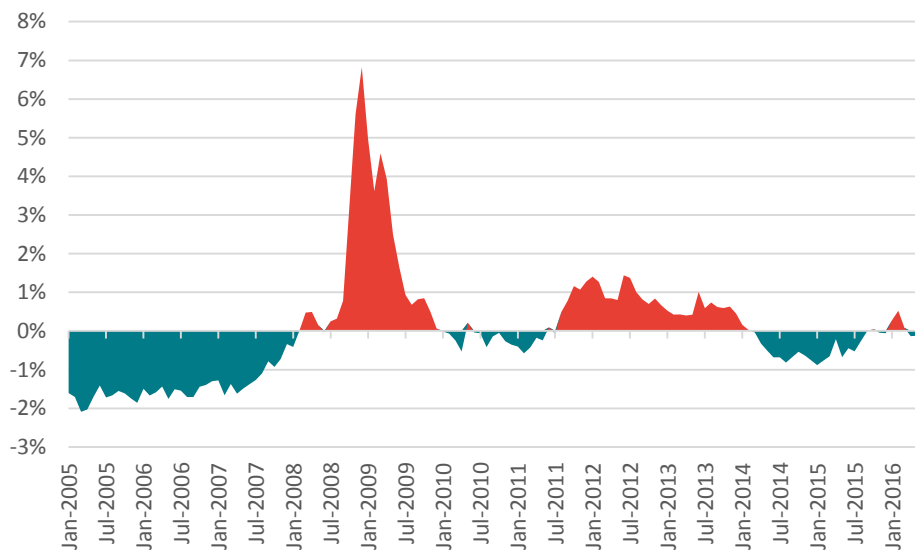
financed itself, the supplier’s shareholder would need to absorb that cost. As the analysis in section 2.2.1 has shown, the mismatches between the efficient and allowed debt premium can, in some periods, be very material. In those times, efficient investments that would otherwise proceed had the regulatory allowance been aligned with the efficient debt premium may be deferred, and the supplier itself could face financial distress.

The Commission suggests that:²¹

Any potential mismatches can take place in both directions. Therefore, over time mismatches are likely to even out over time. We consider that regulated suppliers should be able to manage this risk.

The Commission is correct that the mismatches can occur in both directions. However, that does not necessarily mean that the mismatches are symmetric. If very large mismatches in any one direction occur, without similarly large offsetting mismatches in the other direction, consumers or suppliers may have to bear the consequences for a long period of time. We illustrate this point using Figure 5, which plots deviation of the prevailing debt premium on Australian 10-year BBB non-financial corporate bonds from the average debt premium level (i.e., 2.78%).²²

Figure 5: Deviation from average debt premium level – Australian 10 year BBB non-financial corporates



Source: Data from Reserve Bank of Australia, Frontier analysis

²¹ Draft IM decision, para. 108.2.

²² We use Australian data in this illustrative example because the effect of large changes in the debt premium are apparent, and therefore effective in making the point.

The blue regions in this Figure indicate periods when the prevailing debt premium was below the average level, whilst the red regions indicate periods when the prevailing debt premium was above the average level. The effect of the peak of the GFC, in December 2008, is clearly visible. At that time, the debt premium rose above the average debt premium level by over 6.80%.

The unlucky supplier

Consider the plight of a hypothetical supplier regulated under the ROTD approach that faced a regulatory reset in June 2008. At that point, the prevailing debt premium was just fractionally (i.e., 3 bps) lower than the average debt premium. That debt premium (i.e., 2.75%) would have been locked in by the regulator for the duration of the regulatory period. However, any refinancing undertaken by the supplier over the next 12 months would have been at materially higher rates, for which the supplier would have received no compensation.

Suppose the supplier was forced to refinance some of its debt in December 2008, when debt premiums were at their peak, because a portion of its debt portfolio had matured. The Commission's assertion is that the very large mismatch between the allowed debt premium (i.e., 2.75%) and the debt premium paid by the supplier when refinancing in December 2008 (i.e., 9.60%) would even out over time. This could potentially happen. However, given the very large mismatch faced by the supplier, it would take a very long period of time before the errors would even out, if at all.

For example, the average monthly deviation between the prevailing debt premium and the average debt premium, over the period December 2008 to June 2016 is +0.47%.²³ This means that the mismatch experienced by the supplier at the time it refinanced had not been offset fully by deviations in the other direction even by June 2016.²⁴ If the mismatches had evened out fully over this period, the average deviation would have been 0% because sufficient mismatches in the opposite direction would have occurred such that the *average* mismatch was 0%. At no point between December 2008 and June 2016 does the average deviation fall to 0%.

In addition, we note that:

- As the ROTD allowance is fixed for the duration of the regulatory period, the supplier must wait until the next reset before it can hope for a debt allowance that is sufficiently above the efficient level to offset the loss it

²³ The average monthly deviation is calculated by summing up the shaded regions in Figure 5 and dividing by the number of months between December 2008 and June 2016.

²⁴ This is evident even from a visual inspection of Figure 5 as the blue regions since December 2008 have clearly been insufficient to offset the red regions since December 2008.

experienced when raising debt at the peak of the GFC. At the next regulatory reset, the prevailing rate may be higher than the efficient level, in which case the ROTD approach may allow the supplier to recover at least some of the losses from the previous period. However, the prevailing rate may turn out once again to be *less* than the efficient level, in which case the losses from the previous period would be compounded by further losses in the subsequent period. In other words, the supplier effectively faces a lottery at the next reset, because the ROTD approach might once again lock in a cost of debt allowance that is too low.

- The Commission offers no analysis that shows that the mismatches are guaranteed or likely to average out over time. This is simply an assumption. Nor does the Commission consider how long it is likely to take for a mismatch in one regulatory period to be offset by opposite mismatches in future regulatory periods.
- The larger the initial mismatch, the longer it will likely take for the mismatch to be evened out, if that occurs at all.

These factors mean that mismatches may persist for a very long time, and possibly may never be eliminated. Dr Lally argues that by the Law of Large numbers, the mismatches faced by a supplier would even out eventually, thereby making the supplier whole.²⁵ However, due to the scope for mismatches to occur in consecutive periods, the scope for very large mismatches in some periods, and the fact that regulatory resets occur relatively infrequently (i.e., every five years in Transpower's case), it may take a very long time before these mismatches even out completely, if that occurs at all. In the intervening time, the supplier will either have had the difficult task of managing a shortfall of revenues relative to its efficient costs, or have enjoyed revenues in excess of its efficient costs. Neither of these outcomes is, in our view, consistent with the purpose of Part 4 of the Act.

In our view, the objectives of regulation are much better served by setting a regulatory allowance that matches the efficient cost in *every* regulatory period rather than overcompensating in some periods, undercompensating in others, and hoping that errors cancel out in the long-run.

Setting the regulatory allowance equal to the efficient cost in every regulatory period is particularly important when we consider that particular shareholders and consumers may not be around for the long-run averaging out of regulatory mismatches to occur. For example, an individual, who is a customer of a particular regulated supplier for only one or two regulatory periods may pay more than the efficient cost and then cease to be a customer of that supplier – never

²⁵ Lally (2016), p.30.

benefitting from the square-up that the Commission asserts will be waiting for them in the long-run.

The lucky supplier

Consider another, altogether more fortunate supplier, whose reset was finalised in December 2008. This supplier was awarded, by sheer luck, a ROTD allowance that locks in a debt premium at the peak of the GFC. In this case, consumers would be paying far more than the supplier's efficient cost of debt. Further, as the analysis above shows, any subsequent mismatches in the other direction would have been insufficient (even by June 2016) to offset the gain enjoyed by the supplier.

This scenario is not a hypothetical one as this is essentially what occurred in Australia. The notion of the TACD was first introduced in Australia through an Australian Energy Markets Commission (AEMC) Rule Change process, which concluded in November 2012. The proponents of this change to the National Electricity Rules (NER) and the National Gas Rules (NGR) were the AER and the Energy Users Rule Change Committee (EURCC), which represented a number of large energy consumers in Australia.

The EURCC expressed concern during the rule change process that the ROTD approach was not producing an appropriate estimate of the return on debt for a benchmark efficient entity. Specifically, the proponents noted that at the time the AER was resetting prices for many energy networks in 2008 and 2009, the ROTD cost of debt had risen steeply as a consequence of the GFC. However, the bulk of the debt held by those networks was raised at significantly cheaper, pre-GFC rates. Hence, there was a significant divergence between the actual debt service costs faced by regulated networks at the time and the allowed return on debt (determined using the ROTD approach, whereby the contemporaneous (high) rate was applied to the firm's entire debt portfolio).

As Figure 2 shows, between 2009 and 2011, the ROTD cost of debt fell sharply as the threat of widespread bank failures was averted by rescue packages put in place by governments around the world, and as credit markets reopened and returned to normal. This meant that the very high cost of borrowing that the AER had locked into its regulatory decisions during the peak of the GFC was short-lived, and reflected very poorly the actual debt service costs faced by the businesses.

In its submissions to the AEMC, the EURCC argued strongly that “[t]he actual cost of debt should be given more weight in the estimation of the [return on debt allowance]”.²⁶ In doing so, the EURCC recommended that the cost of debt allowance be determined using the 10-year TACD approach, which had been

²⁶ AEMC, Summary of issues raised in submissions in response to Directions Paper, p.59.

adopted by Great Britain's energy sector regulator, Ofgem, when it rolled out its RIIO regulatory framework in 2010.

The TACD has been supported more recently, for very similar reasons, by other consumer groups in Australia. For instance, the South Australian Council of Social Service (SACOSS) made the following submission to ESCOSA:²⁷

The appeal of the lower rate [that would have been delivered at the time by the ROTD approach] is obvious but SACOSS is also conscious that Global Financial Crisis (GFC) conditions could reappear at some future date and would prefer a solution that reduces volatility for both the owners and customers of SA Water.

This is an opportunity to establish a long term approach to how water users are exposed to changes in the cost of capital over time.

The SACOSS submission raises a crucial point relevant to the Commission's deliberations.

The Commission cannot foresee if or when the next GFC-type event will occur. Nor can the Commission predict whether suppliers or consumers would be the winners or losers under a ROTD approach, in such an event. However, the evidence and experience from other jurisdictions shows that the impact (on prices to consumers or on suppliers' ability to recover their efficient costs) can be very material. Such outcomes could be pre-empted and avoided if the Commission were to (like several Australian regulators) adopt the TACD approach now.

2.2.3 Offsetting errors

The Commission notes that Dr Lally has advised that any mismatches in relation to the debt premium are likely to be at least partially offset by mismatches between the Commission's estimate of the TAMRP and its true value.²⁸

Specifically, Dr Lally argues that the ROTD approach over-compensates a supplier that follows an efficient, staggered debt management strategy during financial crises, when the prevailing debt premium will be high, and will under-compensate such a supplier during economic expansions when the debt premium is likely to be low. This is true.

Dr Lally then argues that the opposite is likely to be true in respect of the TAMRP. This is because when economic conditions are unfavourable, under the Commission's current approach to the TAMRP (which it proposes to maintain), the actual TAMRP is likely to be higher than the Commission's estimate, which is

²⁷ ESCOSA (2015), p.31

²⁸ Draft IM decision, para. 108.3; Lally (2016), pp.8-9.

effectively constant.²⁹ However, when economic conditions are favourable, the Commission's estimate of the TAMRP is likely to be too high relative to the actual TAMRP.

Dr Lally provides no empirical evidence of the quantum of each of these errors, so it is uncertain the extent to which these two errors can be relied upon to offset one another. Nevertheless, Dr Lally implies that these two errors create a natural hedge. In other words, according to Dr Lally, it is desirable that the Commission deliberately continue an approach to the debt premium that he accepts produces erroneous allowances because those errors help offset mistakes he acknowledges are created by his preferred approach to the TAMRP.

Our recommended solution is not to maintain two errors in the hope that they might cancel each other out. Rather, the better approach is to fix both errors by:

- determining the cost of debt using the TACD approach to match the efficient cost; and
- setting the TAMRP allowance in a way that is commensurate with the prevailing market conditions (as we explained in our February report), rather than employing an approach that is likely to continue producing TAMRP estimates of 7.0% or thereabouts irrespective of market conditions.

If the Commission proposes to maintain its proposed approach, it should:

- Acknowledge clearly that it does so on the basis that it is setting a cost of debt allowance and a cost of equity allowance that are inconsistent with efficient financing costs, but it considers these two errors to offset; and
- Quantify the magnitude of each error to demonstrate they do in fact offset.

2.3 Reduced period-to-period volatility

We and a number of other submitters have argued that the TACD approach would produce more stable cost of debt allowances and, therefore, prices to consumers, than the ROTD approach. This is obviously true because the process of averaging involved in the TACD approach would smooth out year-on-year volatility in prevailing rates.

The Commission agrees with this point.³⁰ However, it argues that the impact of volatility under the ROTD approach is mitigated by two factors:³¹

²⁹ Dr Lally (2016, p.9) notes that the Commission's TAMRP allowance "has always been 7% or close to it".

³⁰ Draft IM decision, para. 121.

³¹ Draft IM decision, para. 122.

1. the ability of suppliers to enter swap market arrangements to reduce the effect of any volatility from changes to the risk-free rate; and
2. the ability of the Commission to “manage any significant changes [owing to changes in WACC, for instance] to consumer prices at the time of each reset through regulatory pricing mechanisms”.

We disagree with the Commission that swap agreements can be used to mitigate period-to-period volatility in the cost of debt. It is true that, at some cost, suppliers can use interest rate swaps to align the base rate of their cost of debt to the risk-free rate allowance. We fail to see how these instruments can possibly be used to dampen volatility in prices across regulatory periods. Price shocks at each new regulatory period (arising from use of the ROTD approach) would not be reduced in any way by the employment of swaps. Swaps simply lock in the spot rate at the beginning of each regulatory period and the issue is that spot rates vary considerably over time. The Commission seems to have confused volatility of the spot rate over time with the suppliers’ ability to lock in those spot rates.

In addition, the Commission does not explain what “regulatory pricing mechanisms” it has at its disposal to mitigate period-to-period price volatility. In our view, *ad hoc* interventions by the Commission to dampen price volatility should be avoided as such interventions would involve too much regulatory discretion, may not be reflective of efficient costs, and would likely increase regulatory uncertainty. In our view, a better approach for the Commission would be to adopt a predictable methodology, such as the TACD, which minimises mismatches between regulatory allowances and efficient costs, and has the desirable property of naturally smoothing returns and prices.

Further, as we have argued in section 2.2.2, as well as providing for smoother price paths to consumers (due to incremental, annual updating of the cost of debt allowance), the TACD approach would protect consumers and suppliers from undue exposure to spot market volatility, and large deviations away from the efficient cost of debt. This would promote the long-term benefits of consumers because it would naturally limit consumers’ exposure to large price shocks, and increase certainty for suppliers (which would make investment planning easier).

Finally, we note that the Commission appears to have taken somewhat inconsistent approaches in relation to volatility of the TAMRP allowance and the cost of debt allowance. The Commission argues that an approach that produces a stable and predictable estimate of the TAMRP (7.0%, typically) has advantages for investors and consumers of regulated services.³² The Commission cites this as a key reason why it proposes to maintain its current approach to estimating the

³² Draft IM decision, para. 436.3.

TAMRP. By contrast, the Commission argues that increased stability in the cost of debt allowance is not a reason to adopt the TACD. This is inconsistent.

3 The Commission's reasons for rejecting the TACD approach

Whilst the Commission accepts that there are benefits associated with the TACD approach, it rejected that approach on the grounds that these benefits would be outweighed by a number of perceived disadvantages. The main perceived disadvantages cited by the Commission (and Dr Lally) are the following:

1. Using historical rates could blunt capital market signals for new investment.³³ This could dampen incentives for efficient investments.³⁴
2. The use of the TACD increases the potential for violations of the NPV=0 principle (and thus increases bankruptcy risk).³⁵
3. Moving from a prevailing approach to a trailing average approach would be a substantial policy change in the approach to estimating the cost of debt. This would potentially incur significant one-off regulatory cost both in terms of administrative costs of implementing the change and the impact on the conditional regulatory predictability that the IMs are intended to promote.³⁶
4. A change in regulatory approach could impose a significant one-off gain or loss on regulated businesses. In such circumstances, a transitional regime should be adopted in order to mitigate this effect.³⁷ However, a transition to a TACD approach is likely to be subject to significant debate.³⁸
5. Updating the price path to take account of take into account a revised cost of debt would be an additional administrative burden.³⁹
6. If a 10-year trailing average is used it is likely to overcompensate suppliers compared to the existing approach. The allowance for the cost of debt would be based on the price of issuing debt with a term of 10 years, rather than five years.⁴⁰

³³ Draft IM decision, para. 135.1.

³⁴ Draft IM decision, para. 135.2.

³⁵ Draft IM decision, para. 135.3.

³⁶ Draft IM decision, para. 135.5.

³⁷ Lally (2016), p.15.

³⁸ Draft IM decision, para. 135.6.

³⁹ Draft IM decision, para. 135.7.

⁴⁰ Draft IM decision, para. 135.4.

Of these six concerns, the first two are conceptual arguments about perceived shortcomings of the TACD approach. The remaining four issues relate to implementation and design questions. To the extent that different implementation and design options are available, the Commission should consider those matters separately from the conceptual arguments about whether the TACD approach has merit. For instance, the Commission could conceivably decide that a TACD approach should be adopted, but may prefer a different implementation approach to the one proposed by particular submitters. The Commission should not reject the idea of the TACD approach on the basis that it disagrees with specific design options put forward by stakeholders.⁴¹

In this section, we deal first with the two conceptual arguments against the TACD approach offered by the Commission. We then address the four implementation concerns raised by the Commission.

3.1 Blunting of signals for efficient investment

The Commission argues that prevailing interest rates provide the best signals to investors about the expected cost of capital of future investments. The corollary of this view is that the use of historical rates to determine the cost of debt allowance (as would be the case under the TACD approach) might blunt these signals and weaken incentives to make efficient investments.

There are two counterarguments to this view:

- When suppliers are contemplating efficient, long-lived investments (e.g., 50 years or more), it is far from clear that those investments are made on the assumption that prevailing rates are likely to be representative of the cost of capital the suppliers are likely to face over the lifetime of those investments.⁴² This is particularly so when interest rates have a tendency to be volatile over time (because under such circumstances prevailing rates are unlikely to be a good predictor of rates in the distant future).
- A more important consideration to investors is whether, over the investment horizon, the revenues that those assets will generate will be adequate to cover the costs (including the cost of capital) associated with those investments.

⁴¹ In any case, as the Commission itself has noted, the proposed implementation of the TACD approach varies between submitters.

⁴² If suppliers did attach significant weight to prevailing rates when making investment decisions, we would have expected to see a glut of investments by regulated businesses around the world in the early 2000s, when the ROTD was very high, and a significant slowdown in investment by those businesses since 2008 once the ROTD fell sharply. There is no evidence of this having occurred in countries like Australia, where the ROTD approach was, until recently, ubiquitous.

- In that regard, a regulatory approach such as the TACD approach that aligns the regulatory allowance to efficient debt costs is likely to enhance, rather than deter, efficient investment.
- By contrast, an approach such as the ROTD approach, which tends to produce mismatches between the efficient cost of debt and the allowed cost of debt makes the returns to shareholders from future investments more volatile and uncertain. The supplier would also face weakened incentives to invest (or may seek to delay otherwise efficient investment) if the efficient cost of capital faced by the supplier rises above the cost of capital allowance locked in by the ROTD approach. As a result, the ROTD approach is more likely to deter efficient investment than would the TACD approach.

3.1.1 Views of regulators overseas

We note that a number of Australian regulators, who use prevailing rates when estimating the risk-free rate used in the cost of equity allowance, have also adopted the TACD approach. These regulators include the ESC, ESCOSA, the AER and the ERA. None of these regulators consider that the adoption of the TACD approach would deter efficient investment. They all accept that the alignment of the regulatory allowance to efficient costs under the TACD approach would promote certainty and stability of returns.

We present below views expressed by a number of regulators, including ESCOSA, the AEMC and Ofgem on this issue.

ESCOSA

When it announced its intention to adopt the TACD approach, ESCOSA argued that the approach would encourage investment at prevailing rates (which make up a portion of the TACD), while rewarding efficient past financing practice:⁴³

The approach incentivises SA Water to finance any new investments at or below the prevailing efficient market rates, meaning that consumers ultimately pay not more than the efficient cost of those investments. For legacy investments, the approach recognises efficient past financing practices (but does not reward inefficient practices), encourages efficient management of the re-financing costs of those investments over time and in that way reduces the volatility inherent in an approach which assumes all legacy financing costs will be re-financed at the start of a new, four or five year, regulatory period.

⁴³ ESCOSA (2015), p.30

AEMC

When weighing the pros and cons of the TACD approach, the AEMC explained how mismatches in the cost of debt could influence incentives for efficient investment.⁴⁴

The impact on the incentives for efficient capex is also an important consideration. The incentives for efficient capex are stronger when the difference between the return on debt and the debt servicing costs of the service provider is minimised.

Ofgem

In 2010, when Ofgem rolled out its current RIIO regulatory framework, it introduced the TACD approach. In guidance to the industry about how RIIO would operate, Ofgem made clear that a key role of the WACC allowance is to facilitate new investment:⁴⁵

The allowed return has two main roles in the regulatory framework. First, it provides a fair return to existing investors in network companies and second it is the value which facilitates investment in new infrastructure.

Like ESCOSA and the AEMC, Ofgem regarded the TACD approach as a means of ensuring that regulated businesses are allowed to earn a return commensurate with their efficient cost of debt. This in turn, said Ofgem, would promote efficient investment.⁴⁶

Our approach, under the RIIO model, is to extend the concept of regulatory commitment to the estimation of the cost of debt. We believe that if there is a commitment to remunerating efficiently incurred debt costs, it will facilitate a greater role for equity in the capital structure of regulated companies going forward. We also believe that such an approach will mean a higher likelihood of getting the WACC 'right' thus leading to better investment decisions by companies.

Ofgem also made clear that the TACD was a means of managing uncertainty (i.e., an 'uncertainty mechanism') and would give businesses confidence that their efficient debt costs would be funded through revenue allowances.⁴⁷

Under the RIIO model the cost of debt embedded in the allowed return will be based on a long-term trailing average of forward interest rates, and the revenues allowed under the price control will be adjusted each year for changes in this trailing average. This annual adjustment for changes in the cost of debt will be entirely mechanistic, with the rules determined at the price control review. This will represent a type of uncertainty mechanism. Estimating the cost of debt on this basis should provide

⁴⁴ AEMC, Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services, Final Position Paper, 15 November 2012, p.58.

⁴⁵ Ofgem, Handbook for implementing the RIIO model, 4 October 2010, p.108.

⁴⁶ Ofgem (2010), p.108.

⁴⁷ Ofgem (2010), pp.108-109.

comfort that new debt, financed at efficient rates – even at levels higher than the allowed return - will be fully funded in the future.

Ofgem assured businesses in this way because it considered that they would be less likely to pursue efficient investments if they faced uncertainty over whether their efficiently-incurred cost of debt would be covered by the allowed cost of debt.

3.1.2 Inconsistency with approach to TAMRP

We also note that the Commission’s preference to focus on prevailing rates when determining the cost of debt allowance is at odds with its approach to the TAMRP. The Commission states in its Draft IM decision the following:⁴⁸

We also note that we are setting a TAMRP for the IMs, so the value we determine will apply to all WACC determinations until the next review of the IMs (in up to seven years’ time). Therefore, we consider it inappropriate to give significant weight to short term movements in TAMRP, as these movements may not reflect the value expected to prevail over the period until the IMs are next reviewed.

In other words, the Commission argues that it is “inappropriate to give significant weight to short term movements in TAMRP” because the TAMRP allowance would be locked in for a significant period of time (i.e., the interval between IM reviews), and those prevailing estimates may not be reflective of the actual TAMRP over which the allowance would be fixed. (It is puzzling why the Commission does not say that such an approach would blunt incentives for efficient investment.)

At the same time, the Commission argues that the cost of debt allowance should be set using the ROTD approach, which fixes the prevailing cost of debt for several years, notwithstanding that the prevailing cost of debt could move significantly over that period.

These two positions are inconsistent. Our recommended approach is clear and internally consistent:

- Both the cost of debt allowance and the TAMRP allowance should be updated annually rather than fixed for significant periods of time.
- The cost of debt allowance should be estimated using the TACD approach, which would reflect prevailing *and* past rates, and reflect efficient debt financing practices.
- The TAMRP allowance should be estimated using a range of techniques, with the weights attached to each approach reflecting the strengths and characteristics of that approach, and depending on whether market

⁴⁸ Draft IM decision, para. 434.

conditions at the time the Commission makes its estimates are normal or abnormal.

3.2 Violation of the NPV=0 principle

Dr Lally has advised the Commission that use of the TACD approach increases the potential for violations of the NPV=0 principle (and thus increases bankruptcy risk).

It is important to be clear what the NPV=0 principle is. This principle simply means that, over the lifetime of the regulated assets, the expected present value of regulated revenues generated by those assets should just equal the expected present value of the efficient costs (including opportunity costs) associated with those assets. Under these circumstances, the NPV of the investment would just equal zero.

- If the expected present value of future regulated revenues *exceeds* the expected present value of efficient costs, the supplier would earn supernormal profits, and consumers would pay more than is efficient.⁴⁹
- If the expected present value of future regulated revenues *is below* the expected present value of efficient costs, the supplier would earn subnormal profits, and would therefore have no incentive to invest.

We agree with the notion that the present value of expected future revenues should equal the present value of efficient costs. To meet this objective, the Commission should strive to set revenue allowances each period on the basis of its best assessment of efficient practice, and efficient costs, over the forthcoming regulatory period.

In this regard, when selecting an approach to determining the cost of debt allowance, the Commission should ask the following questions:

1. *What is the most efficient financing approach available to the regulated supplier(s)?*⁵⁰
2. *What is the cost of debt commensurate with that efficient financing approach?*

If the Commission sets the regulatory allowance in line with that efficient cost of debt, it will have determined an allowance that is, in expectation, likely to satisfy the NPV=0 principle. This process is no different to the one the Commission and other regulators follow when determining efficient expenditure allowances.

⁴⁹ Of course, *ex post*, a supplier's actual revenues may exceed its efficient costs if the regulator failed to forecast efficient costs accurately, or (under a system of incentive regulation) if the supplier became more efficient than anticipated or outperformed in some way.

⁵⁰ The efficient financing practice may vary depending on the characteristics and circumstances of the supplier.

As we and others have set out in submissions, a staggered refinancing policy is the most efficient debt management approach for infrastructure businesses (including Transpower) with relatively large debt portfolios. This has been accepted by a number of regulators overseas. Dr Lally himself agrees that such an approach is “clearly efficient” (at least in respect of the debt premium). The TACD approach aligns the regulatory allowance to this efficient debt management strategy and, therefore, is consistent with the NPV=0 principle. It is not at all clear why any violation of the principle should occur.

By contrast, the ROTD allowance can deviate materially from the cost of debt that would be faced by suppliers following an efficient debt management strategy, and so is more likely than the TACD to violate the NPV=0 principle.⁵¹

If the Commission maintains its ROTD approach to the cost of debt on the basis of the NPV=0 principle:

- It should explain that its favoured ROTD approach is likely to violate the NPV=0 principle;
- It should explain how the NPV=0 principle would be met by setting a regulatory allowance different from the efficient cost; and
- It should explain whether it understands the NPV=0 principle to mean something other than that setting expected allowed revenues to equal the expected efficient costs.

3.3 One-off administrative cost and regulatory uncertainty

The Commission argues that moving from a prevailing approach to a trailing average approach would be a substantial policy change in the approach to estimating the cost of debt. This, suggests the Commission, would potentially incur a significant one-off regulatory cost both in terms of administrative costs of implementing the change and the impact on the conditional regulatory predictability that the IMs are intended to promote.

3.3.1 Administrative switching costs

In our view, the Commission has overstated the one-off administrative switching costs associated with moving from the ROTD approach and the TACD

⁵¹ The only way the ROTD approach would not violate the NPV=0 principle is if mismatches (of the ROTD, relative to the efficient cost of debt) in one direction are offset over time by mismatches in the other direction. As discussed in section 2.2.2, this is likely to occur only over the very long-run, if at all.

approach. In Australia, these costs have been minimal. In terms of administrative changes, a move to the TACD approach would require three things:

- *An amendment to the IM.* Once the form of the trailing average has been decided, it would be trivial to write down clearly how the TACD approach would be implemented. The Commission has developed new approaches in the past, and there is no reason why it would be incapable of developing a suitable TACD methodology, especially in light of the work that has already been performed by regulators in other jurisdictions.
- *A clear explanation of how the TACD would work.* This could be achieved through the Commission's IM decision (as any other change to the IM would be explained).
- *Modification of the revenue model.* If the TACD approach is adopted, it would be necessary to modify the revenue models used by the Commission and suppliers to calculate maximum allowable revenues (MAR), in order to accommodate annual updating of the return on debt. The AER has already worked out in detail how this should be done. In January 2015, the AER released an update to its post-tax revenue model (PTRM). The new PTRM now accommodates annual updating of the return on debt allowance, in order that the trailing average approach may be implemented. This model release was also accompanied by detailed documentation on the changes made to the model.⁵² In brief, the steps used by the AER to effect annual updating (through a five-year regulatory period) are the following:
 1. At the beginning of the regulatory period, compute the TACD.
 2. Insert the resulting return on debt allowance for all five years of the regulatory period.
 3. Compute allowed revenues as usual.
 4. After one year, recompute the TACD.
 5. Insert the resulting number for each of the remaining four years to produce a new set of annual revenues (this happens automatically in the PTRM).
 6. Apply an X-factor smoothing to spread the resulting MAR over the remaining four years (again, this is automated in the PTRM using a smoothing macro).
 7. Repeat steps 4 to 6 for each of the remaining years of the regulatory period.

⁵² AER, Amendment – Electricity distribution network service providers – Post-tax revenue model handbook, Final Decision, 29 January 2015.

We can see no reason why the Commission could not update its own revenue model, particularly when it can build on the work of other regulators that have adopted the TACD approach.

3.3.2 Regulatory uncertainty

It is unclear to us why the Commission considers that adoption of the TACD approach would increase regulatory uncertainty. To the contrary — doing so should reduce uncertainty.

- As explained above, the main benefit of the TACD is that it aligns the regulatory allowance of the cost of debt to the efficient debt cost.
- This would reduce significantly the scope for mismatches between the cost of debt of suppliers that finance their activities efficiently and revenues (relative to the ROTD approach).
- This, in turn, would enhance rather than reduce certainty to suppliers and consumers. Indeed, this a key benefit cited by Ofgem, ESCOSA and other regulators that have adopted the TACD approach.⁵³

As long as the Commission implements the TACD approach in a predictable way (as other regulators have done), and as long as the Commission does not make unexpected changes to the approach once it has been rolled out, there is no reason to suppose that adoption of the TACD approach would increase regulatory uncertainty.

3.4 One-off gains or losses and transitional arrangements

Dr Lally argues that a change in regulatory approach could impose large, one-off gains or losses on regulated businesses (or consumers). For example, Dr Lally notes that a switch to the TACD approach might require some suppliers to change their hedging behaviour. Specifically:

- Some suppliers may have executed swap contracts to align the base rate of their cost of debt to the Commission's risk-free rate allowance.
- Under a full TACD approach, there would be no need to enter into such agreements. However, some existing agreements may remain outstanding at the time the Commission switches approaches.

When considering the TACD approach in 2012, the AEMC anticipated precisely this concern and recommended that transitional arrangements be considered in the event that a supplier had extant hedging agreements (entered into under the

⁵³ Ofgem introduced the TACD approach explicitly as a mechanism to reduce regulatory uncertainty.

ROTD approach) that needed to be unwound (because they are not needed under the TACD approach). However, such unwinding is unlikely to be needed as swaps entered into in order to match the ROTD allowance would expire naturally at the end of the regulatory period. Thus, the supplier would enter the next regulatory period with no hedge book.

A separate claim that has been made in Australia is that the switch from the ROTD approach to the TACD approach may inadvertently award regulated networks a windfall gain. This is because (as described in section 2.2.2) a number of networks faced resets under the ROTD approach in 2009, near the peak of the GFC. The AER alleged that because most businesses followed a staggered debt management approach, their actual (trailing average) debt costs were much lower than the peak-GFC rates that were locked into revenue allowances under the ROTD approach. The AER considered that had it continued with the ROTD approach, this ‘gain’ would have eventually been offset by mismatches in the opposite direction. However, according to the AER this would not occur if it switched suddenly to the TACD approach. The AER argued that an immediate change of approach would lock in a windfall gain to the regulated networks. Consequently, the AER sought to apply transitional arrangements that would effectively ‘clawback’ that gain by deliberately setting the regulatory allowance below the efficient cost.⁵⁴

As we have explained elsewhere, such arrangements would have undesirable consequences in the regulatory setting.⁵⁵ However, the alleged windfall gain that the AER sought to address in Australia does not arise in New Zealand. This is because the earliest price-setting decision made by the Commission under the current IM was in 2011 — well after the peak of the GFC, by which time the effects of the GFC on prevailing rates in debt markets had dissipated. So no AER-type clawback is necessary or warranted in New Zealand, even if such a clawback were justified.

In any event, the fact that the Commission would have to consider whether (a) some sort of transition should be applied and (b) the specific form of any such transition should not be used as a reason for the outright rejection of the TACD approach.

3.5 Administrative burden owing to annual updates

The Commission argues that updating the price path to take into account a revised cost of debt would be an additional administrative burden. In our view, this concern is also overstated.

⁵⁴ This action by the AER was the cause of the recent cost of debt appeals in Australia that the Commission refers to in the Draft IM decision.

⁵⁵ Frontier Economics bulletin, *Once bitten, twice shy*, May 2016.

When the AER was developing its trailing average approach, a number of stakeholders suggested that this process of annual updating would add significant complexity to the regulatory process. However, it became evident that a mechanistic process for making these updates could be developed, and that the resulting increase in complexity would be minimal.

At present, the Commission publishes frequent updates of the WACC. As such, there would be no additional administrative burden imposed on the Commission by having to update the TACD annually.

Another concern raised by stakeholders in Australia was that annual updating through the regulatory period might introduce volatility in prices to customers. However, the year-on-year changes in the return on debt allowance tend to be fairly small in most years. In addition, it might be more preferable to customers to face relatively small annual changes (up or down) in regulated prices than infrequent but large changes (due to the accumulated effect of movements in the return on debt over the regulatory period if the return on debt were updated at each regulatory reset).

On the issues of complexity and price volatility, ESCOSA explained recently that annual updates of the return on debt could be thought of in the same way as annual updates to regulated prices or revenues for inflation, which most regulatory frameworks provide for.⁵⁶

The implication of annual updating is that the regulator cannot determine in advance what the exact revenue allowed will be in the outer years of the regulatory period. Therefore, just as allowed revenue is adjusted each year for actual inflation, adjustments could also be made to reflect changes in the cost of debt. These annual adjustments would not be substantial as nine out of ten years which make up the cost of debt calculation would be the same as the previous year, thus smoothing out the revenue path when compared with resets that coincide with regulatory terms.

Annual updating of prices in this way is a fairly trivial and mechanistic process that involves neither regulators nor regulated businesses incurring significant additional regulatory burden.

3.6 Alleged overcompensation by 10-year TACD

As the Commission notes in its Draft IM decision, a number of suppliers (including Transpower) proposed the use of a 10-year TACD approach. The Commission argues that if a 10-year trailing average is used, it is likely to overcompensate suppliers compared to the existing ROTD approach. This is because the 10-year trailing average implies that the allowance for the cost of debt should be based on 10-year tenor debt rather than five-year tenor debt. In the event that

⁵⁶ ESCOSA, SA Water Regulatory Rate of Return 2016 – 2020: Final Report to the Treasurer, March 2015, p.59.

the yield curve is upward-sloping, the former would attract a higher premium than the latter.

In our view, the question of whether the TACD approach should be adopted is entirely separable from the question of whether the approach should or should not take the form of a 10-year trailing average. At present, the Commission seems to be conflating this design option with the broader question of whether the TACD approach is appropriate or not.

Placing that aside, we note that the Commission's position is based on the premise that the 'right' term assumption is one that matches the length of the regulatory period (i.e., five years). This view derives from a belief that the only term assumption that satisfies the NPV=0 principle is one that matches the length of the regulatory period.

That view would be correct only if the efficient debt management practice was for suppliers to fix rates for their whole debt portfolios in line with regulatory cycles. However, that is not an approach that is adopted by non-regulated infrastructure businesses, which tend to adopt debt management approaches that align with the TACD approach. That is, the only reason for a business to fix rates every five years would be because the approach of the regulator drove them to depart from the debt management approach that they would otherwise have adopted. By contrast, if the regulator were to adopt the TACD approach, and if the supplier adopted the standard debt management strategy used generally by infrastructure businesses, there would be a match between the regulatory allowance and the efficient cost – which is consistent with the NPV=0 principle.

There are two important points to make in relation to the NPV=0 principle:

- If the staggered debt management strategy (consistent with the general approach of infrastructure businesses) is efficient (as the Commission acknowledges it is), and suppliers adopt such a strategy, the *only* regulatory approach that is consistent with the NPV=0 principle is the TACD approach.
- Under the ROTD approach, it is *impossible* for the NPV=0 principle to hold in every period – because the ROTD approach does not account for the fact that the debt premium will be fixed when the debt is issued, rather than at the time the base rate is fixed at the beginning of each regulatory period.

In addition, as the Commission itself accepts, it is efficient for some suppliers (including Transpower) to issue debt with tenor in excess of five years. For example, the Commission states that:⁵⁷

A prudent supplier may issue debt for longer than five years to reduce the refinancing risk associated with assets that have long economic and engineering

⁵⁷ Draft IM decision, para. 198.

lives. We consider that a supplier financing assets to reduce refinancing risk in this way is likely to be providing long-term benefits to consumers, and this is why we continue to consider that including a TCSD helps provide the best estimate of a cost of capital incurred by prudent suppliers.

We are advised by Transpower that, in its case, it prefers 10-year debt (some of which is issued overseas rather than domestically) rather than 5-year debt because this:

- aligns better with the long-lived nature of Transpower's assets; and
- reduces its refinancing risk.

As explained in section 3.2, the NPV=0 principle requires that the regulatory allowance must be set in line with efficient costs. Therefore, to the extent that 10-year debt is an efficient tenor of debt for Transpower and some other suppliers, and that debt is staggered, a 10-year TACD would *not* overcompensate those suppliers.

We note that Transpower is regulated under an individual price-quality path (IPP) regime. This means that the Commission could put in place bespoke TACD arrangements for Transpower that reflects the debt management strategy that is most efficient for businesses with Transpower's characteristics. It would be open to the Commission to take a different approach to suppliers regulated under a default price-quality path (DPP) approach if it considers that is warranted. Given the IPP framework that applies to Transpower, the Commission should not seek to automatically apply the same approach to Transpower and suppliers regulated under the DPP framework.

4 Tax-adjusted market risk premium

The Commission proposes not just to retain its current methodology for estimating the TAMRP, but continue to fix in the IM a *specific estimate* of the TAMRP, 7.0%.⁵⁸ This was also the Commission's approach in the 2010 IM.

As the Commission acknowledges, this estimate will not be reconsidered (even in the context of particular regulatory decisions) until the IM is reviewed again in up to seven years' time.⁵⁹

The Commission cited the following reasons for its decision:

1. Given that the various approaches to estimating TAMRP produce significantly different estimates of TAMRP, and that no approach is generally accepted as superior or free from methodological criticisms, the Commission prefers to place (equal) weight on a wide range of estimates, rather than preferring one approach over others.⁶⁰
2. The Commission considers that historical estimates of equity returns are useful indicators of a prevailing TAMRP, and understands that such methods are widely used by other analysts to estimate TAMRP (who continue to place weight on estimates of TAMRP derived from such approaches).
3. Using a range of estimates is the Commission's long-standing approach, and this approach has produced a stable and predictable estimate of TAMRP. This has advantages for investors and consumers of regulated services, and is appropriate when specifying IMs which will apply to WACC determinations for up to seven years.⁶¹

In this section we address each of the arguments enumerated above.

4.1 Weighting of estimates

The Commission argues that given that the various approaches to estimating TAMRP produce significantly different estimates of TAMRP, and that no approach is generally accepted as superior or free from methodological criticisms, the Commission prefers to place (equal) weight on a wide range of estimates, rather than preferring one approach over others.

⁵⁸ Draft IM decision, para. 436.

⁵⁹ Draft IM decision, para. 434.

⁶⁰ Draft IM decision, para. 436.1.

⁶¹ Draft IM decision, para. 436.3.

As we noted in section 2.2 of our February report, whilst the Commission considers estimates derived using different approaches, and those estimates display a reasonable degree of variation, the Commission keeps arriving at the same estimate of the TAMRP, 7.0%. The Commission's approach produces an estimate of 7.0% during economic expansions, financial crises, and everything in between. A key reason for this is because the Commission's approach to assessing the empirical evidence on the TAMRP has a tendency to entrench the same estimate.⁶²

- Most of the approaches the Commission considers produce estimates that move very slowly over time (i.e., Ibbotson, Siegel 1 and surveys). If the Commission computes a mean estimate of the TAMRP, estimates from the few approaches that vary more with prevailing market conditions (i.e., DGM, Siegel 2) would generally have to be implausibly high to ever move the Commission away from its traditional estimate of 7.0%.⁶³ The Commission does not dispute this point in its Draft IM decision.
- If the Commission computes a median estimate of the TAMRP (as it did in its most recent decision in respect of UCLL/UBA pricing), during periods when prevailing market conditions deviate significantly from average market conditions, the ordinal ranking of estimates will generally mean that slow-moving estimates (e.g., Ibbotson and/or surveys) will determine the final estimate of the TAMRP (and estimates from all other sources will generally be discarded).⁶⁴ Again, this will tend to result in a persistent estimate of 7.0%. Once again, the Commission does not dispute this point in its Draft IM decision.

So, whilst the Commission claims that its preference is to place weight on a wide range of estimates, in fact its approach will tend to favour slow-moving estimators that will entrench a value of 7.0%, irrespective of the cost of capital actually faced by suppliers in different market conditions. This, in our view, is not a reasonable approach because it is unlikely to produce estimates of the TAMRP that reflect the risk premiums that suppliers actually face.

In general, we agree with the Commission that the TAMRP is difficult to estimate, and that the estimate should be informed by a range of approaches.

⁶² We also explained in section 2.5.2 of our February report that the Commission's policy of rounding TAMRP estimates to the nearest 0.5% also makes it very difficult for the overall estimate to deviate from a figure of 7.0%. There is no economic or regulatory rationale for rounding estimates in this way. Whilst the Commission suggests in the Draft IM decision that the effect of rounding on the TAMRP allowance is small, we showed section 2.5.2 of our February report that this practice can have significant impact (upwards, or downwards, depending on the direction of rounding) on revenues. In cases where the TAMRP estimate is rounded up, this practice will be to the detriment of consumers.

⁶³ The reasons for this are set out in full in section 2.5 of our February report.

⁶⁴ The reasons for this are set out in full in section 2.5 of our February report.

Thus, for a given set of estimates, the question is how those estimates are distilled into a final allowed TAMRP. The Commission's approach is essentially to distil every set of estimates into an allowed TAMRP of 7.0%. Estimates during economic expansions are distilled into an allowed TAMRP of 7.0% and estimates during financial crises are also distilled into an allowed TAMRP of 7.0%. As we explained in our February report, an allowed TAMRP of 7.0% is the inevitable consequence of the fact that (a) three of the five approaches that the Commission considers produce effectively constant estimates and (b) the Commission then rounds the average estimate to the nearest 0.5%.

Whereas the Commission and its advisers recognise that the true TAMRP varies with financial market conditions, the Commission's practice is to fix the allowed TAMRP to a constant 7.0%. The Draft IM decision is quite explicit about this in that the Commission does not propose to even try to estimate a TAMRP that is consistent with the prevailing market conditions at the time of each determination, but rather has announced that it will always use 7.0%, regardless of whatever conditions might be encountered in the future.

The Draft IM decision and Dr Lally are also quite explicit about the fact that the fixed 7.0% TAMRP will overstate the true risk premium during some economic conditions and understate it during others. As we discuss above, the Commission appears to be comfortable with this known mis-estimation on the basis that it also knowingly mis-estimates the debt premium and it hopes that these two errors might offset one another. By contrast, our approach would be to seek to provide estimates of debt premium and the TAMRP that best reflect the efficient cost of debt and equity for an efficient supplier.

In our February report, we explained why the Commission's approach of applying equal weight to three approaches that produce effectively constant estimates of the TAMRP, regardless of what estimate might be produced by the other approaches that the Commission considers. We provided some examples of how some practitioners and other regulators had considered other methods for estimating equity risk premiums and how they had applied different weighting schemes – for the Commission to consider. However, as set out above, the Draft IM decision indicates that the Commission favours strongly an approach that “puts to bed” the question of the TAMRP for the duration of the IM. One way of doing this is to fix a figure of 7.0% for the duration of the IM. However, as set out above, this has the unattractive feature that it cannot reflect evidence of any changes in equity risk premiums over the next several years. An alternative approach would be for the Commission to set the weights that it will apply to the estimates from its various approaches to estimating the TAMRP.

Dr Lally has argued that in our February report we had been imprecise about how various TAMRP estimators should be weighted. Taking on board his comments, for clarity, we would propose the following framework for

determining the weights that should be applied to the Commission's favoured approaches for estimating the TAMRP:

- We first note that the Commission produces estimates for New Zealand and for international markets. A natural default would be to place 50% weight on the New Zealand estimate and 50% weight on the international estimate (which reflects data from a number of countries). If the Commission considered that different relative weights should be applied it could explain why. In the past, the Commission has favoured the approach of applying equal weights.
- Next, we note that Dr Lally divides the Commission's estimates into two groups – those that analyse historical data (Ibbotson, Siegel 1 and Siegel 2) and those that use current forward-looking data (DGM and surveys).⁶⁵ Again, a natural default would be to place 50% weight on each. The historical estimates have the advantage of being based on large data sets, but they necessarily reflect average market conditions, which may differ from the prevailing conditions. The forward-looking estimates are less precise statistically, but have the benefit of reflecting the prevailing market conditions.
- The Commission considers two types of historical estimates – those based on historical excess returns (Ibbotson and Siegel 1) and those based on historical real returns (Siegel 2). The excess returns estimates are based on the assumption that the TAMRP is constant over time and the required return on equity moves one-for-one with changes in the risk-free rate. The real returns approach assumes that the real required return on equity is constant over time and the TAMRP moves to offset changes in the risk-free rate. These are the two end points of a spectrum and the truth likely lies somewhere in between. For this reason, a natural default estimate would be to place 50% weight on each approach. But again, the Commission could set out reasons for preferring a different weighting.
- The next question is how to distil a single historical excess returns estimate from the Ibbotson and Siegel 1 approaches. For the reasons set out in our previous report, and in the Appendix to this report, we consider that no weight should be applied to the Siegel 1 approach. The Siegel 1 approach is the Ibbotson approach less a deduction based on the extent to which inflation might have exceeded expectations during part of the sample period. The Commission would have to consider how reasonable it would be to

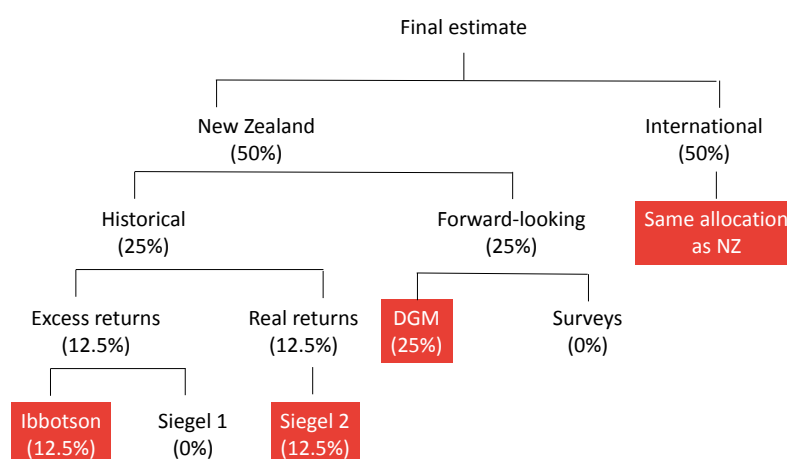
⁶⁵ We have previously questioned whether surveys really do provide a forward-looking estimate of the required return on equity – given that they have tended to produce the same estimate during expansions, recessions and crises. Nevertheless, Dr Lally and the Commission consider that surveys should be considered to be forward-looking because the respondents have the option of changing their estimate from time to time if they wish.

make this adjustment to the observed data, and weight the Siegel 1 approach accordingly. We note that it is certainly not appropriate to consider the Ibbotson and Siegel 1 approaches to be separate techniques. Contrary to what Dr Lally claims in his advice to the Commission, this would be akin to considering DGM estimates based on different long-run growth rates to be separate estimates.⁶⁶

- The final question is how to distil a single forward-looking estimate from the DGM approach and survey responses. For the reasons set out in our February report, we consider the TAMRP survey responses to be among the most unreliable evidence that a regulator might consider and recommend that they be given no weight.⁶⁷ Of course, if the Commission considered that surveys were due greater weight vis-à-vis DGM estimates, it would need to justify why.

In summary, our recommended default weightings are as set out in Figure 6 below.

Figure 6: Frontier's suggested default scheme for weighting TAMRP estimators



Source: Frontier Economics

⁶⁶ We note that the Commission currently does treat the Ibbotson and Siegel 1 approaches to be separate estimates. This has the effect of doubling the weight applied to the historical excess returns.

⁶⁷ If the Commission were to restrict its survey evidence to Fernandez-type estimates employed in the UCLL/UBA decision, and by Dr Lally, we consider that survey kind of evidence is entirely unreliable and should be given no weight at all. However, if the Commission were to expand its survey evidence to include expert valuation reports (as some regulators in Australia do), then some minimal weight could be given to the survey evidence. Independent valuation reports typically provide considerably more information about how estimates are derived, and to what purpose they would be put, than is offered by Fernandez-type studies.

Using the Commission’s estimates for each approach as set out in the UCLL/UBA decision this weighting scheme would produce a TAMRP estimate of 7.8%.

4.2 Estimating the prevailing TAMRP using historical returns

The Commission concludes that “historical estimates of equity returns are useful indicators of a prevailing TAMRP”. This is a somewhat ambiguous statement. If by this the Commission means that it considers the Ibbotson approach produces TAMRP estimates that are reliable estimates of the prevailing TAMRP, we disagree.⁶⁸

As we argued in section 2.6.1 of our February report, because the Ibbotson approach is to take a long-run average of actual historical excess returns on the market, the Ibbotson approach only produces estimates of the TAMRP that investors should expect during long-run average market conditions.⁶⁹ In abnormal market conditions (e.g., during periods of financial crisis or periods of economic boom), the Ibbotson approach is likely to produce poor estimates of the TAMRP. Estimates of the TAMRP derived from the Ibbotson approach provide very little information on investors’ *required* risk premiums when market conditions have deviated from average conditions. As the Commission has itself explained, the cost of capital is forward-looking, and reflects the returns that investors require in the future.⁷⁰ Therefore, the Commission should seek to estimate the required TAMRP.

Moreover, to the extent that Ibbotson-type TAMRP estimates do vary over time, they will often move in the *opposite* direction to risk premiums actually demanded by investors. For instance, during financial crises when financial risk premiums are at their highest, stock prices tend to fall materially, causing a small reduction in the historical average. Some prominent historical illustrations of this are provided in section 2.6.1 of our February report.

Therefore, the Commission’s statement that “historical estimates of equity returns are useful indicators of a prevailing TAMRP” is true only in certain limited circumstances. At the present time, government bond yields in New Zealand are significantly lower than the historical average level, so it is difficult to

⁶⁸ As we have demonstrated in our February report, the Ibbotson approach is central to Commission’s approach to estimating the TAMRP (for instance, in its recent decision on UCLL/UBA prices).

⁶⁹ Average market conditions would be characterised as conditions in which the risk-free rate and risk premiums are close to their long-run means.

⁷⁰ Commerce Commission (2010), para. 6.1.4.

see how an estimate of the TAMRP in average market conditions would also be an estimate of the TAMRP in the prevailing market conditions.

4.3 Investment banks' views on the TAMRP

The Commission notes that, based on its discussions with analysts, a TAMRP of 7.0% is generally consistent with estimates used by investment banks.⁷¹ The Commission presents Table 2 below, which suggests that three out of five banks surveyed estimated a TAMRP of 7.0%, one estimated the TAMRP to be 6.5%, and one estimated the TAMRP to be 8.0%.

Table 2: TAMRP estimates by major New Zealand investment banks

Investment bank	TAMRP estimate
Craigs Investment Partners	6.5%
Macquarie	7.0%
First NZ Capital	7.0%
UBS	7.0%
Forsyth Barr	8.0%

Source: Draft IM decision, Table 10, p.114.

It is difficult to comment on the reliability of this analysis because the Commission has published very few details about the evidence it has collected.⁷² However, we would caution the Commission against drawing strong conclusions on the basis of what appears to be very anecdotal and incomplete information, gathered from a limited sample of analysts.

A recent Australian study by HoustonKemp has investigated systematically the cost of equity estimates made by independent valuation experts (including investment banks).⁷³ The study covered a large sample of 195 expert valuation reports from 2008 to 2016. HoustonKemp found that:

- The valuation reports used a range of estimates for the MRP, averaging 6.27% (prior to any adjustment for the assumed value of dividend imputation tax credits). This is very close to the estimates produced by an Ibbotson-type approach applied to Australian data.

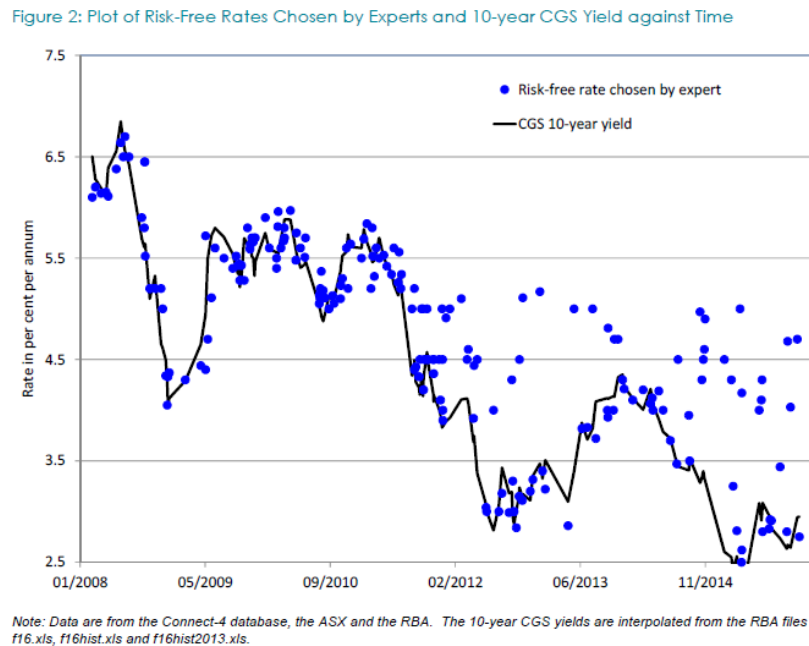
⁷¹ Draft IM decision, para. 435.

⁷² For example: What period do these estimates relate to? For what purpose were these estimates made? How frequently are they reviewed? What level of effort went into producing these estimates?

⁷³ HoustonKemp, The cost of equity: response to the AER's draft decisions for the Victorian electricity distributors, January 2016.

- Until late 2011, almost all valuation reports used a risk-free rate estimate very close to the prevailing 10-year government bond yield.
- However, from late 2011, several valuation reports adopted a risk-free rate in excess of the prevailing 10-year government bond yield as a market-wide adjustment to offset the recent decline in government bond yields (see Figure 7).

Figure 7: Risk-free rates adopted by independent experts



Source: HoustonKemp (2016)

For each valuation report, HoustonKemp computed the effective estimate of the return on the market as the sum of the expert's estimate of the risk-free rate and MRP. HoustonKemp then subtracted the contemporaneous 10-year government bond yield to produce an estimate of the effective MRP.

Next, HoustonKemp used regression analysis to quantify the relationship between the effective MRP used by independent experts and the contemporaneous 10-year government bond yield, and found a statistically significant inverse relationship: For every 1% fall in the government bond yield, the effective MRP was found to increase by approximately 25 basis points.

Thus, there is evidence that, in the current market conditions, independent valuation experts in Australia effectively adopt a higher MRP as government bond yields fall.⁷⁴ However, that would not be apparent by examining in isolation

⁷⁴ Other Australian studies have found evidence of valuation experts applying explicit risk premium uplifts to CAPM-based estimates of the cost of equity, to account for greater risk following the

the headline MRP estimate reported by valuation experts, which is effectively what the Commission has done.

For the avoidance of doubt, we do not argue that the precise relationship found in Australia also holds in New Zealand. We simply say that the Commission would need to undertake much more comprehensive and complete analysis of New Zealand investment banks' estimates of the cost of capital before concluding that 7.0% is consistent with those banks' actual view of the TAMRP.

4.4 The benefits of a stable and predictable TAMRP

The Commission argues that its long-standing approach has produced stable and predictable estimates of the TAMRP, and that this has advantages for investors and consumers. It is certainly true that the Commission's approach has produced stable TAMRP estimates. As we demonstrated in section 2.2 of our report, and as Dr Lally acknowledges, the Commission's estimate has typically been 7.0% irrespective of prevailing market conditions. However, we disagree that this approach has advantages for investors and consumers. In fact, the Commission's approach maximises the volatility in the allowed return on equity – which is neither in the interests of suppliers or customers.

As we explain below, the Commission's approach is deleterious to certainty because:

1. It exposes suppliers and consumers to unabated volatility in government bond yields.
2. It exposes suppliers and consumers to mismatches between the regulatory allowance and the TAMRP required by equity investors.

4.4.1 Increased exposure to volatility in interest rates

In section 2.3 of our February report, we explained that the Commission's approach of fixing its estimate of the TAMRP at 7.0% since 2004, whilst estimating the risk-free rate using the prevailing (i.e., one-month average) yield on five-year government bonds, has meant that the Commission's CAPM estimates of the cost of equity have effectively tracked the movements in government bond yields over time. This has resulted in implausible, counterintuitive regulatory outcomes.

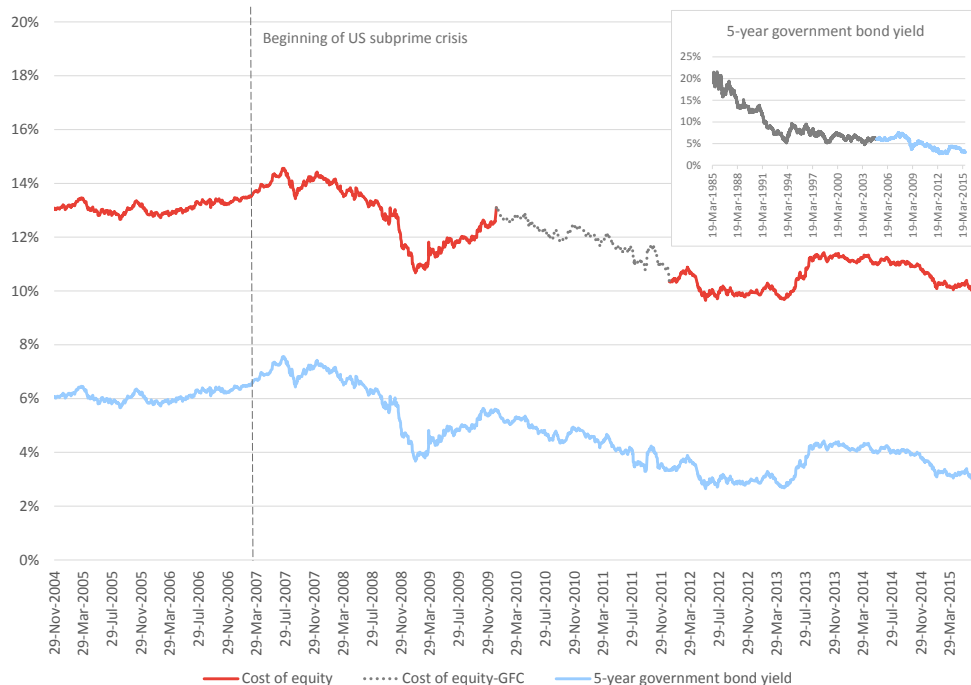
Specifically, as demonstrated in Figure 8, the cost of equity, assessed using the Commission's approach:

GFC. See, for example: SFG Consulting, Evidence on the required return on equity from independent expert reports, 24 June 2013.

- was fairly flat (and even increased slightly) between the end of 2004 and mid-2007, when the start of the US subprime crisis heralded the onset of the GFC; and
- fell sharply as the GFC took hold between 2007 and 2009.

As the chart inset to Figure 8 shows, the period since 2007 saw five-year New Zealand government bond yields fall to the lowest point since records have been kept. The Commission’s approach to the TAMRP has meant that its cost of equity allowance has moved in lock-step with fluctuations in government bond yields, but, there is no reason to think that the *true* cost of equity faced by suppliers moved in this way.

Figure 8: Cost of equity estimates implied approach to TAMRP



Source: RBNZ, Frontier calculations

Notes: The red and grey curves in the main chart plot cost of equity estimates for an average firm (i.e., with a beta of 1) derived using the Commission’s methodology. This involves adding to the Commission’s estimate of the TAMRP the Commission’s estimate of the risk-free rate (i.e., a one-month average of prevailing yields on five-year government bond yields computed using annualised returns). The red curve plots the implied cost of equity during the period the Commission applied a TAMRP estimate of 7.0%; the grey curve plots the implied cost of equity during the period the Commission applied a TAMRP estimate of 7.5%. The chart inset plots the average nominal yield on 5-year New Zealand government bonds since data on those yields became available in 1985.

This volatility in the overall cost of equity allowance has flowed through to prices. As it happens, the decline in government bond yields since the GFC has benefited consumers. However, should bond yields recover, prices to consumers would rise also. So, the Commission’s current approach to the TAMRP exposes consumers and suppliers to interest rate volatility.

Furthermore, not only did the Commission's methodology produce declining estimates of the cost of equity during the worst financial crisis since the Great Depression, the approach also implied that over that period, equity capital was cheaper than ever before. By any reasonable analysis, these are not plausible outcomes, and indicate a serious weakness in the Commission's approach to estimating the TAMRP. We made this point clearly in our February report, but the Commission has offered no response to it in the Draft IM decision.

4.4.2 Mismatches between the regulatory allowance and the true cost of capital

Dr Lally acknowledges that, under the Commission's approach, the true TAMRP has probably moved over time by more than the Commission's estimate (although he does not believe that this additional movement can be estimated reliably).⁷⁵

He also accepts that the *true* TAMRP is likely to be above the Commission's TAMRP estimate when economic conditions are unfavourable, and is likely to be below the Commission's TAMRP estimate when economic conditions are favourable.⁷⁶ In other words, the Commission's current approach imposes mismatches between the true TAMRP and the allowed TAMRP on suppliers and consumers. This can mean that in some periods:

- Consumers end up paying more than would be efficient (i.e., when the true TAMRP is less than the Commission's allowance). This would not promote the long-term benefit of consumers as it would effectively result in suppliers earning excessive profits.
- Suppliers' revenues are insufficient to cover their efficient costs (i.e., when the true TAMRP exceeds than the Commission's allowance). If, as a consequence, suppliers' incentives to innovate and to invest efficiently are eroded, that would also not promote the long-term benefit of consumers.

Whilst the Commission may argue that these wins and losses will eventually even out, that may occur only over the very long-term, if at all. Interest rates have declined and remained persistently low for several years now (which means that suppliers have face a prolonged period of detriment). It is not inconceivable that interest rates could rise and remain persistently high for a long period of time (i.e., over multiple regulatory periods), in which case consumers would likely face a prolonged period of detriment. Whilst this might be evened out over the very

⁷⁵ Lally (2016), p.65.

⁷⁶ Lally (2016), pp.8-9.

long-run, suppliers or consumers are likely to face unjustified wins or losses in the short to medium-term.

For these reasons, we do not think that the Commission's current approach to the TAMRP has advantages to consumers or suppliers.

5 Asset beta

We agree with many aspects of the Commission's proposed approach to estimating asset betas. For instance, we think it is appropriate that:

- *The Commission has proposed to continue using a large sample of comparators, drawn from a range of jurisdictions, rather than the much smaller comparator sample proposed by Contact Energy.*⁷⁷ The use of a large sample of comparators is much more likely to produce statistically robust estimates than analysis conducted using a small sample of comparators (as was proposed by Contact Energy). The Commission is also right to point out that the methodology used by Contact Energy to select its comparators is not transparent. The judgments involved in filtering out comparators as Contact Energy suggests would introduce unwarranted arbitrariness into what is currently a transparent and systematic selection process.
- *The Commission has decided to estimate weekly and four-weekly betas using every possible reference day and then average the results.*⁷⁸ As we noted in our February report, this approach is likely to reduce estimation errors.
- *The Commission has decided to not adjust the estimated energy asset beta for differences in systematic risk between electricity and gas services.*⁷⁹ In our view, there is no reliable way to quantify differences in exposure to systematic risk between electricity and gas networks. Robust estimation of systematic risk is a very challenging task. In practice, it is not possible to distinguish genuine differences in systematic risk from statistical noise. The Commission's own analysis of subsamples within its comparator set found no clear evidence for adjustments to the estimated energy beta, and the Commission concluded (correctly, in our opinion) that:⁸⁰

observed differences in asset betas between electricity and gas are more likely to reflect measurement error than a systematic difference over time.

Whereas it is feasible that two subsets of comparators may have different betas, our view is that the adoption of different beta estimates should be based on evidence that allows the difference to be quantified. The dataset considered by the Commission does not produce reliable evidence of a difference between the gas and electricity subsamples.

⁷⁷ Draft IM decision, para. 315.

⁷⁸ Draft IM decision, para. 286.

⁷⁹ Draft IM decision, paras. 331-392.

⁸⁰ Draft IM decision, para. 384.1.

In the remainder of this section, we discuss one area in which the Commission's approach to estimating asset betas could be improved.

5.1 Statistical precision of daily beta estimates

The Commission proposes to give equal weight to four-weekly and weekly asset beta estimates. It goes on to say that:⁸¹

Due to the 'noisy' nature of daily betas, we consider that they should not be given significant weight when estimating our average asset beta.

In our view, the Commission should not disregard beta estimates based on daily returns data based on this reasoning. The Commission's reasoning (i.e., that daily beta estimates are "noisy") is not correct conceptually or empirically.

The Commission cites work by Professor Olan Henry in which he describes daily data as being "noisy".⁸² The Commission also refers to advice given by PwC to Ofgem in which PwC claims that:⁸³

...standard errors of monthly betas are lower than those for daily and weekly betas as they suffer from less noise.

PwC provide no empirical evidence in its report to support this claim. It does not report and compare the standard errors of beta estimates derived using daily, weekly and monthly returns data. As such, this statement is simply an assertion.

PwC also claims that:⁸⁴

Movements in monthly returns are more likely to be representative of underlying systematic risk than daily and weekly movements because daily and weekly returns may be influenced by short-term factors that have little to do with systematic risk — this is known as "noise" because it obscures the relationship being measured.

This statement is also an unsupported assertion. PwC provides no evidence at all that monthly returns are more likely to be representative of systematic risk than weekly or daily movements, or that short term fluctuations may not provide information about underlying systematic risk.

In fact, exactly the opposite of PwC's claim is true: the standard errors of estimated daily betas are typically lower than the standard errors of estimated weekly and monthly betas. Standard errors are a widely-used measure of the

⁸¹ Draft IM decision, para. 596.

⁸² Draft IM decision, para. 297.

⁸³ Draft IM decision, para. 302.

⁸⁴ Draft IM decision, para. 302.

statistical precision of an estimator. Estimators with large standard errors are likely to be statistically unreliable (i.e., subject to large estimation error). The conventional standard error formula is the following:⁸⁵

$$SE = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (x_i - \bar{x})^2}$$

where N is the number of observations in the sample, x_i denotes an individual observation in the sample and \bar{x} denotes the mean value of these observations. It is clear from this formula that, other things being equal, the standard error of the estimator will fall as sample size increases.

For a fixed estimation period, the higher the frequency of the returns data, the larger will be the number of observations within the sample used for estimation. For example, for a five year estimation period (which is what the Commission uses in its analysis):

- The use of *daily* returns data will deliver 1,250 observations (assuming 250 trading days, on average, within a year).
- The use of *weekly* returns data will typically deliver 260 observations (i.e., 52 weeks \times 5 years).
- The use of *monthly* returns data will typically deliver 60 observations (i.e., 12 months \times 5 years).

For purely mathematical reasons, estimates based on daily returns will have lower standard errors (because of the larger number of observations) than estimates based on weekly and four-weekly estimates.

Professors Stephen Wright, Robin Mason and David Miles explain this in a report to a group of UK regulators, and demonstrate this empirically by estimating daily, weekly and monthly betas for BT. Their results are reproduced below in Table 3, which shows the standard error of the beta estimate increasing as the frequency of the data used falls.

⁸⁵ See, for example, Commerce Commission (2010), footnote 1255, p.560.

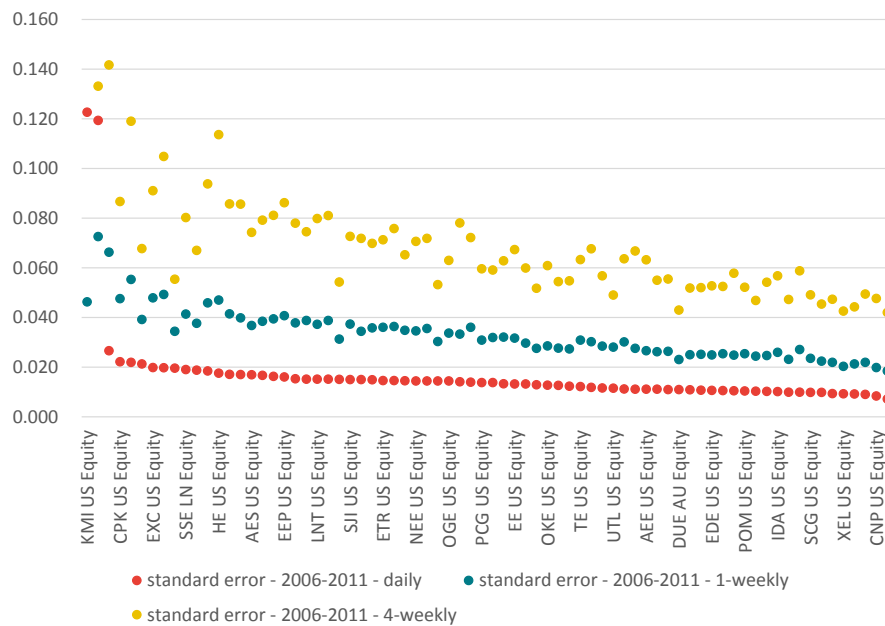
Table 3: Estimates of BT’s beta – 5-year estimation window to August 2002

Frequency of data	Number of obs.	Beta estimate	Standard error
Daily	1,250	1.052	0.034
Weekly	260	0.960	0.074
Monthly	60	0.855	0.124

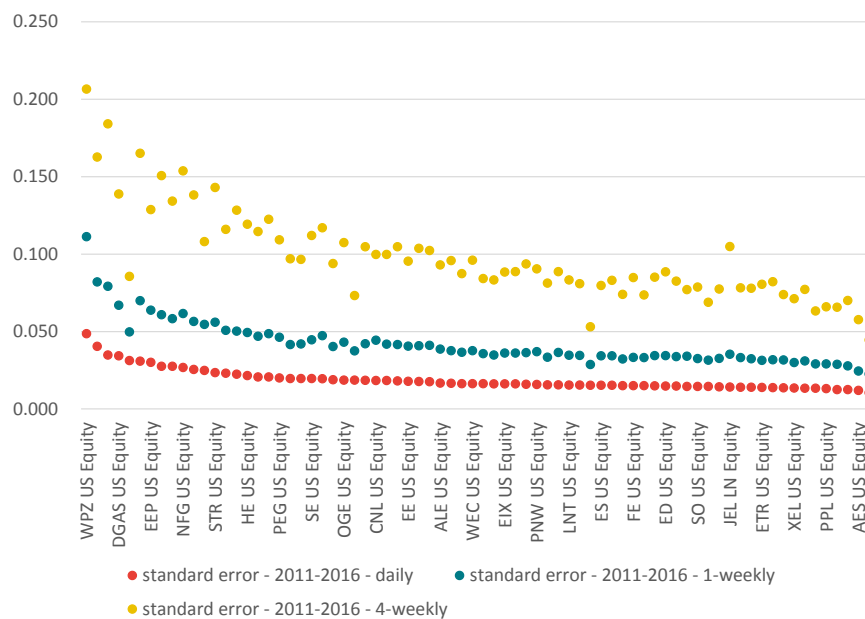
Source: Wright, Mason, Miles, *A study into certain aspects of the cost of capital for regulated utilities in the UK*, 13 February 2003, Table 4.1, p.84

The same pattern can be seen from the Commission’s own beta estimation work. Figure 9 below plots the standard errors of the asset betas, for individual comparators, estimated by the Commission, using daily (red dots), weekly (blue dots) and four-weekly (yellow dots) returns data.⁸⁶

Figure 9: Standard errors of estimated asset betas



⁸⁶ These estimates were sourced from the Excel file entitled *Input methodologies review draft decisions – Asset beta spreadsheet*, which was published by the Commission on 11 July 2016.



Source: Commerce Commission calculations, Frontier analysis

The Commission's calculations show, for the two most recent estimation periods considered by the Commission, that the standard errors of daily beta estimates are almost always lower than those of the weekly and four-monthly estimates. Note that the standard errors of the weekly and four-monthly betas presented in Figure 9 are the standard errors of estimates derived by the Commission using all possible reference days. As such, this result is not an artefact of reference day sampling error.

The analysis above shows that there is no conceptual or empirical reason to think that daily asset beta estimates are more 'noisy' than weekly or four-weekly asset beta estimates.

5.2 Dealing with other statistical problems associated with daily betas

We do not claim that estimates of daily betas are free from statistical problems. However, any of the main statistical problems that may arise can also be addressed relatively easily as part of the estimation process.

- *Serial correlation.* It is well recognised that relatively high-frequency returns data, such as daily data, can be serially-correlated (i.e., correlated over time). Weekly and four-weekly returns data will tend to be less prone to serial correlation. It is important to recognise that the presence of serial correlation will *not* bias beta estimate, but it would make estimated standard errors unreliable. However, a range of techniques (such as the Newey-West approach) have been developed to correct for serial correlation. These

techniques can be implemented very easily in standard statistical software packages.

- *Heteroscedasticity.* The problem of heteroscedasticity occurs when the variance of the regression errors are not constant over all observations. There is no reason to suppose that daily beta estimates are more likely to suffer from this problem than weekly or monthly beta estimates. Like serial correlation, heteroscedasticity would make estimated standard errors unreliable, but would not bias beta estimates. Heteroscedasticity can also be corrected easily using established techniques, such as the White approach and the Newey-West approach.
- *Non-synchronous trading.* Non-synchronous trading refers to the situation where individual stocks prices over-anticipate, or move with delay relative to, movements in the overall market. If this not accounted for in the estimation process, the resulting beta estimates will be biased. Non-synchronous trading is more likely to be a problem with high-frequency (daily) returns than weekly or four-weekly returns, and generally affects thinly-traded or thickly-traded stocks. The Commission already makes allowances for thin trading (by filtering out comparators that are likely to suffer from this problem). Non-synchronous trading can also be controlled for by specifying leads or lags within the model used to estimate betas.⁸⁷ The overall beta estimate for the comparator in question would then be derived by summing up the estimated coefficients (except the constant term).

So, whilst daily beta estimates can suffer from some statistical problems, these can be addressed as part of the estimation process.

5.3 Effect of putting weight on daily estimates

Table 4 below reports the Commission's daily, weekly and four-weekly energy asset beta estimates.

Table 4: Summary of the Commission's energy asset beta estimates

Estimation period	Daily	Weekly	Four-weekly
2011 - 2016	0.39	0.34	0.30
2006 - 2011	0.39	0.36	0.34

Source: Draft IM decision, Table 2

⁸⁷ Dimson, E., 1979. "Risk measurement when shares are subject to infrequent trading", *Journal of Financial Economics*, 7, 197-226.

The Commission's proposed approach is to give equal weight to weekly and four-weekly estimates, and to put most weight on the two most recent estimation periods. This results in an average asset beta estimate of 0.34.

If, instead, the Commission were to give equal weight to daily, weekly and four-weekly beta estimates over the two most recent estimation periods, the Commission's asset beta estimate would be slightly higher, 0.35.

Appendix: Response to Dr Lally's defence of Siegel 1

In our February report, we argued that there is no sound basis for Siegel 1, and that the Commission should not use this approach when estimating the TAMRP. We cited several problems with Siegel 1:

1. The main prediction underpinning Dr Lally's rationale for Siegel 1 (i.e., that real government bond yields would rise relative to 1990 levels) has turned out to be completely wrong. This is a fact that Siegel himself has observed.
2. Siegel himself proposes several possible explanations for the low real government bond yields observed since the 1920s. However, Dr Lally's Siegel 1 approach focuses exclusively on only one of those explanations — unanticipated inflation. Moreover, the adjustment to the historical data that Dr Lally proposes is based entirely on unanticipated inflation. This overstates the role of unanticipated inflation in explaining the low real yields noticed by Siegel.
3. Inflation is only one of many factors that investors may not have anticipated accurately. It is not at all clear why Dr Lally should 'correct' for one example of market outcomes potentially deviating from expectations while ignoring all others.
4. The correction that Dr Lally applies to the Ibbotson estimate, when applying Siegel 1, is likely to be overstated as it fails to account for likely illiquidity premia within the yields on inflation-protected bonds issued by the New Zealand government.

We also argue that Siegel 1 is simply another version of the Ibbotson estimator, so if the Commission were to compute a mean estimate of the TAMRP using these two approaches, it would essentially double the weight given to historical average excess returns.

Dr Lally provides a response to each of these arguments.⁸⁸ However, as we explain below, none of those responses are convincing. We remain strongly of the view that Siegel 1 is entirely without merit, and should therefore play no part in the Commission's TAMRP estimation process.

⁸⁸ Lally (2016), pp.66-69.

Dr Lally's rationale for Siegel 1

In a report prepared for the Commission in 2015, Dr Lally explains his rationale for Siegel 1 as follows:⁸⁹

Siegel (1992) analyses real bond and equity returns in the US over the sub-periods 1802-1870, 1871-1925 and 1926-1990. He shows that the Ibbotson type estimate of the standard MRP (historical averaging of excess returns) is unusually high using data from 1926-1990, due to the very low real returns on bonds in that period. He further argues that the latter is attributable to pronounced unanticipated inflation in that period. Consequently the Ibbotson type estimate of the standard MRP is biased up when using data from 1926-1990. Thus, if the data used is primarily from that period, then this points to estimating the standard MRP by correcting the Ibbotson type estimate through adding back the historical average long-term real risk free rate and then deducting an improved estimate of the expected long-term real risk free rate.

Dr Lally's rationale for Siegel 1 (as embodied in the quote above) may be distilled into three key points:

1. Using US data, Siegel (1992) suggests that average excess returns over the period 1926-1990 were, in Dr Lally's words, "unusually high" because:
 - a. although real equity returns over the period 1926-1990 were similar to real equity returns in earlier periods,
 - b. real returns on government bonds over the period 1926-1990 were significantly lower than real returns on those assets in earlier periods.⁹⁰

Siegel (1999) reiterates this point (albeit with reference to US data on the slightly longer period 1926-1998).⁹¹

2. According to Dr Lally, Siegel argues that the 'high' excess returns during the period 1926-1990 "is attributable to pronounced unanticipated inflation in that period."
3. Consequently, argues Dr Lally, the Ibbotson estimate of the TAMRP is "biased up" when using data from 1926-1990, and should be corrected by "adding an estimate of the long-term real risk free rate net of the historical average."

We analyse each of these points in turn and show that they do not withstand scrutiny.

⁸⁹ Lally, M., Review of submissions on the risk-free rate and the TAMRP for UCLL and UBA services, 13 October 2015, p.26.

⁹⁰ Siegel, J.J., 1992. "The Equity Premium: Stock and Bond Returns since 1802", *Financial Analysts Journal*, Jan-Feb, 28-38.

⁹¹ Siegel, J.J., 1999. "The Shrinking Equity Premium", *Journal of Portfolio Management*, Fall, 10-17.

Unusually low bond yields, unusually high excess returns

The main reason that Siegel argued that the equity risk premium in future would be likely to be lower than implied by historical data was his observation that real bond yields over most of the 20th century had been anomalously low — i.e., *by comparison to real yields over the 19th century and since the early 1980s*.⁹²

The low measured level of the risk-free rate may in fact be in part an artefact of the time period examined. There is abundant evidence that the real rate both during the nineteenth century and after 1982 has been substantially higher.

Siegel's conclusion that low real bond yields over most of the 20th century were an anomaly was an inference he drew from the information available to him at the time he wrote his articles in the 1990s. Based on bond yields that prevailed in the late 1990s, Siegel (1999) argued that:⁹³

The market projects real returns on risk-free assets to be substantially higher in the future than they have been over most of this century.

In the same vein, Siegel (1992) states:⁹⁴

The last 10 years represent only about 5 per cent of the total time examined in this study, but the period since 1980 contains the highest real long-term bond returns during any consecutive 10-year period since 1884 and the highest real short-term bond returns since the 19th century (excepting the sharp deflationary periods of the Depression). It is not unreasonable to assume that the current higher real rates will turn out to be more characteristic of future returns than the unusually low real rates of the earlier part of this century.

It is clear from this that Siegel viewed the level of real yields on bonds in the earlier part of the 20th century as “unusually low” because he had observed a significant increase in real rates since the 1980s. He was also making a clear prediction that the real rates prevailing during the 1990s would continue into the future. On the basis of that prediction, he went on to speculate that:⁹⁵

The degree of the equity premium calculated from 1926 is unlikely to persist in the future. The real return on fixed-income assets is likely to be significantly higher than that estimated on earlier data. This is confirmed by the yields available on Treasury inflation-linked securities, which currently exceed 4%.

It is essential to recognise that the key reason Siegel argued that historical average excess returns would overstate the equity risk premium in future was because he observed that real bond yields had risen since the 1980s, and he predicted that those relatively high real yields would persist beyond the late 1990s.

⁹² Siegel (1999), p.11.

⁹³ Siegel (1999), p.12.

⁹⁴ Siegel (1992), p.37.

⁹⁵ Siegel (1999), p.15.

It turns out that the high real yields on which Siegel based his prediction were short-lived. As we pointed out in section 2.6.3 of our February report, Siegel's forecast turned out to be spectacularly wrong: real yields on government bonds have fallen significantly since the 1990s (in a number of countries, including the US and New Zealand).

As we noted in our February report, in an article in the wake of the GFC, Siegel (2011) himself admits that his prediction that real government bond yields would increase was wrong, as was his assessment that post-war realised bond yields were biased downward:⁹⁶

Another prediction that did not materialize was my estimate of future bond yields. I believed that the real yields on bonds would remain between 3 and 4 percent, the level that prevailed when Treasury Inflation-Protected Securities (TIPS) were first issued in 1997. I also believed that the realized bond returns in the period after World War II (WWII) were biased downward because of the unanticipated inflation from the late 1960s through the early 1980s. So, I did not consider historical returns on bonds; instead, I used the current yield on TIPS in making my forecast for future bond yields.

Instead, real yields fell dramatically, especially in the wake of the financial crisis. As of early 2011, 10-year TIPS yields are less than 1 percent and 5-year TIPS yields are negative. The two primary reasons for the drop in real yields are the slowdown in economic growth and the increase in the risk aversion of the investing public, which, in turn, is caused by both the aging of the population and the shocks associated with the financial crisis. The decline in inflation has caused the yields on nominal bonds to drop even more, generating very large realized returns for nominal bond investors. Over the last decade, realized bond returns were 4.7 percent per year after inflation, swamping stock returns. Over the past 20 years, realized bond returns were 6.0 percent per year, 1 percentage point less than the 7.0 percent real returns on stocks.

Siegel (2011) went on to conclude that his views on the direction of equity risk premiums, and on any 'bias' in those premiums, have been reversed completely.⁹⁷

Real bond returns are on track to be much lower. Ten-year TIPS are now yielding about 1 percent, so the excess returns of stocks over bonds should be in the 5–6 percent range, which is higher than the historical average. And the bias, if any, will be toward a higher equity premium if real bond yields rise from their extremely low levels, as I think they should. In short, relative to bonds, stocks look extraordinarily attractive, and I expect stock investors will look back a decade from now with satisfaction. [Emphasis added]

In response to our presentation of these most recent statements by Siegel, Dr Lally asserts incorrectly that:⁹⁸

⁹⁶ Siegel, J.J., 2011. "Long-Term Stock Returns Unshaken by Bear Markets", Rethinking the Equity Risk Premium, CFA Institute Research Foundation Publications, 4, 143-147.

⁹⁷ Siegel (2011), p.147.

⁹⁸ Lally (2016), p.66.

Frontier argues that Siegel (2011) has abandoned his earlier belief about unanticipated inflation in the late 20th century (that it reduced real yields on conventional government bonds, that this induced an overestimate of the MRP, and that this will not persist into the future), due to the post 1999 decline in real yields on inflation-protected government bonds, and that this undercuts the merits of Siegel version 1.

A correct reading of our February report would show that we never claimed that Siegel “has abandoned his earlier belief about unanticipated inflation in the late 20th century.” Dr Lally appears to have misunderstood our point.

For clarity, we say that:

1. The decline in real yields on government bonds since the 1990s demonstrates, beyond question, that Siegel’s prediction that the yields on those assets would remain high beyond the 1990s turned out to be wrong.
2. This undercuts his earlier belief that the relatively low yields on government bonds since the mid-1920s was biased downward, or anomalous. If anything, it suggests that the relatively brief period of high real yields, during the 1980s and 1990s, was anomalous.

With the benefit of new information since the late 1990s (which Siegel himself acknowledges), there is no longer any reason to think that real yields on government bonds over most of the 20th century were ‘too low’ and require any form of upward adjustment.

Low real bond yields between 1926-1990 are attributable to pronounced unanticipated inflation

Dr Lally claims that:

[Siegel] shows that the Ibbotson type estimate of the standard MRP (historical averaging of excess returns) is unusually high using data from 1926-1990, due to the very low real returns on bonds in that period. [Siegel] further argues that the latter is attributable to pronounced unanticipated inflation in that period.

This is misleading. A thorough reading of Siegel (1999) shows that he was not as unequivocal about the causes of the relatively low real yields on bonds through much of the 20th century as Dr Lally implies. Siegel postulated that unanticipated inflation *may* be *one* possible explanation but is not as definitive as Dr Lally suggests. For example, Siegel says:⁹⁹

It is not well understood why the real rate of returns on fixed-income assets was so low during the 1926-1980 period. The bursts of unanticipated inflation following the end of World War II and during the 1970s certainly had a negative impact on the realized real returns from long-term bonds.

⁹⁹ Siegel (1999), p.12.

But Siegel then casts doubt over his own hypothesis of unanticipated inflation as an explanation when he notes the following:¹⁰⁰

But real rates on short-dated bonds, for which unanticipated inflation should have also been less important, were also extremely low between 1926 and 1980.

This suggests that there may be other plausible explanations for the level of real bond yields between 1926 and 1990. Indeed, Siegel (1992) himself offers a range of possible explanations.¹⁰¹

Perhaps the low real interest rates during much of this century can be explained by a combination of historical and institutional factors. The 1929-32 stock market crash and the Depression left a legacy of fear; most investors clung to government securities and insured deposits, driving their yields down. Redistribution policies undertaken by the government subsequent to the Depression may also have lowered real rates by shifting wealth to more risk-averse segments of the population. Furthermore, during World War II and the early post-war years, interest rates were kept low by the Federal Reserve. Because of its inflationary consequences, this policy was abandoned in 1951, but interest rate controls, particularly on deposits, lasted much longer.

Finally, one cannot ignore the development of the capital markets, which transformed a highly segmented market for short-term instruments in the 19th century into one of the world's most liquid markets in this century.

Whilst Siegel takes the balanced and sensible approach of proposing several possible explanations, Dr Lally focusses narrowly on only one possible explanation (unanticipated inflation).¹⁰²

On page 25 of our February report, we pointed out that Siegel had suggested several factors that could have “explained the post-war decline in real government bond yields”. Dr Lally evades this point by claiming we had offered alternative explanations for low real yields during the “late 20th century”:¹⁰³

Thirdly, Frontier argues that there are many alternative explanations for the low real yields on conventional government bonds during the late 20th century observed by Siegel (1999).

By misrepresenting our focus as being on the late 20th century (as opposed the post-war years), Dr Lally argues that the factors we cite from Siegel all relate to

¹⁰⁰ Siegel (1999), endnote 4, p.15.

¹⁰¹ Siegel (1992), pp.36-37.

¹⁰² Furthermore, Siegel does not suggest anywhere that the supposedly depressed real yields over the entire 1926-1990 period were due to unanticipated inflation. His suggestion was that there were relatively short periods (“bursts”) of unanticipated inflation that might explain the level of real yields in those periods. Yet, Dr Lally’s Siegel 1 approach involves correcting all of the New Zealand historical excess returns data from 1931, as though unanticipated inflation was a problem over the entire period.

¹⁰³ Lally (2016), p.67.

much earlier periods, and so could not explain the low real returns observed during the late 20th century:¹⁰⁴

The other explanations offered by Frontier are those offered by Siegel (1992, pp. 36-37): the legacy of fear from the Great Depression, interest rate controls from WWII till the 1980s, redistributive government policies after the Great Depression, and increased liquidity in the market for government bonds. However, none of these phenomena could explain the negative real returns that arose during the late 20th century, with Siegel (2011, Table 1) reporting an average of -3.9% on bonds for 1966-1981.

This is merely a means of diverting from our main point, which may be found on page 26 of our February report: Events such as those suggested by Siegel belong properly in the historical record of excess returns, and contribute to the picture of average risk premiums that investors can expect to demand over the long-run. Scrubbing these periods from the historical record (as Siegel 1 effectively does) distorts the picture of the full range of market conditions that investors can expect to face over the long-run and, therefore, the average excess returns they can expect to earn over that period. Dr Lally leaves this crucial point entirely unanswered.

Nevertheless, since Dr Lally insists on focussing on the late 20th century, we note that a number of the factors that Siegel proposes, *did* in fact arise in the late 20th century. For instance:

- A number of financial crises, including the 1970s energy crisis, the 1987 stock market crash and the 1997 Asian financial crisis. Dr Lally has no way of disentangling the flight-to-safety effect on real yields precipitated by an event such as the 1973 oil price shock from the effect of unanticipated inflation arising from the same event. But Dr Lally seems to assume that the ‘low’ yields over this period are explained wholly by unanticipated inflation.
- In a paper that Dr Lally co-authored with Alastair Marsden, he describes how New Zealand was subject to interest rate controls through parts of the 1970s and 1980s, which had the effect of “lowering the real yield on nominal bonds”:¹⁰⁵

Direct controls on interest rates were imposed in the periods 1972-1976 and again in 1982-1984. They were supplemented with indirect controls in the sense of compelling designated financial institutions to invest in government bonds.

¹⁰⁴ Lally (2016), pp.67-68.

¹⁰⁵ Lally, M., and A. Marsden, 2004. “Estimating the market risk premium in New Zealand through the Siegel methodology,” *Accounting Research Journal*, 17, 93-101.

The ‘bias’ in the Ibbotson estimate should be corrected

Dr Lally’s view is that periods of unanticipated inflation are temporary and induce some form of bias in the Ibbotson estimate. Therefore, argues Dr Lally, any such bias needs to be corrected in order to obtain a ‘better’ estimate of the TAMRP.

It is worth noting that *nowhere in his writings does Siegel actually propose or advocate the Siegel 1 approach*. In the words of Lally and Marsden (2004), Siegel’s proposed response to investors failing to anticipate inflation in the past is the following:¹⁰⁶

In light of the stability over time in the real return to equities, Siegel suggests estimating expected real return on equities from the long-run historical average. In addition he suggests estimating the expected real risk free rate from the current yield on inflation-protected government bonds.

This is basically what Dr Lally calls the ‘Siegel 2’ approach. Dr Lally himself acknowledges that Siegel proposes Siegel 2 rather than Siegel 1.¹⁰⁷ Siegel 1 is an approach that Dr Lally (rather than Siegel himself) has developed.

Implicit within the Siegel 1 approach is a belief that:

1. Bondholders failed to anticipate inflation in some past periods;
2. Mistakes of this kind will not be repeated in future; therefore
3. The Ibbotson approach produces a biased estimate of the future TAMRP; so
4. In order to obtain an ‘unbiased’ estimate of the future TAMRP, it is necessary to remove from the Ibbotson estimate the effect of unanticipated inflation.

There are three main objections to this line of reasoning, which we explain below.

Firstly, as noted above, the Ibbotson approach produces an estimate of the TAMRP that investors would require if they were to invest over the long-run. In order to be as representative as possible of the long-run, the estimate must reflect the full range of market conditions that investors can expect to face over the long-run. This should include circumstances in which investors might have failed to anticipate accurately future outturns. Indeed, the fact that a whole range of different market outcomes can occur is *the* reason for considering a long-run average estimate.

Secondly, as we noted in our February report, there are any number of other events in the past that investors may have failed to anticipate accurately. Some of

¹⁰⁶ Lally and Marsden (2004), p.95.

¹⁰⁷ Lally (2016), p.67.

these events would have resulted in excess returns being higher than expected by investors, and others would have resulted in excess returns being lower than expected by investors. If Dr Lally insists on correcting one example of potential mis-forecasting, he should logically correct all of them. However, as Dr Lally himself notes, it is impractical to do this. So, what we are left with, in the form of the Siegel 1 approach, is a partial and one-sided adjustment. Note that we do not advocate making any adjustments to the historical data. As we noted in our February report, it is better to use the historical data as they are, rather than attempt (poorly) to estimate what those data would have been if a particular event or phenomena had not occurred. We raise this point simply to highlight the futility of *ex post* Siegel 1 adjustments to the data of the kind that Dr Lally advocates.

Finally, implicit within the Siegel 1 approach is an assumption that it is feasible to deduce, *ex post*, what investors' expectations of inflation in fact were historically, and then to make an after-the-fact correction to replicate those expectations. Contrary to Dr Lally's claim, it is not possible to do this reliably. We develop this point in the next section.

The 'bias' in the Ibbotson estimates can be corrected reliably

The Siegel 1 estimate of the TAMRP is computed by adding back to the Ibbotson estimate the long-run average real yield on nominal bonds, and then subtracting from that figure what Dr Lally refers to as "a reliable indicator of expected real yields":^{108, 109}

$$\begin{aligned} \text{Siegel 1 estimate} &= \text{Ibbotson estimate} + \text{Average real yield on nominal bonds} \\ &\quad - \text{A reliable indicator of expected real yields} \end{aligned}$$

Supposing that the Siegel 1 adjustment to the Ibbotson estimate were warranted (which we dispute), it would only be feasible to implement this adjustment if one could find a "reliable indicator of expected real yields" — i.e., the third term in the equation above.

Dr Lally argues that an obvious candidate for this term would be the average yield on inflation-protected bonds, presumably on the basis that inflation expectations, correct or otherwise, have no influence on those yields. In other words, Dr Lally assumes that the yields on inflation-protected bonds provide a more 'pure' estimate of the real risk-free rate. In our view, this assumption is highly questionable for two reasons.

¹⁰⁸ Lally and Marsden (2004), pp.95-96.

¹⁰⁹ When computing the TAMRP as opposed to the MRP, the terms on the right-hand-side of this formula would be computed net of the tax effect of the treatment of capital gains tax and dividend imputation in New Zealand.

Firstly, as we explained in section 2.6.3 of our February report, the yields on inflation protected bonds in New Zealand are likely to be an upward biased estimate of the real risk-free rate because those bonds are very thinly traded (and, therefore, an illiquidity premium is likely to be impounded within those yields). Dr Lally agrees with this point but he argues that:¹¹⁰

...it is also true that the real yield on conventional bonds is uncertain (because inflation is uncertain), the same does not apply to inflation protected bonds, and therefore use of the yield on the latter to estimate the expected real rate on conventional bonds is likely to underestimate the expected real yield on conventional bonds. Since the net effect of these forces is unclear, one cannot conclude that the use of real yields on inflation-protected bonds would impart a bias in the estimate of the average expected real-risk-free rate over the 1931-2014 period.

We fail to see the relevance or truth of this statement. There is no reason to suppose that the lack of inflation uncertainty associated with inflation-protected bonds should necessarily mean that the yields on such bonds would *underestimate* the expected real yields on nominal bonds. No evidence in support of this statement is provided by Dr Lally — it is mere assertion.

Secondly, although the Ibbotson estimates for New Zealand are calculated excess returns from 1931, Dr Lally's Siegel 1 adjustment is based on data over a much smaller period of time. As Dr Lally notes, inflation-protected bonds were introduced in New Zealand only in 1996.¹¹¹ As of 2014, the Ibbotson estimate for New Zealand was based on 83 years of excess returns data, but the Siegel 1 adjustment was implemented using just 18 years of yield data on inflation-protected bonds. Dr Lally recognises this problem and therefore 'supplements' these yields with average real yields on nominal bonds over the five-year period 1961-1965, during which, says Dr Lally, inflation was relatively stable.

In other words, Dr Lally uses just 23 years of data to estimate what he regards as a "reliable indicator of expected real yields", which he then uses to adjust an Ibbotson estimate based on 83 years of data. Dr Lally's estimate of the average real yield is then assumed to be an estimate of the real yield that investors were expecting between 1931 and 2014. We fail to see how an estimate based on just 23 years of data can be *assumed* to be a reliable indicator of expected real yields over an 83 year period.

Dr Lally says that he uses "other sources of evidence" to overcome the problem that inflation-protected bonds have been available in New Zealand for a relatively short period of time.¹¹² We disagree that supplementing 18 years of evidence with

¹¹⁰ Lally (2016), p.60.

¹¹¹ Lally (2016), p.60.

¹¹² Lally (2016), p.60.

a mere five years of additional evidence addresses the fundamental problem noted above.

Furthermore, we point out that, according to Lally and Marsden (2004):

- The average yield on inflation-protected bonds over the period 1996-2004 was 4.8%.¹¹³
- The average real yield on nominal bonds over the period 1961-1965 was 2.4%, which is significantly lower than the real risk-free rate implied by inflation-protected bonds in the later period.

Lally and Marsden (2004) conclude that “this evidence points to a long run expected real yield of around .03-.04.”

However, Lally and Marsden (2004) also propose an alternative method, whereby the real risk-free rate could be estimated by excluding the entire high-inflation period 1973-1987 (during which time annual inflation rates generally exceeded 10%). Under that approach, Lally and Marsden (2004) found the average real bond yield was just 2.3%. This figure is considerably smaller than the estimate of real yields computed with the assistance of yields on inflation-protected bonds. This figure is also very consistent with the average real bond yield over the period 1961-1965, during which Dr Lally says inflation was stable.

This suggests strongly that the average yield on inflation-protected bonds is *not reliable indicator of expected real yields*. This, in turn, suggests that the Siegel 1 approach should not be relied on by the Commission.

¹¹³ Lally (2015) updates this analysis using data to 2014 and finds that the average yield on inflation-protected bonds over the period 1996-2014 was 3.6%.

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