Melbourne Water – trailing average cost of debt

Essential Services Commission

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ECONOMIC CONSULTING

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1. Executive Summary

Scope and outline of approach

The Essential Services Commission (ESCV or the Commission) is undertaking reviews of Goulburn-Murray Water's and Melbourne Water's price submissions, which include proposed rates of returns (commencing 1 July 2016) over a five-year regulatory period for Melbourne Water and four years for Goulburn-Murray Water. The Commission has engaged Incenta Economic Consulting (Incenta) to advise on the reasonableness of Melbourne Water's cost of debt proposal, to recommend alternative approaches that may best meet regulatory guidance, and provide supporting reasoning for our conclusions.

Melbourne Water's proposal

Melbourne Water has proposed setting the allowance for the cost of debt (part of the WACC) at a "trailing average". This means the allowance would reflect a hypothetical debt portfolio that is assumed to be refinanced continuously over time (10 per cent of the portfolio per annum) – i.e., an average of past interest rates, updated annually to include the latest interest rate (and to remove the oldest). Prices are adjusted during the regulatory period in line with the new portfolio interest rate. Under the previous method (i.e. the "on the day" approach) the interest rate was set at the prevailing rate at the time of a determination and fixed for the duration of the regulatory period.

In our view, Melbourne Water's proposal raises three key questions:

- Is the switch to the trailing average a good idea, in principle?
- The model assumes there is an existing portfolio that is refinanced over time – what should be assumed about this starting portfolio?
- How should the model be applied so that updating the allowance (and prices) annually is administratively feasible?

Trailing average approach – in principle

Melbourne Water's proposal says that switching to the "trailing average" has a number of advantages, in particular it:

- Reduces the potential for price volatility associated with the "on-the-day" approach; and
- Permits a closer alignment between the allowance for the cost of debt and the firm's actual cost of debt, thus reducing its risk.

We agree with Melbourne Water's views on these points. Volatility in allowances for debt costs has caused volatility in regulated prices, which has been a particular issue in the energy sector. It is desirable to reduce the influence of any single period on prices. With a "trailing average", firms will be able to replicate the benchmark assumption if they choose, which was not possible with the "on-the-day" approach. With the exception of the Queensland Competition Authority (QCA), most regulators have either adopted a trailing average (Australian Energy Regulator (AER), Economic Regulation Authority Western Australia (ERA)), are in the process of adopting (Essential Services

Commission of South Australia (ESCOSA)), or have an approach that gives weight to a trailing average (Independent Pricing and Regulatory Authority (IPART)). However, issues exist in the transition to the trailing average, and in its implementation.

Transition to a trailing average

Melbourne Water proposal

A starting portfolio is required to apply the "trailing average" approach. This starting portfolio is then refinanced over time. Adopting a 10 year debt term, this would mean that 1/10 of the starting portfolio is assumed to be refinanced each year. A decision is needed about this portfolio. Melbourne Water has proposed that the starting portfolio should be an average of historical, commercial debt costs going back 10 years. We have concerns with Melbourne Water's proposal on the starting portfolio, as this:

- Incorporates the very high interest rates that were seen during the Global Financial Crisis – at the time the ESC did not permit these high interest rates to be included in prices, and hence their inclusion in estimating the starting portfolio is inconsistent with past decisions; and

- Would be expected to provide Melbourne Water with a materially higher allowance compared to the "on-the-day" approach. This would result in higher customer prices, and most likely overcompensate Melbourne Water for its actual costs.

We observe that two different approaches to the transitional portfolio have been applied by Australian regulators:

- *Australian Energy Regulator* – has derived a starting portfolio on the assumption that all of the debt is refinanced just prior to the new determination at prevailing interest rates, and

- *Energy Regulatory Authority (WA)* – has derived a starting portfolio that comprises a base interest component that is set at the "spot rate" just prior to the new regulatory period, together with a historical average for the debt risk premium.[1]

We have concerns with either of these approaches in the context of Melbourne Water. Both assume that certain derivative instruments have been used in the past (interest rate swaps) in relation to the whole of the debt portfolio, which we know not to be the case for Melbourne Water. In addition, the potential exists under either approach for Melbourne Water's cost of debt allowance to differ materially to what would have been provided under the "on-the-day" approach *if* interest rates are

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[1] The ERA's starting portfolio reflected an assumption that the regulated business had used interest rate swaps (a type of derivative instrument) to cause the base interest rate component of its cost of debt to reset at the spot rate at the time of a price review (similar derivatives do not exist for the debt risk premium component). Under this assumption, the starting portfolio would accurately reflect the embedded cost of debt for a firm that had financed according to the benchmark assumptions. In addition, the trailing average the ERA implemented assumed that this hedging behaviour would continue, with the result that only the debt risk premium component of the cost of debt would be subject to the trailing average (this has been referred to elsewhere as the "hybrid trailing average"). We agree with Melbourne Water that it is preferable (in terms of reducing the volatility in prices to customers) to apply the trailing average to the whole cost of debt, and note that this also avoids the need for regulated businesses to access interest rate swaps (and thereby incur additional transaction costs). We show below the cost of debt allowance that Melbourne Water would be expected to receive under the ERA method.

assumed to revert in the future to levels that are more consistent with historical averages.[2] This latter result arises because current interest rates are at historically very low levels.

We agree with the arguments of the adviser to the AER – Professor Lally – that it is inappropriate for the expected future allowance for the cost of debt under the trailing average regime to differ materially to what would have been expected under the "on-the-day" approach. As he observes, under the previous regime it was expected that the allowance for the cost of debt could be higher or lower than actual costs during any regulatory period, but the allowance would be expected to align with actual costs approximately over the long term if the mechanism remained unchanged. However, as he points out, the "approximate correctness" under the previous approach could disappear if there was a switch to a regime that reflected embedded costs (and if appropriate transitional arrangements were not put in place).

In our view, the concerns of Professor Lally can be turned into an objective for the setting of transitional arrangements – namely that the starting portfolio (being the mechanism for giving effect to transitional arrangements) should be derived such that Melbourne Water and its customers are expected to be neutral (in NPV terms) between the "on-the-day" approach and the "trailing average" approach. This will preserve the intended operation (and intended risk allocation) of the previous "on-the-day" approach and so ensure that there is no windfall gain or loss as a consequence of the move to a trailing average regime. We observe that deriving this starting portfolio will require assumptions about future interest rates; however, this is a one-off decision that will need to be taken at the time of first switching to the trailing average approach. The benefits from switching to a trailing average approach (in terms of reducing volatility of prices and offering better risk management for the regulated business) are unaffected by the precise make-up of the starting portfolio.

Detailed implementation of the trailing average

We agree with many of Melbourne Water's proposals about updating the "trailing average", including annual updating of the cost of debt. We also recommend that the trailing average be applied to the nominal cost of debt rather than the real cost of debt. It is important for the annual updating process to be as mechanistic as possible, while remaining reliable and unbiased. In our view, this can be achieved by:

- Using estimates of corporate interest rates created by independent parties – we recommend averaging the "yield curve" produced by the Reserve Bank of Australia (RBA) and one that is produced by Bloomberg. The former database is available from the RBA website and requires only minor adjustment to be used, and the latter is available from a subscription service and the data so extracted do not require any adjustment (Treasury Corporation Victoria has informed us that it will source the data for the ESC);
- Assuming a 10 year term for debt, and applying the broad BBB credit rating band estimate; and
- Using a simple average of rates across the previous year ending 31 March as the new year's actual interest rate to replace the value from 10 years previous (3 month lag needed to flow through to new tariffs)

[2] We consider this assumption to be reasonable because it is well accepted that interest rates are "mean reverting".

Regulatory models can be designed so that effect of the new allowance on prices is mechanical.

Applying our recommended approach

Our "placeholder" estimate of a spot cost of debt is 5.59 per cent,[3] and we consider that a long term average cost of debt of 7 per cent is a reasonable assumption. As discussed above, in order to derive our starting portfolio, an assumption is required about future interest rates. We have applied the assumption that:

- Interest rates will move in a linear manner to a long term cost of debt of 7 per cent, and
- This will occur over 10 years (we have also tested scenarios for this mean reversion over terms of 5 and 15 years).

We further assume that under the "on-the-day" approach, the allowance for the cost of debt would have been reset at the spot rate during the quarter just prior to the start of the new regulatory period and held constant during that period. Given these assumptions, we have derived the interest rate on the starting trailing average portfolio by:

- Assuming a constant interest rate across the starting portfolio, and assuming a "seed" value for this interest rate;
- Deriving the allowance that would result under the trailing average approach given this starting portfolio and comparing this to the allowance under the "on-the-day" approach in net present value terms,[4] both assuming a mean reversion of interest rates over 10 years (and sensitivities of 5 and 10 years), and
- Then iterating the "seed" value for the starting portfolio interest rate until the allowances derived above are equated.

As shown in Table ES.1 below, the NPV-equivalent starting portfolio interest rate is calculated to be 6.06 per cent for the base case assumption of a 10 year mean reversion of interest rates (and 6.13 per cent or 6.01 per cent for a 5 or 15 year mean reversion, respectively). The outcome of this calculation – 6.06 per cent – is our preliminary estimate of the cost of debt for the first year of the new regulatory period. It is preliminary because we have been asked to update the figure using the interest rates in effect just prior to the commencement of new regulatory period. The allowance will then be adjusted each year to reflect an assumption that 10 per cent of the starting portfolio has matured and is replaced with debt financed at current rates (defined as the average interest rate over the year ending with March just prior to the new regulatory year).

[3] This is the estimated cost of debt for the 20 business days to 31 December, 2015, calculated as the average of the extrapolated 10 year RBA BBB corporate bond yield series, and the 10 year Bloomberg BBB (BVAL) series.

[4] The net present value is calculated using a discount rate equal to the average spot interest rate over the test period and implicitly also assumes a constant stock of debt. Each year was divided into quarters for the calculation.

Table ES.1: Regulatory cost of debt – NPV neutral starting portfolio

	2016/17	2017/18	2018/19	2019/20	2020/21
5 year mean reversion	6.13%	6.09%	6.08%	6.10%	6.15%
10 year mean reversion	6.06%	6.02%	6.00%	5.99%	5.99%
15 year mean reversion	6.01%	5.97%	5.94%	5.93%	5.92%

Source: RBA, Bloomberg, and Incenta analysis

In Figure ES.1 and Table ES.2 below we display the future regulatory cost of debt under alternative “trailing average” approaches relative to the “on-the-day” approach. All of these figures assume the same “mean reversion” that was discussed above, namely to a 7 per cent cost of debt over the ten years from 2017.[5] In addition, in all cases, new borrowings are assumed to occur at our forecast (commercial) interest rates (including for the scenario shown below that is intended to reflect the actual cost for a benchmark Victorian water business). The different functions show the allowance that would be generated by:

- The “on-the-day” approach (labelled “on-the-day”);
- The starting portfolio that we recommend (labelled “Incenta recommendation”);
- The starting portfolio under Melbourne Water’s approach (labelled “MW proposal”);
- The starting portfolio under the AER’s approach, whereby the starting portfolio is assumed to consistent of debt financed wholly at prevailing rates (labelled “AER starting portfolio”);
- The ERA “hybrid trailing average”, whereby only the debt risk premium is subject to the trailing average and historical values for the debt risk premium are used (labelled “ERA approach”); and
- The embedded cost of debt that a benchmark Victorian water business would have, which assumes that it had raised debt historically at the prevailing Victorian Government borrowing rates and paid the prevailing “Financial Accommodation Levy” applicable to a BBB rated entity (labelled “Benchmark actual cost”).[6]

We would draw the following observations from the above figure.

- All of the full “trailing averages” converge after 10 years (which reflects the length of time before the starting portfolio has been refinanced) and all approaches converge after 20 years (being the sum of the refinancing period and the time over which interest rates are assumed to revert to the mean).
- Our recommended approach is forecast to provide a higher allowance than the AER starting portfolio, which reflects the fact that we think the AER starting portfolio will place Melbourne Water in an inferior position relative to the continuation of the “on-the-day” approach, which we consider to be inappropriate. Compared to the ERA’s method, our recommended approach is

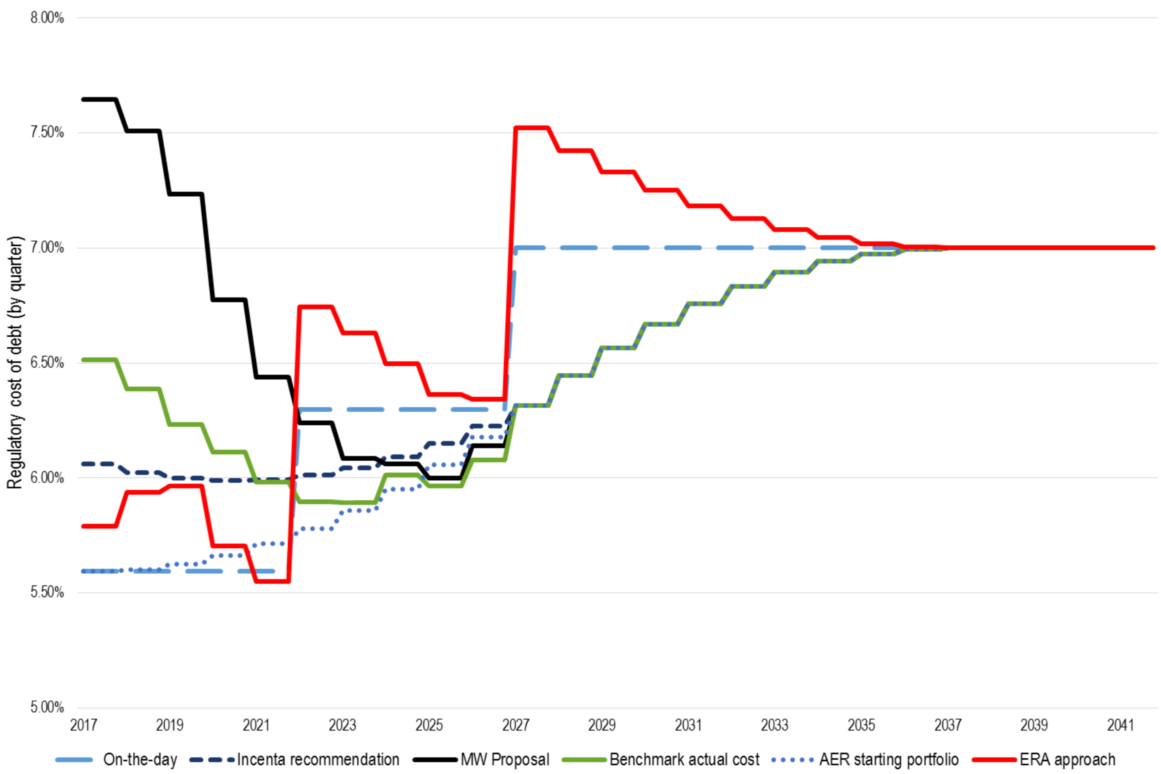
5 Melbourne Water’s proposal included its own projected cost of debt which, while not identical to ours, also assumed an increasing cost of debt over the next regulatory period.

6 The Department of Treasury and Finance applies a Financial Accommodation Levy to allow for the difference in borrowing costs for the government and a commercial entity. This is applied for competitive neutrality purposes.

forecast to generate a higher allowance in the next regulatory period but lower allowances thereafter. We also note that the ERA's approach would not appear to result in a smoother regulatory cost of debt profile under the scenario of mean reversion over the next decade.

- Our proposed starting portfolio is forecast to generate an allowance that is materially lower than that expected under Melbourne Water's proposal during the next regulatory period, but is expected to generate a higher allowance in the following regulatory period. Our proposed starting portfolio is expected to generate a smoother allowance over the next two regulatory periods.
- Our proposed starting portfolio is forecast to generate an allowance that is relatively close to the actual cost of a benchmark Victorian water business (i.e. our recommended allowance is slightly lower in the first regulatory period and slightly higher in the second period).

Figure ES.1: Regulatory cost of debt under alternative approaches (assuming mean reversion to 7 per cent over 10 years)



Source: RBA, Bloomberg, and Incenta analysis

Table ES.2 displays the cost of debt averages under each approach after taking account of the time value of money. While the Incenta recommendation provides a higher cost of debt relative to the "on-the-day" approach in the first period, it is lower in subsequent periods, but is the same (6.34 per cent) over the whole period (2017 to 20141) by design. The benchmark actual cost approach similarly provides an almost identical result overall (6.39 per cent). However, the AER's approach provides a materially lower outcome (6.17 per cent), while Melbourne Water's approach implies a materially higher cost of debt (6.73 per cent) over the whole period, which is due to a much higher cost of debt during the first regulatory period (2017 to 2021). The ERA's approach results in an overall cost of debt that lies between Incenta's recommendation and Melbourne Water's approach (i.e. 6.54 per cent).

Table ES.2: Cost of debt in each regulatory period and overall (time value of money adjusted)

Regulatory period	Overall	2017 to 2021	2022 to 2026	2027 to 2031	2032 to 2036	2037 to 2041
On-the-day approach	6.34%	5.59%	6.30%	7.00%	7.00%	7.00%
Incenta recommendation	6.34%	6.02%	6.10%	6.54%	6.92%	7.00%
MW Proposal approach	6.73%	7.16%	6.11%	6.54%	6.92%	7.00%
Benchmark actual cost (BBB)	6.39%	6.26%	5.96%	6.54%	6.92%	7.00%
AER starting portfolio	6.17%	5.64%	5.95%	6.54%	6.92%	7.00%
ERA approach	6.54%	5.80%	6.53%	7.35%	7.06%	7.00%

Source: RBA, Bloomberg, Melbourne Water, ERA and Incenta analysis

The comparisons presented above confirm our view that a starting portfolio interest rate of 6.06 per cent will provide a fair basis for transitioning from the "on-the-day" approach to the cost of debt to the use of a "trailing average".

2. Background, Scope of Work and outline of report

2.1 Background

The Essential Services Commission (ESCV or the Commission) is undertaking reviews of Goulburn-Murray Water's and Melbourne Water's price submissions, which include proposed rate of returns (commencing 1 July 2016) over a five-year regulatory period for Melbourne Water and four years for Goulburn-Murray Water. This rate of return assessment requires an estimate of the debt risk premium, and the Commission has engaged Incenta Economic Consulting (Incenta) to assist it in this matter.

Under the Water Charge (Infrastructure) Rules 2010, Goulburn-Murray Water's rate of return is required to be set by the Commission in a manner that is consistent with the approach required by the ACCC: i.e., on the basis of a benchmark gearing level of 60:40 debt to equity, based on the yields of BBB+ rated corporate bonds with a 10 year term to maturity. Melbourne Water has indicated a preference for introducing a "trailing average" approach for estimating the cost of debt, rather than the "on the day approach" previously used by the Commission, and the Commission has indicated that it is open to exploring a change in its approach.

2.2 Scope of Work

Specifically, the Commission has requested Incenta to provide the following advice:

- Assess and make a recommendation on the reasonableness of Melbourne Water's proposed approach to the cost of debt, taking account of the Commission's guidance on the rate of return (including parameters and estimation methods), having regard to relevant regulatory guidance and regulatory best practice, and supporting information requirements as outlined in the Commission's April 2015 Guidance paper to Melbourne Water;

- Identify the appropriate data sources and debt risk premium estimation method for Goulburn-Murray Water and Melbourne Water;

- Recommend alternative approaches that may best meet the regulatory guidance; and

- Provide supporting reasons for the conclusions and recommendations.

The Commission has indicated that it will confirm the methodology to be used to calculate the cost of debt for the draft and final decisions.

2.3 Outline of report

To address the Scope of Work we have organised the current report as follows:

- Chapter 3 sets out Melbourne Water's cost of debt proposal, provides an introduction to the broad conceptual issues and outlines the regulatory precedents in Australia. We review Melbourne Water's submission and consider the key question of whether, in principle, a trailing average approach is desirable.

- In Chapter 4 we examine a number of implementation issues associated with implementing a trailing average cost of debt, particularly the question of "what should be the starting portfolio?" We provide an estimate of the year-by-year cost of debt series for Melbourne Water using the recommended estimation method, and compare this with estimates under a number of alternative approaches.

3. Melbourne Water's proposal

3.1 Introduction

In this chapter we set out Melbourne Water's cost of debt proposal, as well as the AER's trailing average approach, and consider the key question of what the starting portfolio is. We propose an alternative forward looking trailing average approach that leaves Melbourne Water and its customers in an NPV neutral position.

3.2 Melbourne Water's cost of debt proposal

3.2.1 Outline of Melbourne Water's cost of debt estimation method

Melbourne Water's cost of debt estimation method is contained in its 2016 Price Submission.[7] The implementation features as well as the rationale behind Melbourne Water's decision to adopt a trailing average cost of debt approach follow the recommendations of its adviser, Frontier Economics.[8] The proposed method has a number of implementation features as follows:

- *Trailing average or 'on the day'*: Immediate application of the trailing cost of capital to determine the whole of the cost of debt (not just the debt risk premium);
- *Averaging period*: The annual rate being calculated by averaging over an entire 12 month period from 1 April to 31 March each year;
- *Cost of debt estimation*: Cost of debt to be calculated by the simple average of the 10 previous consecutive years based on the extrapolated (to 10 years) RBA cost of debt estimates series;
- *Benchmark credit rating*: A benchmark credit rating of BBB; and
- *Updating period*: Annual updating of the cost of debt through the regulatory period.

By applying these features, Melbourne Water proposes a cost of debt series that begins with an estimated trailing average cost of debt of 7.6 per cent for 2016/17 that is the simple average of the previous 10 years' of cost of debt estimates (the actual cost of debt for 2016/17 will not be known until 31 March, 2016). The costs of debt for successive years of the coming regulatory period have been estimated based on Treasury Corporation Victoria (TCV) forward estimates of the 10 year AAA curve, with TCV's Financial Accommodation Levy (FAL) added to bring the estimates up to BBB yield equivalents.

Melbourne Water's rationale for adopting the trailing average method are to:

- Reduce the volatility in prices to "better enable low income and vulnerable customers to manage water bills";

7 Melbourne Water (30 October, 2015), *2016 Price Submission*, pp.33-35.

8 Frontier (October, 2015), *Rationale and implementation of trailing average approach to return on debt*, Airport prepared for Melbourne Water Corporation.

- Better align the regulatory cost of debt allowance with the actual cost of debt, to "provide a better signal of the cost of providing services"; and

- Promote financial viability by 'incentivising prudent debt arrangements and significantly reducing exposure to refinancing risk'.

3.2.2 Incenta's comments on Melbourne Water's approach

In this section we consider each of the features of Melbourne Water's trailing average cost of debt proposal in turn, and provide our views. We note at the outset that we agree with a number of Melbourne Water's proposals with respect to the trailing average cost of debt approach. However, we disagree with Melbourne Water's proposed implementation of its approach.

Trailing average vs "on the day" approach

Melbourne Water's first rationale for adopting the trailing average cost of debt approach is that it lessens the volatility of prices relative to the on-the-day approach. There can be little doubt that this is the case, and even the Queensland Competition Authority (QCA) recognises this, despite electing not to adopt the trailing average.[9]

The QCA recognises that the trailing average approach provides better investment signals than the on-the-day approach, but considers these to be of marginal significance. In addition, it considers that while a mismatch between the cost of debt allowance and actual debt costs under an on-the-day approach can arise, this is also unlikely to have a material impact on financial viability, since regulated firms stagger their debt to reduce refinancing risk. We agree with this view.

As noted by the AER, if applied consistently and based on the same cost of debt estimate, it is likely that both approaches would provide similar outcomes to investors and consumers in the long run. However, both consumer groups and a majority of regulated businesses have requested that some form of trailing average approach should be introduced, and most Australian regulators have now adopted some form of the trailing average approach (as discussed further below).

What is the starting portfolio?

The key question is how to transition from the "on the day" approach to a trailing average? This requires a decision about what the starting portfolio will be.

Historical implied cost of debt portfolio

Melbourne Water's proposal is to apply the implied historical cost of debt portfolio that is implied by estimates of the previous annual cost of debt. However, Melbourne Water's experience is somewhat different to that of privately and publicly owned energy businesses. Throughout the crisis period (i.e. the global financial crisis and the sovereign debt crisis) Melbourne Water's financing was undertaken by Treasury Corporation Victoria (TCV), which applied its Financial Accommodation Levy (FAL) adjustment to the AAA bond yield.[10] As a result the cost of debt that was historically incurred by

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9 QCA (April, 2015), *Final Decision, Trailing average cost of debt*, p. 36

10 The FAL is applied by the State of Victoria to its state owned businesses in order to achieve competitive neutrality with privately owned businesses. Hence, the FAL is set as the cost of debt

Melbourne Water was lower than the rates observed in the market (i.e. there was no marked spike in the debt risk premium during the global financial crisis).

For the period 2006/07 to 2014/15, Table 3.1 below shows the relationship between the historical cost of debt estimated by Frontier (Melbourne Water's proposal), the Bloomberg BBB series,[11] the benchmark actual interest costs of Melbourne Water (TCV's AAA bond yield plus FAL for an A- credit rating), the benchmark actual cost applying Melbourne Water's actual A- credit rating,[12] the benchmark actual cost when applying Melbourne Water's a BBB credit rating (implying a higher FAL), the regulatory allowance for the cost of debt that was provided by the Commission, and the weighted average actual cost achieved by Melbourne Water.

Table 3.1: Regulatory cost of debt allowance vs Melbourne Water proposal, historical benchmarks and actual interest cost incurred

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	Average
Melbourne Water proposal	7.25%	8.18%	10.75%	9.19%	7.96%	7.97%	6.88%	7.19%	5.38%	**7.86%**
Bloomberg (RBA extrapolated)	6.91%	8.62%	9.69%	9.31%	8.30%	7.62%	6.32%	6.94%	5.15%	**7.65%**
Regulatory cost of debt allowance	6.48%	6.48%	7.08%	7.08%	7.08%	7.08%	7.08%	7.47%	7.47%	**7.03%**
Benchmark actual cost at (BBB rating)	6.95%	7.38%	7.16%	7.41%	7.10%	6.42%	5.33%	7.15%	5.66%	**6.73%**
Benchmark actual cost (A- rating)	6.78%	7.25%	6.96%	7.41%	7.10%	6.42%	5.33%	6.60%	5.21%	**6.56%**
Weighted average actual cost	6.64%	6.77%	6.09%	6.30%	6.67%	6.68%	6.18%	6.19%	6.11%	**6.40%**

Source: Bloomberg, ESCV, RBA, Frontier/Melbourne Water, TCV and Incenta analysis

Over the entire period from 2006/07 to 2014/15 the regulatory cost of debt allowance was on average 31 (BBB rating) to 47 basis points (A- rating) higher than the benchmark interest rate, and up to 2013/14 these differentials were only 12 to 25 basis points. Table 3.1 also shows a relatively large disparity (of 1.46 percentage points) between the RBA's 10 year BBB estimated cost of debt of 7.86 per cent (estimated by Frontier) and the 6.4 per cent weighted average actual cost, and an 83 basis points premium over the average regulatory cost of debt allowance for the period. That is, the RBA cost of debt series relied upon by Melbourne Water to estimate the trailing average cost of debt is not reflective of:

- The average actual debt costs incurred by Melbourne Water;
- The benchmark (A- or BBB) actual cost of debt faced by Melbourne Water; and
- Not reflective of the revenue allowances that Melbourne Water has obtained from the Commission over the past decade.

Applying historical values of the Bloomberg BBB series would reduce but not eliminate these material differentials. Furthermore, as shown in Appendix A, these differentials persist whether the

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differential between the credit rating applied by the regulator, and the AAA credit rating that is applied to state borrowings.

11 Most of the Bloomberg cost of debt series relies on the Bloomberg 7 year BBB estimate extrapolated to 10 years using the RBA's BBB series cost of debt between 7 years and 10 years.

12 Both the benchmark actual cost series apply a 3 basis points TCV execution fee, with the benchmark A- credit rating series being derived by reference

nominal or real cost of debt is compared, and whether the total cost of debt or just the debt risk premium is measured.

Melbourne Water justifies its approach on grounds that its actual debt profile approximately matches the theoretical condition of a staggered debt portfolio with one-tenth of the debt being refinanced each year.[13] We have some concerns about Melbourne Water's proposal, because the historically high estimated cost of debt (using extrapolated RBA estimates) observed during the global financial crisis, most of which was not incurred by Melbourne Water, would be incorporated into the future trailing average cost of debt, and therefore prices. This would result in a windfall gain to Melbourne Water, and corresponding windfall losses to Melbourne Water's customers.

The AER's approach – the starting portfolio is the "spot rate"

The controversy that has surrounded the introduction of the trailing average approach in the sphere of energy is centred on the manner in which the AER has proposed to transition from the on-the-day approach to a trailing average approach, which is discussed below.[14] That is, the issue has centred on whether windfall gains / losses are made / incurred as a result of shifting from the "on-the-day" approach to a trailing average approach.

The AER has stated that it is opposed to application of the historical estimated cost of debt portfolio because it would "lock in" windfall gains that have arisen because of the relatively high cost of debt estimates that are observed for the period of the global financial crisis and the European sovereign debt and US debt limit crises that followed. The AER's consultant, Professor Lally, considers that immediate transition to a trailing average will constitute a 'double-counting' of the revenue benefit to the regulated entities – once at the time of the increase in debt risk premiums in regulatory decisions that were made during that period of economic crises, and again as a result of being impounded in the trailing average cost of debt (which is raised as a result).[15]

Professor Lally and the AER maintain that if there is a change in the regulatory approach mid-stream during this process to an immediate introduction of a trailing average approach, there will be a windfall gain to investors, with a consequent windfall loss to consumers. That is, the previously expected negative component of the cash flow stream would not be incurred, since the higher trailing average debt risk premium (incorporating the spike period) would be applied immediately. Professor Lally estimated if an immediate transition to a trailing average was introduced in 2014, the size of this windfall would be in the order of 5.29 per cent of the firm's regulatory debt. Hence, the AER has adopted a "transition approach", which effectively applies a starting portfolio that is the "spot rate" at the beginning of the transition.

The AER's concerns about the potential for windfall gains do not apply to Melbourne Water in its circumstances. Since Melbourne Water is commencing from a relatively neutral position in NPV terms. It made modest excess returns due to its actual cost of debt exceeding the regulatory allowance, and this excess was returned to customers. We are concerned that the application of a "spot rate"

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13 Our discussions with Melbourne Water, and with its financier TCV, indicate that approximately 70 per cent of Melbourne Water's debt portfolio targets a 10 year term, with 30 per cent of the portfolio being covered under interest rate swaps.

14 Here we are referring to the appeal process before the Australian Competition Tribunal, which is likely to be concluded prior to the draft determination for Melbourne Water.

15 Martin Lally (24 November, 2014), *Transitional arrangements for the cost of debt*, Report for the Australian Energy Regulator.

starting portfolio to Melbourne Water is likely to impose windfall losses on the business. This windfall loss is likely due to the fact that the spot rate is currently at historically relatively low levels compared with cost of debt actually incurred on Melbourne Water's existing portfolio. Under the AER's approach, in Melbourne Water's circumstances the regulated revenue that would be earned based on the "spot rate" starting portfolio would be insufficient to service its existing debt portfolio.

Our recommended approach

It is our view that Professor Lally's concerns can become an objective for the setting of transitional arrangements. That is, the starting portfolio (which is the mechanism for giving effect to transitional arrangements) should be derived such that Melbourne Water and its customers are expected to be neutral (in NPV terms) between the "on-the-day" approach and the "trailing average" approach. Such an approach preserves the intended operation (and intended risk allocation) of the previous "on-the-day" approach and thereby ensures that there are no resulting windfall gains or losses due to shifting to a trailing average regime. Deriving an NPV neutral starting portfolio will require assumptions about future interest rates; however, this is a one-off decision that needs to be taken at the time of first switching to the trailing average. The benefits from switching to a trailing average approach (reduced volatility of prices and better risk management for the regulated business) are unaffected by the precise make-up of the starting portfolio.

3.3 Conclusions

Based on the analysis in this chapter, we conclude that the key decision to be made in relation to the adoption of a trailing average approach is the assumption that is made about the starting portfolio. We recommend that a starting portfolio is adopted that maintains NPV neutrality between Melbourne Water and its customers. Alternative approaches are unlikely to satisfy NPV neutrality:

- Melbourne Water's proposal - applies a starting portfolio that is likely to result in a windfall gain for Melbourne Water, since it uses estimates of historically high costs of debt during the global financial crisis, even though Melbourne Water's own financing was undertaken at a considerably lower cost; and

- The AER's approach - applies a starting portfolio that is likely to result in a windfall loss to Melbourne Water, since its starting portfolio is equal to the spot rate of debt at the first implementation of a trailing average. Since the spot rate is currently lower than the embedded cost of debt, the revenues obtained on the basis of the AER's starting portfolio will be insufficient to cover Melbourne Water's debt costs including the embedded cost of debt.

In the next chapter we consider the implementation issues associated with the introduction of a trailing average cost of debt approach.

4. Implementing a trailing average

4.1 Introduction

In the previous chapter we concluded that the trailing average approach has merits relative to the "on-the day" approach, but implementation could result in windfall gains or losses for stakeholders. In Melbourne Water's circumstances, we concluded that the fairest way to effect a switch to the trailing average approach was to derive a starting portfolio that would leave Melbourne Water and its customers in an NPV neutral position at the commencement of the change. In this chapter we describe how this approach can be implemented.

4.2 Assessment of implementation options

4.2.1 Application to debt risk premium or whole of the cost of debt

Melbourne Water proposes that the trailing average approach should be applied to the whole of the cost of debt rather than to only the base risk free rate component. An alternative approach would be to adopt the trailing average approach for only the debt risk premium component, which is referred to as the 'hybrid approach'. In this case the regulated firm would continue to have an incentive to apply interest rate swaps to the base risk free rate component of the cost of debt.

Both the QCA and the Economic Regulation Authority of Western Australia (ERA) consider that the hybrid approach has less scope to result in a cost of debt that overcompensates the regulated firm.[16] However, while the QCA rejected the hybrid trailing average, the ERA has adopted it.[17]

The ERA's starting portfolio assumes that the regulated business is currently using interest rate swaps to reset the base interest rate component of its cost of debt at the spot rate at the time of a price review Such an option does not exist for the debt risk premium component, as the derivative instruments do not exist. If this were the case, the starting portfolio would accurately reflect the embedded cost of debt for a firm that is financing according to the benchmark assumptions. By implementing a trailing average in this way, the ERA has assumed that this hedging behaviour will continue, so that only the debt risk premium component of the cost of debt will be subject to the trailing average (this is often referred to as the "hybrid trailing average"). The hybrid approach has been recommended by some smaller energy distribution businesses (e.g. Jemena) on grounds that these business do not have debt portfolios that are large enough to issue 10 bonds (one a year) at the minimum efficient issuance size (i.e. they are unable efficiently to mimic a trailing average).[18]

We agree with Melbourne Water that it is preferable (in terms of reducing the volatility in prices to customers) to apply the trailing average to the whole cost of debt. We also note that this also avoids the need for regulated businesses to access interest rate swaps (and thereby incur additional transaction costs). It assumes that interest rate swaps have been applied in the past to the whole of the regulated firm's portfolio, and we know this not to be the case with respect to Melbourne Water. In addition, Melbourne Water is not a small network business, but one that has the ability to issue

16 ERA (30 June, 2015), *Final Decision on Proposed Revisions to the Access Arrangement for the Mid-West and South-West Gas Distribution Systems*, Submitted by ATCO Gas Australia Pty Ltd.

17 ERA (30 June, 2015), p.p.186.

18 Jemena Limited (21 June, 2013), *Rate of Return guidelines – Consultation Paper*, Submission to the Australian Energy Regulator.

enough efficiently sized bonds to undertake a trailing average portfolio approach, and in fact has done so in the past.

4.2.2 Complex vs simple trailing average

Melbourne Water has adopted a simple trailing average approach rather than the alternative "weighted" average approach that was proposed by Queensland Treasury Corporation (TCV), which would "weight" the cost of debt in each year by the capital expenditure that took place during that year. This approach was considered by the AER and rejected on grounds that it would add to complexity and cost. However, the Essential Services Commission of South Australia (ESCOSA) has adopted the weighted average approach on grounds that it:[19]

- *Sends the right signal for future investment;*
- *Ensures that the business is able to recover the cost of historic [sic] debt financing that has been prudently incurred; and*
- *Minimises the risk of a prudent business being able to replicate the regulator's approach, which minimises risks to equity holders and lowers the overall cost of capital.*

While the weighted average approach may assist in achieving these objectives in the context of the backward looking (Melbourne Water) or transitional (AER) approaches, Melbourne Water has not proposed it. Furthermore, the forward looking (NPV neutral) analysis that we recommend is not amenable to the weighted average approach, and in these circumstances the question of weighted vs simple average does not arise.

4.2.3 Annual updating

Melbourne Water has proposed that annual updating be applied to the trailing average. With annual updating, there is less opportunity for mismatches between the debt allowance and the cost of debt. It is also expected that signals for investment will be sharpened by annual updating as a result of greater alignment. While these benefits come at the cost of greater complexity and implementation cost, we consider that the requirement for annual updating can be mechanised. The new calculation that is required is to update the price paths each year to reflect the application of the trailing average. The practical effect of updating the trailing average is that the WACC applicable to each year will change.

The trailing average affects the determination of prices as follows.

- When establishing price controls during a periodic review, only the WACC for year 1 will be known (and final). This cost of debt allowance in this WACC will reflect the trailing average over the 10 years prior to year 1 (lagged by 3 months). The WACCs for the remaining years of the regulatory period will not be known (as the trailing average for years 2 onwards use information that only becomes available during the new regulatory period). However, a simple assumption is that the year 1 WACC applies for the period. Given this assumption, the X factors are then estimated in the usual way.

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19 ESCOSA (March, 2015), *SA water regulatory rate of return 2016-2020*, Final Report to the Treasurer, p.44.

- The annual update for year 2 occurs just prior to the commencement of that year. At this, time actual debt costs for the previous year (lagged by quarter) are available, and so the trailing average cost of debt can be calculated for year 2, and from this the final WACC for year 2. The annual updating process involves:
  - Recalculating the target revenue for years 2 to 5 (the target revenue for year 1 was correct at the time of the price review). Again, an assumption will be required about the WACC for years 3 to 5, but a simple assumption is to assume that the year 2 WACC continues for the remainder of the period.[20]
  - Recalculating the X factors for years 2 to 5 so that the forecast and target revenues align (in present value terms). The X factor for year 1 is held fixed.
  - The new X factor for year 2 is then applied to establish prices for year 2.
- The update in relation to year 3 follows the same pattern, in that:
  - A new trailing average cost of debt (and so WACC) for year 3 is calculated (and an assumption is again required about the WACC in years 4 and 5)
  - The revenue requirement for years 3 onwards is recalculated using the new WACCs (the revenue requirements for years 1 and 2 are held fixed at their values in the previous year's update), and
  - The X factors for years 3, 4 and 5 are recalculated, holding the X factors for years 1 and 2 fixed at their values in the previous year's update.

4.2.4 Choice of averaging period

Melbourne Water has proposed that the annual rate be recalculated each year by averaging over an entire 12 month period from 1 April in one calendar year, to 31 March in the following calendar year. This is expected to align with the time span that would be used to re-finance portions of Melbourne Water's debt portfolio. Regulatory precedents vary. For example:

- The AER requires consistency in applying the same term each year in a regulatory period, although that term can range from 20 days to a year.
- The ERA has adopted the approach of allowing the firm to nominate a consistent length of averaging period each year, but confines this range to a 2 to 6 month period.

We agree with Melbourne Water that a consistent averaging period of 12 months (locked in at 1 April to 31 March), is appropriate.

[20] Flexibility could be provided to apply a different assumption about future years where this would reduce the expected future volatility of the annual price adjustments.

4.2.5 Benchmark credit rating

Melbourne Water's proposal is to apply a benchmark BBB credit rating, which it considers to be consistent with the ESCV's approach during the 2013 review of greater metropolitan water businesses, where a BBB- to BBB+ credit rating range was applied.[21]

We do not consider that a range of BBB- to BBB+ is consistent with a BBB credit rating as suggested by Melbourne Water, and do not recommend that the Commission change its approach from "a range of BBB- to BBB+" without further supporting evidence. We note that Melbourne Water's proposal does not provide any evidence to support its position.

4.2.6 Cost of debt estimation method

As noted above, one problem with a backward looking trailing average that has been identified by the AER is the number of different cost of debt sources and their significant divergence during the global financial crisis in particular.[22] The two publicly available cost of debt sources currently available in the Australian market are the RBA series, and the Bloomberg fair value curve (BVAL), which are considered in turn.

RBA series

Melbourne Water has proposed a cost of debt estimation method that relies on the RBA series of monthly cost of debt estimates for the BBB credit rating band that commences in January 2005. More specifically this is the extrapolated (to 10 years) cost of debt for the broad BBB credit rating band. In constructing the series, the RBA applies the Gaussian kernel weighting method, which gives greater weight to bonds that are closest to its target terms (in particular the 5, 7 and 10 year terms). This method consistently produces estimates of the cost of debt for a 10-year term to maturity that have an effective term of approximately 9 years, and are therefore an under-estimate of the 10 year cost of debt. The AER has applied a linear extrapolation method that provides consistent estimates at the 10 year term.[23]

Bloomberg fair value curve (BVAL)

We also note that Melbourne Water's proposal does not refer to the Bloomberg BVAL fair value curve, which since 14 April 2015 has provided estimates of the 10 year cost of debt for a broadly based BBB- to BBB+ credit rating band. This series is available on a daily basis, while the RBA series is available only on a monthly basis. The relativities of these approaches (since the commencement of the Bloomberg series) can be seen in Figure 4.1 below.

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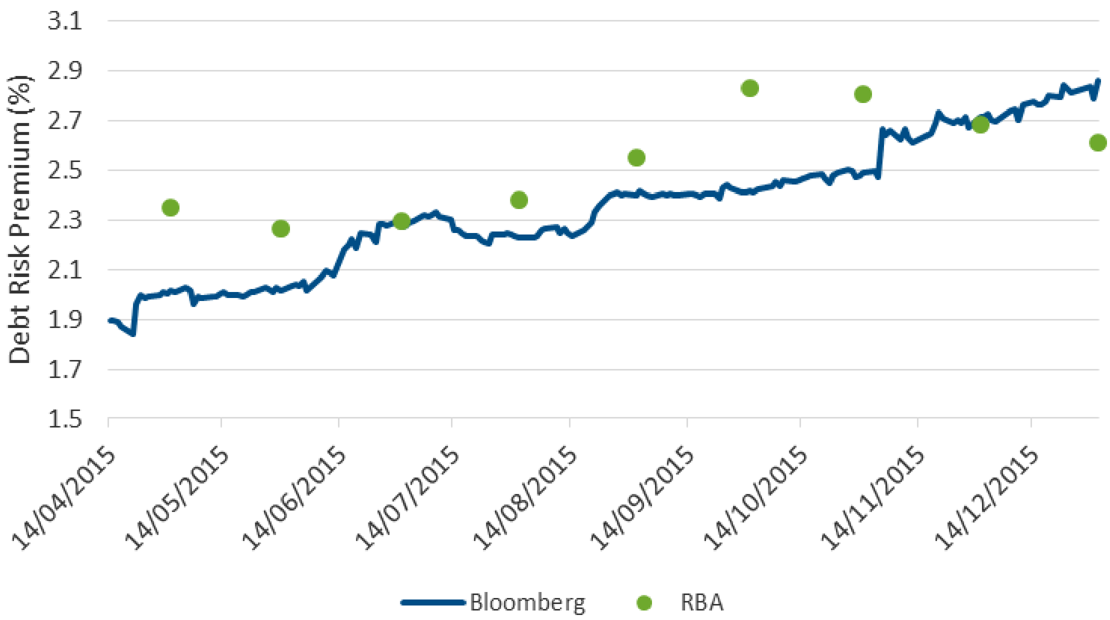
21 ESCV (June, 2013) *Price Review 2013: Greater Metropolitan Water Businesses, Final Decision*.

22 That is, the estimated debt risk premium in early 2009 ranged from 9.5 per cent (RBA), to 5 per cent (CBA Spectrum) and 3.5 per cent (Bloomberg Fair Value Curve).

23 Lally, Martin (20 November, 2014), *Implementation issues for the cost of debt*, report for the AER, pp. 38-44.

Figure 4.1: 10 year BBB- to BBB+ Debt risk premium – comparison of RBA and Bloomberg



Source: RBA, Bloomberg and Incenta analysis

While this is limited evidence of the relationship between the two series, it suggests that the RBA BBB series is both higher and more volatile than the Bloomberg BBB series. The AER considered that in the absence of one series being clearly superior to the other it would rely on a simple average of the two. We agree that at this point it is difficult to conclude that either of these series is clearly superior to the other, although we do know that during the global financial crisis Bloomberg's estimates were too low and immediately afterwards were too high, and that the RBA series has at times exhibited considerable volatility. We therefore recommend that a simple average of Bloomberg and the RBA series be applied to estimate the cost of debt.

4.2.7 Treatment of inflation – should the trailing average be specified in terms of a *real* or a *nominal* interest rate?

The ESC's standard model for setting regulated charges requires a real (inflation exclusive) interest rate as an input. Prices are set to provide this real return, plus compensation for the actual inflation that is experienced over the regulatory period. This compensation for inflation is provided through the escalation of prices for measured inflation, and for the regulatory asset value (which flows into the subsequent period's prices) similarly being escalated for actual inflation, and is inherent in CPI-X regulation of prices.[24]

Under this model, the obvious way to finance, in principle, would be to issue inflation-linked bonds. Under these instruments, the interest rate payable is the sum of a fixed *real* interest rate, plus actual

[24] The AER's standard calculations (as well as those of IPART and the QCA) compensate for inflation in a near identical manner, although the treatment of inflation in the ESC's method is much more obvious.

inflation (calculated with reference to CPI).[25] By financing in these terms, the component of the interest rate that reflects compensation for inflation aligns with the amount that is received through the regulated prices. It has long been known, however, that the markets for inflation-linked debt and inflation swaps are very small and, as a consequence, it is not possible for regulated businesses to finance in the manner suggested above. Rather, the dominant form of financing is to issue debt in fixed rate nominal terms, where the nominal interest rate (rather than the real interest rate) is fixed. With this form of financing, a regulated business will bear inflation risk – that is, the payment for inflation that is implicit in the interest rate payable will be fixed (reflecting, implicitly, the expected rate of inflation over the period of the borrowing), whereas the compensation for inflation will reflect the actual rate of inflation that is experienced. Thus, if inflation is higher than expected, the regulated business will benefit, and the converse will apply if inflation is lower than expected.

Against this background, a decision is required as to whether the trailing average cost of debt should be specified in terms of a nominal interest rate or a real interest rate. The difference between the two is that:

- If the trailing average is specified in terms of a real interest rate, then the real interest rate would be fixed at the time the debt was issued. Compensation for inflation would reflect actual inflation from that point forward.

- If the trailing average is specified in nominal terms, that nominal interest rate would be used at each price reset, and an implied real interest rate would be calculated based on the new forecast of inflation.

Which of these should be preferred from a risk management point of view depends on how it is thought that the firm in question would (efficiently) finance.

- If the firm was assumed to issue inflation-linked debt, then the application of a trailing average to real interest rates would minimise inflation risk.

- However, if the firm was assumed to issue fixed rate (nominal) debt, then – while inflation risk remained – this risk would be minimised by applying the trailing average to the nominal interest rates:

  - If the trailing average was applied to in real interest rates, then the firm would "win" or "lose" to the extent that there was a difference between actual inflation and the rate of inflation that was expected *at the time of the debt issuance*, whereas

  - If the trailing average was applied to nominal interest rates, then the firm would "win" or "lose" to the extent that there was a difference between actual inflation and the rate of inflation that was expected *at the time of each price review* (i.e., the allowance for the cost of debt would always be reset such that the regulated business would expect to recover the trailing average nominal cost of debt, a win or loss would only arise to the extent that inflation during the regulatory period differed to the forecast).

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25 This could also be achieved synthetically by issuing standard fixed rate nominal debt and entering into an inflation swap, whereby a fixed payment obligation is swapped for a payment obligation that varies with movements in the actual CPI.

Given our understanding of how regulated businesses typically finance, we recommend that the trailing average be applied to the nominal cost of debt, unless Melbourne Water expresses a clear preference for the trailing average to be applied to the real cost of debt (if Melbourne Water is able to source inflation swaps, then this may be feasible). We note that the AER applies the trailing average to nominal interest rates, and the same approach has been signalled by the other Australian regulators.

In practical terms, applying the trailing average to the nominal interest rate means that the cost of debt for each regulatory period in real terms would be calculated by:

- First, calculating the trailing average of the relevant nominal costs of debt.
- Secondly, calculate the implied real cost of debt by deducting the forecast of inflation from the nominal interest rate, applying the Fisher transformation.

We also recommend that the same approach be carried forward during the regulatory period, with the forecast of inflation made at the time of the price review continuing to be applied when undertaking the annual updating. Applying the fixed inflation forecast in this way is simple, and consistent with the current approach, whereby this inflation risk is borne by the regulated business between price reviews. The AER has also adopted this approach.

4.3 Summary of regulatory precedents and implementation approach

Table 4.1 below sets out the key decisions relating to a change from an 'on-the-day' approach to a trailing average cost of debt approach. Apart from the QCA, all of the regulators in the larger jurisdictions have adopted a trailing average approach (AER, ERA), are in the process of adopting a trailing average (ESCOSA), or apply an approach that may be considered to be close to a trailing average (IPART).

Only the AER has adopted a "spot rate" starting portfolio, which it justifies on grounds that it considers regulated businesses would 'lock in' a windfall gain if the regulatory approach switches from "on-the-day" to trailing average mid-way through a debt risk premium cycle. ESCOSA is still considering the transitional issues, including the question of how to implement without resulting windfall gains or losses being incurred by stakeholders. The ERA considers that most of the issues fall away if the trailing average (starting portfolio) relates only to the debt risk premium component. All of the jurisdictions apply a simple rather than weighted average approach, the only exception being ESCOSA, which considers that better signalling for investment is achieved using the weighted average approach.

Table 4.1: Summary of Melbourne Water's proposal, regulatory precedents and recommended approach

Issue	Melbourne Water (MW)	AER	ESCOSA	ERA	IPART	Incenta comments vis-à-vis 'NPV neutral" approach
Trailing average (TA) or 'on-the-day' (OTD)?	TA	TA	TA	TA	TA is given regard to	Key question is transition from TA that keeps firm & customers neutral in NPV terms
Starting portfolio	Historical Kd estimate	Spot rate	TBA	Historical DRP estimate	n/a	Starting portfolio should be set to keep MW & customers NPV neutral
Apply TA to all debt cost or just DRP component?	All	All	All	DRP	All	MW is a large business that has a staggered debt portfolio - applying TA to all the debt cost is appropriate if parties held NPV neutral
Simple' vs 'weighted trailing average'?	Simple	Simple	Weighted	Simple	Simple	Benefits must exceed costs/complexity - not an issue for "NPV neutral" approach
Annual updating of weighted average	Yes	Yes	Yes	Yes	No	Annual updating can be mechanised
Choice of averaging period	12 months	Up to 12 months	TBA	2-6 months	40 days	"NPV neutral" approach based on 12 months to 31 March each year
Benchmark credit rating for water	BBB	BBB+ (energy)	BBB	BBB	BBB to BBB-	ESCV precedent to apply a BBB- to BBB+ range for benchmark credit rating
Cost of debt estimation method	RBA	Average of RBA & Bloomberg	RBA	Average of in-house est.	RBA	Recommend average of RBA & Bloomberg as latter is new & less volatile than RBA

Source: Melbourne Water, AER, ESCOSA, ERA, QCA and Incenta analysis. Note: ERA's in-house estimate of cost of debt is average of Gaussian-Kernel (RBA) Nelson Seigel, and Nelson-Seigel-Svensson methods.

The AER has concluded that a transition to the trailing average approach should begin with the current spot rate and be updated each year by a one-tenth component that reflects the cost of debt for that year, so that by the tenth year a complete transition has been accomplished. However this is currently subject to an appeal before the Australian Competition Tribunal.

The last column of Table 4.1 we propose that in Melbourne Water's circumstances the forward looking approach that is NPV neutral can achieve immediate transition to a trailing average that is fair to all stakeholders. Annual updating is not relevant to this approach as it is based on the current spot rate and its forecast path toward its long term average.

4.4 Cost of debt estimate

4.4.1 Overview

As noted in Chapter 3, the objective of the forward looking approach is to determine a cost of debt path in the coming regulatory periods that leaves Melbourne Water and its customers in an NPV neutral position relative to the situation that is expected to prevail under the "on-the-day" approach.

4.4.2 Estimating the spot yield

In order to forecast the future cost of debt, we must estimate the starting point, which is the spot yield at the beginning of the regulatory period. WE have recommended that the spot rate should be estimated from the simple average of the annualised RBA (extrapolated) 10 year broad BBB credit rating band yield, and the annualised Bloomberg 10 year broad BBB credit rating band yield. We suggested that a period of 20 to 40 days should be used to estimate the spot yield. This should be done for the period just before the commencement of the regulatory period.

As a placeholder, and in order to illustrate the application of the recommended approach, we have estimated an average spot yield of **5.59 per cent** for the 20 business days from 2 December and 31 December 2015 as follows:

- An RBA broad BBB extrapolated 10 year yield estimate of **5.56 per cent**, which is the average of the RBA yields for the 20 business days to 31 December 2015;[26] and

- A Bloomberg 10 year broad BBB yield estimate of **5.63 per cent** for the 20 business days from 20 business days to 31 December 2015.

4.4.3 Forecasting the future BBB- to BBB+ yield

To implement a forward looking approach it is necessary to forecast the BBB- to BBB+ yield for the period over which mean reversion is forecasted to take place. There are no published forecasts of yields for 10 year BBB- to BBB+ bonds, but those yields are composed of an underlying 10 year risk free rate and the 10 year BBB- to BBB+ debt risk premium. Hence, we must forecast (then combine):

- The 10 year Commonwealth bond rate; and

- The long term 10 year debt risk premium for the BBB- to BBB+ credit rating band.

10 year Commonwealth bond yield

Bloomberg publishes a consensus view of economist forecasts of the 10 year risk free rate, but these are not long term forecasts – they extend only to the first quarter of 2017. However, there are other sources of long term forecasts, including BIS Shrapnel and London-based Consensus Economics, which interviews Australian economists about their long term views on a number of economic variables. Table 4.2 is drawn from the October 2013 edition of *Asia Pacific Consensus Forecasts* published by Consensus Economics.[27]

Table 4.2: Australia - Long term forecast of annual average 10 year Government Bond Yield (%)

			Historical Data	Consensus Forecasts						
2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019 - 2023
5.7	5.6	3.8	3.3	3.9	4.1	4.9	5	5.2	5.2	5.3

Source: Consensus Economics, (14 October, 2013) Asia Pacific Consensus Forecasts, p.3.

The long term consensus forecasts as at October 2013 foreshadowed a period of 5 to 10 years for the 10 year risk free rate to return to a long term level – i.e. mean reversion over a period of 5 to 10 years. The long term risk free rate of 5.2 to 5.3 per cent is consistent with a view that the long term expected inflation rate should be approximately 2.5 per cent (middle of the RBA target band), and that the long term real growth in the economy should be approximately 2.5 per cent.

26 This is the interpolated RBA BBB 10 year yield based on extrapolated BBB 10 year yield estimates of 5.59 per cent at 30 November 2015, and 5.53 per cent at 31 December, 2015.

27 Consensus Economics notes that every month it 'surveys over 180 prominent Asia Pacific financial and economic forecasters for their estimates of a range of variables.'

10 year BBB- to BBB+ debt risk premium

Forecasting the debt risk premium based on Australian data is made difficult by the fact that the history is limited. The Australian bond market only began in the late 1990s and is still relatively undeveloped compared with the US bond market. Estimates of the Australian 10 year BBB debt risk premium over the past decade have been contentious, with at times widely varying estimates being provided by alternative data sources. In the low market volatility period prior to the global financial crisis, the 10 year broad BBB debt risk premium was in the vicinity of 100 to 130 basis points, which is similar to what was observed for US 10 year Treasuries. However, with the virtual closing of the Australian bond market during the global financial crisis, longer dated bonds became rare, and estimates of the 10 year debt risk premium based on different sources diverged over the next few years. Currently the Australian 10 year BBB debt risk premium is in the vicinity of 250 basis points to 300 basis points, which is significantly higher than the approximately 170 basis points BBB debt risk premium that is being observed in the US.

Our view is that the long term 10 year broad BBB debt risk premium is likely to be higher than the 100 to 130 basis points observed just prior to the global financial crisis, and will fall below current levels as the risk free rate reverts to its long term mean over the next 5 to 10 years. We consider that a long term 10 year broad BBB debt risk premium in the range of 170 basis points to 180 basis points is a reasonable estimate. This is slightly above the current US debt risk premium of approximately 170 basis points, and slightly higher than the long term average of the US debt risk premium since 1999 (also 170 basis points).

Forecast 10 year BBB- to BBB+ yield

Combining the above forecasts, our expectation is that the long term 10 year broad BBB yield will revert to a mean of approximately **7 per cent** based on:

- A 10 year Commonwealth bond rate of between 5.2 per cent and 5.3 per cent; and
- A long term 10 year broad BBB debt risk premium in the range of 1.7 to 1.8 per cent.

We believe that mean reversion over a period of 10 years to a broad BBB yield of 7 per cent is reasonable. We will also show the sensitivities if the mean reversion process were to be forecasted to take place over 5 years or 15 years instead of 10 years.

4.4.4 Estimating the starting portfolio

The objective of our recommended approach is to leave Melbourne Water in an *ex ante* NPV neutral position. This in turn requires that we find the cost of debt for the "starting portfolio" (i.e. the cost of debt for the theoretical trailing average portfolio up to the commencement of the actual trailing average) that equates the two NPVs.

Our "placeholder" estimate of a spot cost of debt is 5.59 per cent,[28] and as set out above, we consider that a long term average cost of debt of 7 per cent is a reasonable assumption. Hence, we have applied the assumption that:

- Interest rates will move in a linear manner to a long term cost of debt of 7 per cent; and
- This will occur over a period of 10 years (we have also tested scenarios for this mean reversion over terms of 5 and 15 years).

We have also assumed that under the "on-the-day" approach the allowance for the cost of debt would be reset at the spot rate during the quarter just prior to the start of the new regulatory period, and held constant during that regulatory period. Using these assumptions, we have derived the interest rate on the starting trailing average portfolio by:

- Assuming a constant interest rate across the starting portfolio, and assuming a "seed" value for this interest rate;
- Deriving the allowance that would result under the trailing average approach given this starting portfolio and comparing this to the allowance under the "on-the-day" approach in net present value terms,[29] both assuming a mean reversion of interest rates over 10 years (and sensitivities of 5 and 10 years), and
- Then iterating the "seed" value for the starting portfolio interest rate until the allowances derived above are equated.

The outcome of this process can be seen in Figure 4.1 below, where:

- The spot rate is forecasted to rise from the current 5.59 per cent up to the long term mean of 7 per cent over the next 10 years.
- Under an "on-the-day" approach the forecasted cost of debt would:
  - Remain at 5.59 per cent between 2016/17 and 2020/21;
  - Rise to 6.3 per cent between 2021/22 and 2025/26; and
  - Then rise to 7 per cent at 2027/28 and beyond.

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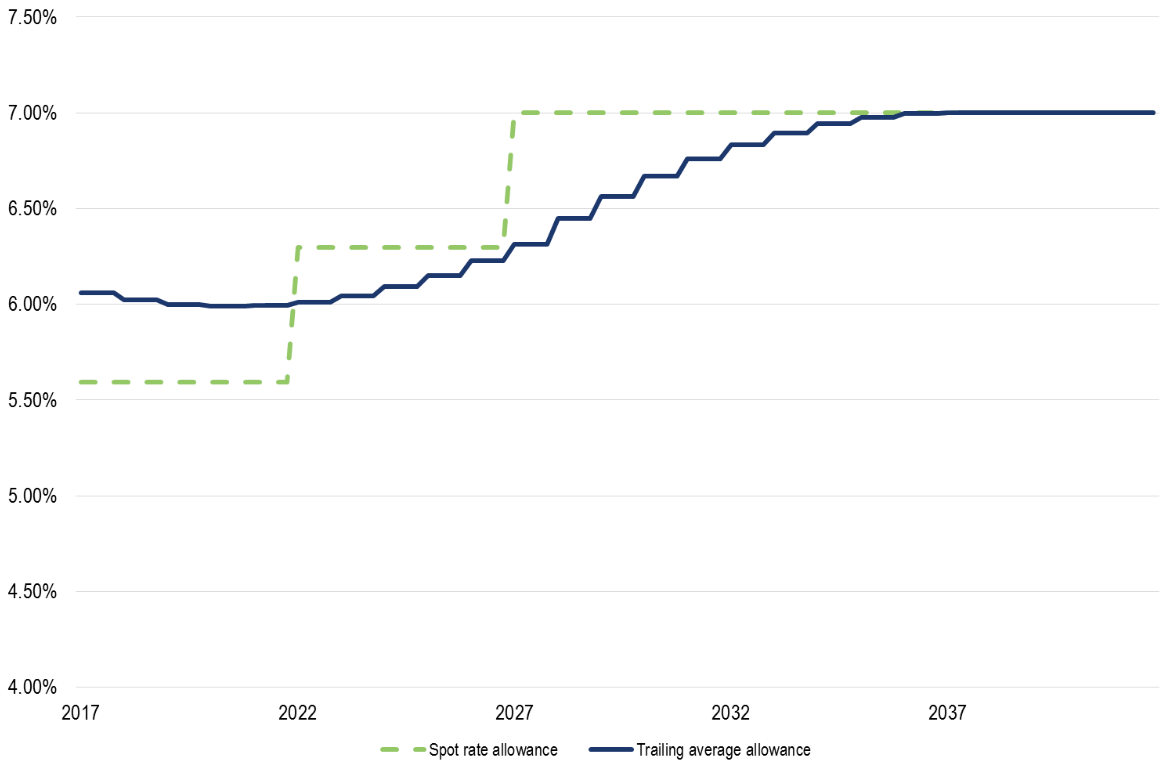
28 This is the estimated cost of debt for the 20 business days to 31 December, 2015, calculated as the average of the extrapolated 10 year RBA BBB corporate bond yield series, and the 10 year Bloomberg BBB (BVAL) series.

29 The net present value is calculated using a discount rate equal to the average spot interest rate over the test period and implicitly also assumes a constant stock of debt. Each year was divided into quarters for the calculation.

Figure 4.2: NPV neutral starting portfolio - trailing average with 10 year mean reversion of the cost of debt



Source: RBA, Bloomberg, Incenta analysis

For the assumed 10 year mean reversion period it requires a 20 year process for the trailing average cost of debt to equal the long term average cost of debt:

- The trailing average begins at **6.06 per cent**, which is the cost of debt of the starting portfolio, and remains at approximately 6 per cent during the next 5 year regulatory period (being brought lower each year by the fact that each year's addition of a 10 per cent tranche of re-financed debt is being completed at a lower cost of debt);

- From 2021/22, because each year the re-financing of 1/10th of the debt portfolio is done at the prevailing spot rate, which is above the trailing average, each year's new financing increases the trailing average cost of debt to approach the long term average of 7 per cent; and

- From 2027/28 both the trailing average cost of debt and the spot yield (on-the-day) would be 7 per cent, which is the forecast long term average.

The outcome of this calculation - an estimated 6.06 per cent the cost of debt for the first year of the new regulatory period - is preliminary because we have been asked to update the figure using the interest rates in effect just prior to the commencement of new regulatory period. The allowance will then be adjusted each year to reflect an assumption that 10 per cent of the starting portfolio has matured and is replaced with debt financed at current rates (defined as the average interest rate over the year ending with March just prior to the new regulatory year).

Sensitivities using 5 year mean reversion and 15 year mean reversion assumptions are shown in Table 4.3 below. While the NPV-equivalent starting portfolio interest rate is estimated at 6.06 per cent for the base case assumption of a 10 year mean reversion of interest rates, it is 6.13 per cent for 5 year mean reversion or 6.01 per cent for 15 year mean reversion.

Table 4.3: Regulatory cost of debt – NPV neutral starting portfolio

	2016/17	2017/18	2018/19	2019/20	2020/21
5 year mean reversion	6.13%	6.09%	6.08%	6.10%	6.15%
10 year mean reversion	6.06%	6.02%	6.00%	5.99%	5.99%
15 year mean reversion	6.01%	5.97%	5.94%	5.93%	5.92%

Source: Melbourne Water, RBA, Bloomberg, AER and Incenta analysis

4.4.5 Comparison of alternative approaches

Figure 4.3 below displays the future regulatory cost of debt under alternative "trailing average" approaches relative to the "on-the-day" approach. All of these outcomes assume the same "mean reversion" to a 7 per cent cost of debt over the ten years from 2017.[30] In all cases, new borrowings are assumed to occur at our forecast (commercial) interest rates (including for the scenario shown below that is intended to reflect the actual cost for a benchmark Victorian water business). We show the regulatory cost of debt allowance over time that would be generated by applying:[31]

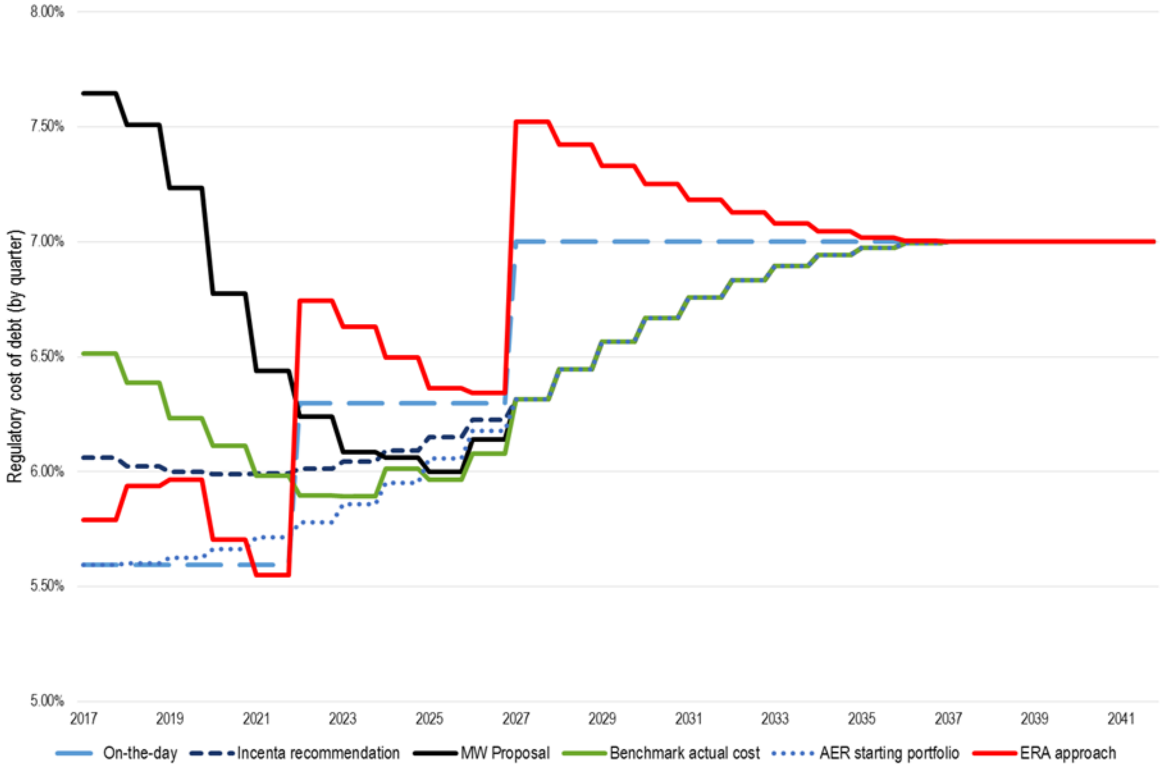
- The "on-the-day" approach (labelled "on-the-day");
- The starting portfolio that we recommend (labelled "Incenta recommendation");
- The starting portfolio under Melbourne Water's approach (labelled "MW proposal");
- The AER's preferred starting portfolio, whereby the starting portfolio is assumed to consistent of debt financed wholly at prevailing rates (labelled "AER starting portfolio");
- The ERA "hybrid trailing average", whereby only the debt risk premium is subject to the trailing average and historical values for the debt risk premium are used (labelled "ERA approach"); and
- The embedded cost of debt that a benchmark Victorian water business would have, which assumes that it had raised debt historically at the prevailing Victorian Government borrowing

30 Melbourne Water's proposal included its own projected cost of debt which, while not identical to ours, also assumed an increasing cost of debt over the next regulatory period.

31 To place the alternative approaches on a level playing field we have calculated the historical "on-the-day" approach, Melbourne Water approach, and ERA approach based on an average of the RBA and Bloomberg (extrapolated using the RBA data) BBB series. In each year the "Benchmark actual cost" is based on the historical TCV base rate plus FAL for a BBB credit rating plus the TCV execution cost of 3 basis points. The TCV base rate for 2015-16 is estimated based on Bloomberg TCV yields plus the BBB FAL of 156 basis points plus an execution cost of 3 basis points.

rates and paid the prevailing "Financial Accommodation Levy" applicable to an BBB rated entity (labelled "Benchmark actual cost").[32]

Figure 4.3: Regulatory cost of debt under alternative approaches (assuming mean reversion to 7 per cent over 10 years)



Source: RBA, Bloomberg, Melbourne Water, Incenta analysis

We would draw the following observations:

- All of the full "trailing averages" converge after 10 years (which reflects the length of time before the starting portfolio has been fully refinanced) and all approaches converge after 20 years (being the sum of the refinancing period and the time over which interest rates are assumed to revert to the mean).
- Our recommended approach is forecast to provide a higher allowance than the AER starting portfolio, which reflects the fact that we think the AER starting portfolio would place Melbourne Water in an inferior position relative to the continuation of the "on-the-day" approach, which we consider to be inappropriate. Compared to the ERA's method, our recommended approach is forecast to generate a higher allowance in the next regulatory period but lower allowances thereafter. We also note that the ERA's approach would not appear to result in a smoother regulatory cost of debt profile under the scenario of mean reversion over the next decade.

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32 The Department of Treasury and Finance applies a Financial Accommodation Levy to allow for the difference in borrowing costs for the government and a commercial entity. This is applied for competitive neutrality purposes.

- Our proposed starting portfolio is forecast to generate an allowance that is materially lower than that expected under Melbourne Water's proposal during the next regulatory period, but is expected to generate a higher allowance in the following regulatory period. Our proposed starting portfolio is expected to generate a smoother allowance over the next two regulatory periods.

- Our proposed starting portfolio is forecast to generate an allowance that is relatively close to the actual cost of a benchmark Victorian water business (i.e. our recommended allowance is slightly lower in the first regulatory period and slightly higher in the second period).

The comparisons presented above confirm our view that a starting portfolio interest rate of 6.06 per cent will provide a fair basis for transitioning from the "on-the-day" approach to the cost of debt to the use of a "trailing average".

In Table 4.4 we show the cost of debt averages under each approach after taking account of the time value of money. Incenta's recommended approach results in a higher cost of debt relative to the "on-the-day" approach in the first period, but is lower in subsequent periods, and by design has the same cost (6.34 per cent) over the entire period (2017 to 20141). The benchmark actual cost approach for a BBB credit rating would provide a very similar result over the entire period (6.39 per cent). By contrast, the AER's approach provides a materially lower outcome (6.17 per cent), and Melbourne Water's approach implies a materially higher cost of debt (6.73 per cent) over the entire period, which is due to the much higher cost of debt implied during the first regulatory period (2017 to 2021). The ERA's approach results in an overall cost of debt that lies between Incenta's recommendation and Melbourne Water's approach (i.e. 6.54 per cent).

Table 4.4: Cost of debt in each regulatory period and overall (time value of money adjusted)

Regulatory period	Overall	2017 to 2021	2022 to 2026	2027 to 2031	2032 to 2036	2037 to 2041
On-the-day approach	6.34%	5.59%	6.30%	7.00%	7.00%	7.00%
Incenta recommendation	6.34%	6.02%	6.10%	6.54%	6.92%	7.00%
MW Proposal approach	6.73%	7.16%	6.11%	6.54%	6.92%	7.00%
Benchmark actual cost (BBB)	6.39%	6.26%	5.96%	6.54%	6.92%	7.00%
AER starting portfolio	6.17%	5.64%	5.95%	6.54%	6.92%	7.00%
ERA approach	6.54%	5.80%	6.53%	7.35%	7.06%	7.00%

Source: RBA, Bloomberg, TCV, and Incenta analysis

4.5 Conclusion

As noted in this chapter, we agree with many of Melbourne Water's proposals about updating the trailing average. The main differentiating feature of our recommended approach is the adoption of a starting portfolio that has been derived by equating the NPV of continuing to apply the existing "on-the-day" approach and a trailing average approach based on an assumed 10 year mean reversion of the cost of debt to a long term average of 7 percent.

Under our proposed approach the regulatory cost of debt over the coming regulatory period would be significantly lower than under Melbourne Water's proposal, which we consider is likely to provide Melbourne Water with a windfall gain. Similarly, we have shown that adoption of the AER's starting portfolio (i.e. the "spot rate"), would be likely to result in a windfall loss for Melbourne Water. We therefore consider our proposal to provide the fairest means of transitioning from the currently applied "on-the-day" approach to a trailing average. In this way stakeholders may benefit from the advantages of a trailing average approach, without the issue of windfall gains/losses.

A. Historical cost of debt and debt risk premium series

Table 3.1 in the body of this report shows the historical cost of debt implied by Melbourne Water's proposal, relative to the regulatory cost of debt allowance, benchmark costs of debt (at A- and BBB credit ratings) and the weighted average actual cost of debt achieved in each year between 2006/7 and 2014/15. In Table A.1 below, we show that the relativities are maintained if the real cost of debt record is examined. In relation to the regulatory allowance we have applied the inflation rate expected at the start of each regulatory period. The other real cost of debt series have been calculated by reference to the average expected rate of inflation in each year, as shown in Table A.3.

Table A.1: Real regulatory cost of debt allowance vs Melbourne Water proposal, historical benchmarks and actual interest cost incurred

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	Average
Melbourne Water proposal	3.97%	4.87%	7.72%	6.48%	5.10%	5.04%	4.11%	4.49%	2.93%	**4.97%**
Bloomberg (RBA extrapolated)	3.64%	5.30%	6.69%	6.60%	5.43%	4.70%	3.56%	4.24%	2.70%	**4.76%**
Regulatory cost of debt allowance	3.83%	3.83%	4.47%	4.47%	4.47%	4.47%	4.47%	4.59%	4.59%	**4.35%**
Benchmark actual cost at (BBB rating)	3.67%	4.10%	4.23%	4.74%	4.26%	3.53%	2.59%	4.45%	3.21%	**3.86%**
Benchmark actual cost (A- rating)	3.51%	3.97%	4.03%	4.74%	4.26%	3.53%	2.59%	4.71%	2.77%	**3.79%**
Weighted average actual cost	3.38%	3.50%	3.19%	3.66%	3.84%	3.78%	3.42%	3.52%	3.64%	**3.55%**

Source: RBA, Bloomberg, TCV, and Incenta analysis

In Table A.2 we see a similar pattern with respect to the debt risk premiums implied by Melbourne Water's proposal. In this table the debt risk premium has been calculated by subtracting the 10 year risk free rate (sourced from Bloomberg) from the cost of debt, benchmark or regulatory allowance. Again we find that the historical debt risk premiums of the Melbourne Water proposal and Bloomberg (RBA extrapolated) series are materially higher than the regulatory allowances, benchmarks and actual debt risk premium.

Table A.2: Debt risk premium implied by regulatory cost of debt allowance vs Melbourne Water proposal, historical benchmarks and actual interest cost incurred

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	Average
Melbourne Water proposal	1.44%	2.01%	5.33%	3.70%	2.51%	3.37%	3.56%	3.26%	2.08%	**3.03%**
Bloomberg (RBA extrapolated)	1.10%	2.45%	4.27%	3.82%	2.85%	3.02%	3.00%	3.01%	1.85%	**2.82%**
Regulatory cost of debt allowance	1.16%	1.16%	2.25%	2.25%	2.25%	2.25%	2.25%	3.99%	3.99%	**2.39%**
Benchmark actual cost at (BBB rating)	1.14%	1.21%	1.74%	1.92%	1.65%	1.82%	2.01%	3.22%	2.36%	**1.90%**
Benchmark actual cost (A- rating)	0.97%	1.08%	1.54%	1.92%	1.65%	1.82%	2.01%	3.49%	1.91%	**1.82%**
Weighted average actual cost	0.83%	0.60%	0.67%	0.81%	1.22%	2.08%	2.86%	2.26%	2.81%	**1.57%**

Source: RBA, Bloomberg, TCV, and Incenta analysis

Table A.3 below shows annual average inflationary expectations, as revealed in the differential between 10 year nominal and CPI adjusted Commonwealth bonds (i.e. the 'break-even' inflation rates). These were applied (via the Fisher relation) to calculate real costs of debt in Table A.1 above.

Table A.3: Estimated average forward looking inflationary expectations

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	Average
Break even 10 year inflation expected	3.16%	3.16%	2.81%	2.54%	2.72%	2.79%	2.67%	2.59%	2.38%	**2.76%**

Source: Bloomberg, and Incenta analysis