

Inflation forecasting methodology

Melbourne Water

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1. Executive Summary

The issue

Incenta Economic Consulting (Incenta) was engaged to advise Melbourne Water on the issue of the inflation forecast that is used by the Essential Services Commission (ESC) as an input to determining the allowance for the real cost of debt for the coming regulatory period.

We observe that if the forecast of inflation is higher (lower) than reasonable, then Melbourne Water will be systematically undercompensated (overcompensated) for its trailing average debt costs. We further note that a characteristic of the ESC's approach to deriving debt costs is that an inflation forecast over only the term of the regulatory period is required (i.e., 5 years). The ESC has proposed to apply the Department of Treasury and Finance (DTF) inflation forecasts, and Melbourne Water has asked Incenta to advise on the appropriateness of that approach relative to other alternatives that might exist.

This is a matter of such concern to regulated businesses at the present time that the Essential Services Commission of South Australia (ESCOSA) recently amended its stated policy on the matter, and the Australian Energy Regulator (AER) has commenced a new review of inflation forecasting after having determined its previous policy only in 2017.¹

Treatment of Covid-19 in our advice

Melbourne Water's new regulatory period will not commence until 1 July 2021, and so we assume that the forecast that is applied will reflect the market conditions at the time. Accordingly, in this advice, we do not address how to deal with the heightened difficulties with deriving a medium term forecast of inflation at the present time. However, we do assume that the deflationary pressures that had been present now for some time prior to the outbreak of Covid-19 continue to be present, and are more likely than not stronger than was the case prior to Covid-19. Where we refer to "at present", we mean the market environment that existed just prior to the onset of Covid-19.

Available methods

In discussing alternative methods, we distinguish between short term (1 and 2-years) forecasts, and medium-term forecasts (3 to 5 years). Medium-term forecasts present the greatest challenges as there are few publicly available forecasts that extend from 3 to 5 years.²

We have identified the following four methods that have been applied (or proposed to be applied) to forecast inflation:

- The DTF Method – This Victorian Department of Finance (DTF) determines 5-years ahead inflation forecasts of the Melbourne CPI each year for the Victorian budget, which it derives using an econometric model. We observe that DTF explicitly forecasts 2 years out then applies a 2.5 per cent assumption (equivalent to the midpoint of the RBA band) to years 3 to 5.

¹ AER (7 April, 2020) *Initiation Notice – Review of treatment of inflation 2020*.

² The IMF publishes CPI forecasts for Australia. For example, IMF (6 February, 2020) *Staff report for the Article IV Consultation*.

- Market instruments – these are:
 - The bond break even inflation rate (BBIR), which is the (Fisher effected) difference between nominal and CPI-linked government bond yields of the same term; and
 - Inflation swaps that are derivative instruments whereby parties exchange a fixed (nominal) cash flow stream for a variable (inflation linked cash flow stream).
- The AER Method – This method, which is applied by the AER and QCA uses the RBA’s 1 and 2-year explicit forecasts and then assumes that inflation from years 3 onwards reverts to the midpoint of the of the RBA’s target band.
- Two years of explicit forecasts with glide path – ESCOSA and the NZCC also start with the first two years of the relevant central bank’s forecasts, but apply a glide path to link the explicit 2-year forecast and an assumed 5-year target level of inflation (the IMF forecast to 5 years in the former and the middle of the central bank’s target band in the case of the latter).

In contrast, regulators typically have not applied the forecasts of market economists as academic research has found that the 1 and 2-year RBA forecasts are more informative. Moreover, market economists rarely provide forecasts beyond 2 years and those that do are proprietary and hence lack transparency.³

Assessment of the methods

Limitations of testing

We observe that one of the difficulties with deciding upon which is the best method for forecasting inflation is that it is very difficult to conduct a reliable test of the accuracy of different methods. While several Australian and New Zealand regulators have examined alternative inflation forecasting methods and have sought to test the accuracy of different forecasting methods by comparing those forecasts to the *ex post* outcomes, there are material limitations to the weight that one can apply to those tests, and particularly in the current context.

- First, the fact that outturn inflation can vary dramatically due to exogenous shocks, means that an examination of inflation over a short period is uninformative, and a very long period of *ex post* observations is required in a period without major shocks in order to shed light on the efficacy of *ex ante* predictions.⁴ However, these results will only be relevant to the extent that the future market environment is expected to be materially the same as when the testing took place.

³ Market instruments should be more informative than economist forecasts in the absence of risk premia and other possible biases in market prices. The issue that we draw attention to is that there is a strong opinion amongst commentators – which has some evidentiary support – that certain risk premia have been particularly pronounced in recent years, which makes these instruments less informative for deriving a forecast of inflation.

⁴ A parallel difficulty faces researchers who estimate the market risk premium by looking at 50 to 100 years of data.

- Secondly, and related to the point above, the fact that we require a five-year forecast means that the most recent forecast that can be tested against the *ex post* outcomes is some distance in the past. Specifically, we are unable to test 5-year inflationary forecasts that were made after March 2015, which means that such testing cannot be applied with respect to the more recent behaviour of inflation.⁵

Could market instruments be applied?

In principle, market instruments have a lot to offer as a means of forecasting inflation because they reflect real market transactions (and hence information that is tested), can provide a contemporary forecast, and could be a method that is straightforward to apply. For these reasons, regulators – including the ORG / ESC – were initially attracted to market instrument-based estimates of future inflation; however, all except the ERAWA have now discontinued using them. This is because of the well-documented potential for material time varying inflation, liquidity and other premia /biases to affect the prices of these market instruments.⁶

In our view, it would be difficult to have confidence in inflation forecasts derived from market instruments until there is a better understanding of the materiality and / or quantification of these premiums and biases. However, if there were empirical techniques developed that enabled a reliable estimate of these biases – and hence their elimination from the inflation forecast – then a return to the use of market instruments would be warranted.⁷

First two years – use of central bank forecasts

We observe that almost all of the regulators in Australia and New Zealand apply the relevant central bank forecasts (i.e., Reserve Bank of Australia or Reserve Bank of New Zealand) for the term of those forecasts, namely approximately 2 years. In our view, the continued use of central bank forecasts (and RBA specifically) for the term of those forecasts remains best practice for the following reasons.

- First, the RBA's short term (1 and 2-year) forecasts have performed relatively well and have been found to deliver superior forecasts to those of market economists.
- Secondly, the RBA is transparent as to the factors that it considers when preparing its inflation forecasts (which are released as part of its Monetary Policy Statement), and the RBA also has an ongoing research program focussed on testing and refining its empirical methods, which again has led to substantial public material.

⁵ March 2015 is the last date at which 5-year forecasts applying the AER Method can be tested against outcomes for the 5 years up to March, 2020.

⁶ There is a significant body of opinion that, in the current low inflation-rate environment, the inflation risk premium – which historically has raised the yield of nominal instruments (and so caused an upward bias to inflation forecasts, all else constant) – has switched direction, and for this reason all market instruments would be expected to under-forecast inflation at present.

⁷ It would be particularly unwise to apply market instruments at a time of severe market dislocation such as in the Covid-19 world although, as we noted above, we do not address in this advice how to form a forecast in the midst of Covid-19.

- Thirdly, the RBA’s forecasts are released quarterly in or around the end of the first week of May, August, November and February, and so there is generally a reasonably contemporaneous forecast available to coincide with a new regulatory period.

As discussed earlier, the DTF undertakes its own forecasting of inflation for the first two years, although in practice the DTF forecasts have tended to be very close to those prepared by the RBA. However, we prefer to use of the RBA inflation forecasts as the basis for the first two years for two reasons.

- First, the DTF forecasts the Melbourne CPI whereas the appropriate indicator is the Australian (average of eight state capitals) CPI. Whilst these two indices move very closely together over the medium to long term, they can depart materially for shorter intervals.⁸
- Secondly, whilst the DTF contains some information about its approach to forecasting on its website, there is not anywhere near the same degree of transparency and continual development as exists in respect of the RBA’s forecasts.⁹

Forecasts for years 3 onwards¹⁰

As discussed above, the AER’s method when forecasting inflation has been to assume that inflation reverts to the midpoint of the RBA target range from years 3 onwards. We observe that a key reason for the AER adopting and remaining with this method is that it has performed very well historically, and most notably from 1993 to 2010.

However, in recent years the RBA, researchers and other observers have commented on the lower than expected inflation outcomes, which have remained largely below the bottom of the RBA’s target inflation band. The RBA Governor, Dr Philip Lowe, has noted that in the current environment, the RBA has less ability to affect the inflation rate using monetary policy. Inflation has remained low partly because of relatively sluggish economic growth in the post global financial crisis economy. In these circumstances it is questionable that the prevailing Australian regulatory assumption of a relatively rapid reversion of inflation to the mid-point of the RBA’s target band can be sustained.¹¹

In its letter to the AER, the RBA noted that assuming an instantaneous reversion to the middle of the target band in year 3 would provide an inaccurate inflation estimate if there was a fundamental change in inflationary expectations. In the ‘Overview’ of its 8 May 2020, Statement on Monetary Policy, the RBA suggests that its baseline scenario is for inflation to remain “low” and “below 2 per cent for

⁸ Over the past 20 years the outturn Melbourne CPI and Australian CPI have been almost identical, although there have been material variations in shorter (e.g., 5-year) periods.

⁹ This is not intended as a criticism of the DTF, only a reflection of the fact that its forecasts are developed for a different purpose.

¹⁰ As noted above, the context for which the ESC applies the inflation forecast means that a 5-year inflation forecast is required, although the methods employed by a number of other regulators implies that a 10 year forecast is needed.

¹¹ The RBA’s inflation target is to get inflation to within the target band (i.e., between 2 per cent and 3 per cent) on average over the medium term. The RBA has no further authority to move inflation within the band (i.e., towards the midpoint). The RBNZ’s inflation target is slightly different in that it is required to pursue the midpoint of the band.

some time,”¹² and provides further analysis of market economists and unions that suggests reversion to the lower part of its target band (2 to 2.5 percent) only over the “long-run” (6 to 10 years).

The RBA’s most recent, August 2020, Statement on Monetary Policy provides further updates of its outlook for inflation over the next two years and beyond. Over the next two years to December 2021 and December 2022 the RBA’s forecast is for CPI increases of 1 per cent and 1.5 per cent respectively.¹³ The RBA also reports that the 5-10 year CPI view of unions is approximately 2 per cent, the outlook of market economists is approximately 2.25 per cent and the 6-10 year CPI forecast of Consensus Economics is approximately 2.5 per cent.

The IMF has recently reviewed Australia’s monetary policy settings and forecasts, concluding that:¹⁴

Monetary Policy has eased since mid-2019. The RBA cut the policy rate from 1.5 percent to 0.75 percent in increments in June, July and October 2019, because of weaker than expected inflation and wage outcomes. It has indicated an accommodation bias, highlighting the need for an extended period of low interest rates to reach full employment and the inflation target.

Our view is that the views expressed by the RBA and IMF imply that over the “medium-term” (i.e. over the next 3 to 5 years) inflation is most likely to approximate the lower bound of the RBA’s target band (2 per cent).

Recommendation

We recommend the following method be applied:

- The RBA’s explicit 1 and 2 year inflation forecasts be relied upon, as they have been found to be relatively accurate, and are subject to on-going research and scrutiny. While the DTF’s 1 and 2-year forecasts have provided a similar inflation forecast to the RBA, they are less transparent and estimate the Melbourne CPI rather than the Australia CPI.
- A more reasonable assumption about the medium-term horizon (years 3, 4 and 5) is that the RBA is able to achieve inflation outcomes near the lower bound of its target range (i.e. at 2 per cent).
- Hence, our recommendation based on the most current RBA Statement of Monetary Policy is as displayed in Table ES.1 below. The geometric mean of the series of forecasts is 1.64 per cent for the 5-year period starting January, 2021.

Table ES.1: Recommended CPI forecast at November, 2020 (5 years from January, 2021)

Calendar year		2021	2022	2023	2024	2025
Basis of estimate	Geometric mean	RBA	RBA	Bottom of RBA target band		
CPI value	1.64%	1%	1.50%	2%	2%	2%

Source: Incenta based on latest RBA Statement of Monetary Policy

¹² RBA (8 May, 2020), *Statement on Monetary Policy*, p.5.

¹³ RBA (August, 2020), *Statement on Monetary Policy*, Appendix: Forecasts.

¹⁴ IMF (March 2020), *Australia: 2019 Article IV Consultation – Press Release; Staff Report: and Statement by the Executive Director for Australia*, p.8.

- However, we also recommend that the assumption about the medium-term trend be kept under review up until the ESC prepares its final decision, and specifically we recommend a close reading of the current and future RBA *Statements on Monetary Policy* up to the time the decision is made and confirm that the recommended medium-term trend remains reasonable.
 - It is plausible that economic growth becomes sufficiently stimulated as a consequence of post Covid-19 measures that it becomes reasonable to assume that inflation reverts more quickly to the midpoint of the RBA target band.
 - However, a more likely scenario is that economic conditions worsen sufficiently that the RBA takes an extended period to stimulate inflation to the lower band (in which case a longer trend to the lower band may be more consistent with the RBA’s statements).

2. Background and outline of report

2.1 The Brief

Melbourne Water engaged Incenta Economic Consulting (Incenta) to provide a report that would be used to support Melbourne Water’s proposal to the Essential Services Commission (ESC) for an appropriate methodology for forecasting inflation along the lines of the methodologies used by the Australian Energy Regulator (AER), Independent Pricing and Regulatory Tribunal (IPART) or other regulators.

The Project Brief required us to:

- Gain familiarisation with the ESC’s 2021 Guidance Paper to inform the context of the project;
- Identify and evaluate alternative inflation forecasting methodologies used in Australian regulatory jurisdictions; and,
- Recommend an appropriate deflator methodology that can be submitted to the ESC in support of Melbourne Water’s price submission.

The key focus of the report is to assess which methodology is most likely to deliver an accurate inflation forecast, which would mitigate Melbourne Water’s risk.

2.2 Background and ESC’s previous inflation forecasting approach

Why inflation forecasts are important

Currently the ESC specifies a set of expected inflation rates in advance over Melbourne Water’s five-year regulatory period, which are used to convert the nominal cost of debt that is derived under the trailing average cost of debt method into a real cost of debt for use in the price submission. This creates a risk that Melbourne Water may be required to apply a number that may not be the best, unbiased forecast of inflation over the period. This is important because, under the ESC’s standard revenue and price setting method, the actual return on debt that Melbourne Water receives will be given by (ignoring the Fisher interaction term):

$$\text{Nominal cost of debt} - \text{ESC forecast of inflation} + \text{Actual inflation},$$

with the “actual inflation” component arising from the indexation of prices / revenue and the Regulated Asset Base (RAB). Thus, if the ESC forecast systematically overstates (understates) forecast inflation, Melbourne Water will be systematically undercompensated (overcompensated) for its nominal trailing average debt costs. Melbourne Water is seeking to mitigate that risk through the commissioning of this report.

We note that some regulators (see Table 3.1 below) forecast inflation over a period of 10 years, while others do so for the length of the regulatory period. Both approaches are correct for the purpose that the inflation forecast is being applied. In Melbourne Water’s case the ESC applies the inflation forecast in such a way that only a forecast to the end of the regulatory period is required (i.e. 5 years).

The ESC's previous inflation forecasting method

In the course of the ESC's previous regulatory decision on Melbourne Water in 2016, the ESC applied an inflation forecast of 2.20 per cent. The real risk free rate was calculated for the 40 day trading period to 7 March 2016 based on what it termed "a paired bonds approach (using Commonwealth Government inflation indexed bonds)," and "Forecast inflation was based on nominal bond rates using the paired bond approach."¹⁵

2.3 ESC's Guidance Paper

The ESC has released a *Guidance Paper* for application of Melbourne Water's 2021 price review, which will be its first under the PREMO framework.¹⁶ The question of inflation forecasting is raised at only a few points in the *Guidance Paper*:

- In section 3.8 at footnote 34 relating to the benchmark 10 year trailing average cost of debt the ESC states that it "will use a market based inflation estimate and specify the applicable inflation rate in the financial model."
- In section 3.11 the ESC states that "the cost of debt is calculated in nominal terms then converted to real terms applying our inflation rate."
- In section 3.21 the ESC states that:

"The model will include a forecast inflation rate (based on the Victorian Department of Treasury and Finance inflation forecasts. The inflation rate will be used to estimate components of the regulatory rate of return (see section 3.8) and estimates for financial indicators (see section 3.20). We will use the latest forecasts for inflation." [emphasis added]

These statements indicate that the ESC intends to apply the latest Victorian Department of Treasury and Finance (DTF) inflation forecasts for the purpose of adjusting a nominal cost of debt to a real cost equivalent.

2.4 Victorian Department of Treasury and Finance's approach to inflation forecasting

The DTF website provides a high-level summary of the methodology that it uses to forecast inflation for the purpose of informing its budget forecasts.¹⁷ In the "Consumer prices growth" section of that document we learn that the approach has several components:¹⁸

The trend value of consumer price growth is estimated to be (sic) correspond closely to the mid-point of the RBA's inflation target band.

¹⁵ Essential Services Commission (March 2016), *Melbourne Water Price Review 2016, Draft Decision*, p.64.

¹⁶ Essential Services Commission (13 November, 2019), *Melbourne Water's 2021 water price review – Guidance paper*.

¹⁷ DTF (November, 2019), *Method for making forecasts of macroeconomic indicators*.

¹⁸ DTF (November, 2019), p.11.

Method

Headline inflation forecasts are developed using these CPI basket subsets. A combination of econometric modelling, extension of historical trends and judgement based on partial information underpin the forecasts.

Inflation in market goods and services is forecast using an ordinary least squares econometric model. In the model, year-ended inflation in market goods and services is positively related to the inverse of the unemployment rate, an autoregressive term, inflation expectations, and a dummy variable to account for the introduction of the GST. Inflation is negatively related to the annual change in the unemployment rate.

The remaining segment of the CPI basket, comprised of administered and other seasonal/volatile items, is forecast using a bottom-up approach based on historical trends and partial information, and informed by judgement of future trends and leading indicators.

The headline inflation forecast for Victoria is based on the sum of the contributions to growth from inflation in market goods and services and the other seasonal/volatile items. Adjustments are made based on additional information such as recent movements in the value of the Australian dollar, developments in oil markets and relevant government policies.

Further in the document we find that inflationary expectations are derived as follows:¹⁹

Inflation expectations are calculated as the difference between standard and indexed bond yields at a maturity of 10 years.

The summary explains that DTF uses an econometric model to forecast inflation, which includes several explanatory variables including a measure of inflationary expectations based on the market-based methodology that is commonly referred to as the “break-even” approach.

The DTF’s inflation forecasting approach formally described, however we have reviewed the DTF inflation forecasts that have accompanied Victorian budget papers (see Appendix A). From the pattern of explicit forecasts displayed in the budget papers we can surmise that the DTF has:

- Applied its modelling to determine explicit forecasts of CPI for the first two years; and
- Has then applied the middle of the RBA’s target inflation band (2.5 per cent) in years 3 to 5.

In principle, we conclude that the DTF inflation forecasting approach is similar to that applied by the AER, except that it uses its own explicit inflation forecasts for the first two years (at least), rather than applying the RBA’s explicit forecasts for that period.

2.5 Treatment of Covid-19 in our advice

We note that Melbourne Water’s new regulatory period will not commence until 1 July 2021, and therefore assume that the forecast that is applied at that time will reflect those market conditions. Hence, in the advice that we provide, we do not address how to deal with the heightened difficulties with deriving a medium term forecast of inflation at the present uncertain time. We do however

¹⁹ DTF (November, 2019), p.13.

assume that the deflationary pressures that had been present for some time prior to the outbreak of the current pandemic will continue to be present then, and are likely to be even stronger than was the case prior to the pandemic. Therefore, when we refer to “at present” in this report we mean the market environment that existed just prior to the onset of the Covid-19 pandemic.

2.6 Outline of report

Having provided some background and context to this report, the remainder of the report addresses the next two tasks identified by the ESC, as follows:

- In section 3 we analyse several potential inflation forecasting methods; and
- Section 4 presents our recommendations.

Our appendixes present further detailed background and analysis that supports the main text:

- In Appendix A we summarise the analysis and conclusions of other regulators; and
- Appendix B reports our own empirical analysis comparing alternative inflation forecasting methods.

3. Analysis of inflation forecasting methods applied by other regulators

3.1 Introduction

In recent years a number of regulators in Australia and New Zealand have addressed the question of inflation forecasting. In this section we analyse the proposed DTF approach and several potential methodologies that have been applied by other regulators.

3.2 Assessment criteria

In this section we analyse alternative inflation forecasting methods through the lens of several desirable criteria:

- Accuracy – that is, accuracy in forecasting inflation over the coming regulatory period. This is a key objective in the case of Melbourne Water.
- Simplicity, transparency and replicability – these three characteristics of a workable inflation forecasting method are expected to be interrelated. That is, a simple and transparent method is also likely to be replicable.
- Robustness – a robust method will provide an estimate that is relatively insensitive to market phenomena. That is, it continues to operate reliably when the market is in different states (e.g., market is subject to net inflationary or deflationary pressure) or is subject to material events (e.g., the global financial crisis or a pandemic).

The ACCC / AER working paper examining this issue focussed attention on the objective of providing “the best estimates of expected inflation”, as this was consistent with the National Electricity Rules.²⁰ It therefore placed considerable emphasis on congruence with market expectations in its list of assessment criteria. Our first objective, accuracy, is a broader concept that is tailored to the requirements of Melbourne Water.

3.3 Potential inflation forecasting methods

In this section we consider the major options that could be applied to Melbourne Water, including the approach that has been proposed by the ESC, which is to use the forecasts that the Victorian Department of Finance (DTF) uses in preparing the Victorian budget.

A summary of the methods applied by regulators is shown in Table 3.1 below, while a detailed description of the analysis undertaken by regulators is contained in Appendix A. In the table we find that three regulators apply what we term “the AER Method” (AER, QCA and IPART), which adopts the first 2 years of the RBA explicit forecasts and moves immediately to the middle of the RBA’s target band thereafter. In 2019 ESCOSA adopted a modified version of the AER Method but has since modified this to include a glide path approach, similar to what has been applied for several years by

²⁰ ACCC / AER (2017), p.7. The National Electricity Rules (NER) 6.4.2 (b)(1) states that the contents of the post-tax revenue model must include as a minimum “a method that the AER determines is likely to result in the best estimates of expected inflation.”

the NZCC. Only the ERAWA has continued to apply the BBIR Method. Due to the concerns of stakeholders in the current uncertain environment, the AER has announced a fresh review of its inflation approach.²¹

Table 3.1: Summary of regulator inflation forecasting methodologies

Geometric average of RBA explicit forecast for 2 years and middle of RBA target band (2.5%) thereafter	Geometric average of RBA explicit forecast for 1 year and middle of RBA target band (2.5%) thereafter	Geometric average of RBA forecast for 2 years, glidepath to IMF forecast at 2024 (years 3-5) middle of RBA target band (2.5%) thereafter	Break-even rate	Glide path to middle of target inflation range (2% in New Zealand)	Period over which expected inflation to be estimated
IPART					10 years
AER					10 years
QCA					Length of regulatory period
	ESCOSA (2019)	ESCOSA (2020)			10 years
			ERAWA		Length of regulatory period
				NZCC	Length of regulatory period

Source: Regulator decisions and guidance papers

3.3.1 Market instruments

During the 1990s and the 2000s up to the global financial crisis (2008/09) regulators like the ACCC and AER were attracted to the bonds breakeven inflation rate (BBIR) as an inflation forecasting method as it held many attractions. An inflation swaps market began to develop just prior to the global financial crisis

Bond breakeven inflation rate (BBIR)

The BBIR reflects the market’s expectations with respect to inflation, as inferred from the (Fisher effected) differential between nominal government bonds and CPI-indexed government bonds for a given term to maturity. BBIR-implied inflation at a term of 10 years was adopted by several Australian regulators in the 1990s and was then widely used in commerce and finance as the long- term inflation estimate.

We agree with the AER that whilst the BBIR method would achieve several of our evaluation criteria, since it a reflection of market opinions, is simple, replicable and transparent, it also suffers from numerous data and theoretical issues. As discussed more fully in Appendix A, there are a number of time varying biases and premiums that have been well documented in the literature, which suggest a likely material but unquantifiable under-estimation of inflationary expectations using the BBIR method. In particular:

- The inflation premium – nominal bond holders normally require a higher return for bearing inflation risk so the differential with CPI-indexed bonds (the BBIR) will normally over-estimate

²¹ AER (7 April, 2020)

inflation, however in recent years inflation has been so low that this premium is likely to be negative,²² which implies that BBIR will under-estimate the market’s inflationary expectations.

- The liquidity premium – because CPI-linked bonds are far fewer in value and much less traded than nominal bonds, the CPI-linked bonds are relatively less liquid, which would cause investors to require a higher yield, and would imply that the BBIR will under-estimate the market’s inflationary expectations.

Inflation swaps

Like the BBIR method, estimating inflation from swaps has a number of advantages against our criteria. This method reflects market opinions, is simple, replicable and transparent, and as a derivative instrument it suffers from data issues than the BBIR. However, it is likely that in recent years a negative inflation risk premium has materially impacted swaps, which would result in an under-estimate of the market’s inflationary expectations. For example, the European Central Bank (ECB) has estimated that for 5 year swaps, relative to January 2014 only up to 20 basis points of the 80 basis point decline to June 2019 represented an actual decline in inflationary expectations over that period, with the rest of the decline being due to a fall in the inflation risk premium.²³

Figure 3.1: 5-year inflation forecast – BBIR vs inflation swaps



²² That is, investors have more recently become concerned about deflation and a happy to have the inflation exposure of nominal bonds.

²³ Benoit Coeure (11 July, 2019), *Inflationary expectations and the conduct of monetary policy*, Speech by Benoit Coeure, Member of the Executive Board of the ECB, at an event organised by the SAFE Policy Center, Frankfurt am Main, 11 July 2019.

Source: Bloomberg

Another problem that relates to all market instruments, is that in periods of extreme market distress, such as the global financial crisis of 2008-09 or the current pandemic period, the BBIR and swap-based estimates have been demonstrated to provide less supportable estimates of future inflation. As seen in Figure 3.1 above, the current outlook for inflation over 5 years based on market instruments is approximately 0.5 per cent (swaps) and approximately 0.25 per cent (BBIR), both of which are not substantiated by broad market opinion. As the RBA's recent *Statement on Monetary Policy* notes:²⁴

Both short- and long-term market-based measures of inflation expectations have declined since the widespread outbreak of COVID-19 in early 2020; however, it is difficult to interpret the magnitude of these declines because functioning in these markets has been significantly impaired recently.

To summarise, while we think that market measures of inflationary expectations have promise, it would be difficult to use them to forecast inflation in the absence of better investigation and understanding of the materiality of the biases and premiums that apply. In addition, an assumption that these instruments would reflect an unbiased view of inflation expectations is subject to even more criticism when material market disruptive events arise.

3.3.2 The AER Method

The AER Method is discussed in some detail in Appendix A below, and has been used or advocated by the AER, IPART, the QCA and ESCOSA (2019). The method breaks the inflation forecasting issue into two parts:

- Years 1 and 2: use the explicit inflation forecasts published quarterly by the RBA in its Monetary Policy Review.
- Beyond 2 years: assume that from year 3 there is an immediate reversion to the mid-point of the RBA's target inflation band (2.5 per cent).

As discussed in Appendix A, and in section 3.4 below, there are relatively small differences between the 1 and 2-year inflation forecasts that are made by the RBA, DTF and market economists.

Whichever one of these approaches were adopted for years 1 and 2 it would make relatively little difference to the overall inflation forecast over 5 years.

In the case of Melbourne Water, what is assumed for years 3 to 5 is of greater materiality. The AER Method's immediate reversion to the midpoint of the RBA target band has resulted in material forecasting error over the past 5 years. As it undertook its review of this issue in 2017, the AER received a letter from the RBA titled "*RE: Regulatory treatment of inflation – inflation expectations*."²⁵ The RBA noted that since it had "adopted inflation targeting in the early 1990s, long- term inflation expectations have been anchored in line with the Bank's target," however:²⁶

²⁴ RBA (May, 2020), *Statement on Monetary Policy*, p.85.

²⁵ RBA (5 July, 2017), *RE: Regulatory treatment of inflation – inflation expectations*.

²⁶ RBA (5 July, 2017), p.2.

If actual long-term inflation expectations were to move notably for a sustained period, it would not be valid to use the Bank's target as a proxy.

More recently, in view of the persistently low inflation, the Economics Committee of the House of Representatives asked the Governor of the RBA, Dr. Philip Lowe, how the RBA could effectively meet the inflation target over the next few years. The committee reported his response as follows:²⁷

The governor advised that 'you'd have to have much lower interest rates to get inflation up. It's just not practical at the moment to get inflation back to 2½ per cent in two years time or 18 months' time with monetary policy.' The Governor explained that this is an issue being faced around the world:

This is why I've got this focus very much on the medium term— getting there gradually over time. We've got to be realistic about what can be achieved with our instrument in a world where the relationship between unemployment and inflation is much weaker than it once was. We're seeing this in every country around the world. There are countries with unemployment at its lowest in 40 or 50 years and inflation is still not picking up. So, something's changed in inflation dynamics around the world, and the same is true in Australia, and we can't really hide from that.

The IMF has recently reviewed Australia's monetary policy settings and forecasts, concluding that:²⁸

Monetary Policy has eased since mid-2019. The RBA cut the policy rate from 1.5 percent to 0.75 percent in increments in June, July and October 2019, because of weaker than expected inflation and wage outcomes. It has indicated an accommodation bias, highlighting the need for an extended period of low interest rates to reach full employment and the inflation target.

We interpret these statements by RBA and IMF staff to suggest that in the medium term (3 to 5 years) adopting an inflation estimate of 2 per cent (the lower bound of the RBA's target range) rather than 2.5 per cent (the middle of the band) is prudent and realistic.²⁹ In our view the progress of the Covid-19 pandemic further reinforces the reasonableness of such a target, as it potentially heralds a sustained period of low economic growth, relatively low interest rates and relatively low inflation.

3.3.3 The DTF Method

As described in more detail in Appendix A, the DTF Method in most cases applies the DTF's own explicit forecasts of Melbourne CPI for 1 and 2 years out, and then applies the middle of the RBA's target range (2.5 per cent). In this way, the method is very similar in principle to the RBA Method, and we show in Appendix A and section 3.4 below, that they would have provided an almost identical outcome had they both been applied late in 2014. Both methods would have over-estimated actual inflation over the 5 years following from 2015.

²⁷ House of Representatives Standing Committee on Economics (March 2020), *Review of the Reserve Bank of Australia Annual Report 2019 (First Report)*, p.11.

²⁸ IMF (March 2020), *Australia: 2019 Article IV Consultation – Press Release; Staff Report: and Statement by the Executive Director for Australia*, p.8.

²⁹ We would still consider the middle of the RBA's target range of 2 to 3 per cent inflation to be a reasonable longer term (10 year) assumption.

Our view is that while the DTF's forecasts over 1 and 2 years are reasonable estimates, and relatively close to those made by market economists (Surveys) and the RBA, they are not subject to the same level of market scrutiny as the RBA forecasts. The fact that the DTF's CPI forecasts target the wrong index, the Melbourne CPI rather than the Australian CPI, is another reason for not using them.³⁰

In addition, the second leg of the DTF Method, which relates to applying the midpoint of the RBA's target band in years 3, 4 and 5 is subject to the same criticisms that have been outlined above in relation to the AER Method. Finally, there may be occasions on which the DTF's forecasts are delayed due to a delay in the Victorian budget.

3.3.4 Two years of explicit forecasts and a glide to the midpoint of the RBA's target band.

In Australasia the glidepath approach was first introduced by the New Zealand Commerce Commission (NZCC), which has applied 2 years of explicit inflation forecasts sourced from the Reserve Bank of New Zealand (RBNZ), and then a glide path to the RBNZ's inflation target of 2 per cent over the remainder of the regulatory period. In addition, the NZCC analyses contemporaneous market economist forecasts for 2 years to test that they generally conform with the RBNZ view. A similar approach has recently been advocated by ESCOSA (2020), which has proposed a glide from the RBA's year-2 forecast to the year 5 forecast of the International Monetary Fund (IMF), which is currently 2.5 per cent.

Our view is that in present market conditions a glide-path approach along the lines applied in New Zealand or as now proposed by ESCOSA will improve the matching of inflation expectation targets with the pronouncements of the RBA and central bankers elsewhere in the world. However, a glide to the middle of the RBA's target band during years 3, 4 and 5 does not appear to us to be fully consistent with the RBA's views. Our reading of the RBA's view is that it would be unlikely to reach the middle of the target band over that time horizon, although it would be more likely to be able to do so over 10 years.

3.3.5 Market economists' forecasts

No regulator has adopted market economists' forecasts of inflation, owing to the fact that they are generally not publicly available for periods longer than 2 years, which makes it difficult to ensure transparency and replicability. In addition, it has been found that market economists' forecasts of 1 and 2-year inflation have not outperformed those of the RBA.

3.4 Relative forecasting performance

When examining alternative inflation forecasting methods regulators have often applied *ex post* testing of outturn inflation against those forecasts for matched periods. However, we note that such testing is not very informative since outturn inflation over a relatively short period of time can vary dramatically due to exogenous shocks that were not foreshadowed in the market's expectations. Hence, a very long period of *ex post* observations would be necessary to determine whether *ex ante*

³⁰ We note that the Melbourne CPI is not the wrong index to apply when forecasting the Victorian budget, which is the purpose for which the DTF derives it.

predictions were on average biased in some direction. This is similar to the issue that faces researchers trying to estimate the market risk premium by examining returns data over a period of 50 to 100 years.

In addition, we are not able to test 5-year inflationary forecasts that were made after March 2015, which means that *ex post* testing cannot be applied to explain the more recent behaviour of inflation except at shorter intervals than 5 years.³¹ This is precisely the period that is most at issue, since there is evidence that some of the fall in medium term (5 year) inflation expectations implied by market instruments during this period is likely due to a negative inflation risk premium rather than due to a fall in actual inflation expectations.

Table 3.2 below shows the outturn inflation over the last 5 years compared to the forecasts that would have been made applying alternative methods as at, 30 June, 2014.³² We have not included an “AER glide path” method as the year 2 RBA forecast was already 2.5 per cent. In our view these results show that:

- Every method displayed in the table would have over-estimated (by 87-97 basis points) the low outturn inflation (1.58 per cent) that occurred over the next 5 years.
- Inflation swaps would have achieved a closer matching to actual inflation had forecasts been made 6 months later, but that better matching would likely have been due to a falling (negative) inflation risk premium that resulted in an under-estimate of the true market inflation expectations at the time.
- The three methods that assumed an immediate jump to the mid-point of the RBA’s target range at year 3 (AER, DTF and Survey) and the “AER with glide path” method provided very similar outcomes, and over-estimated inflation by similar amounts, with the DTF Method marginally closer to the actual.³³ This is partly because the overall outcome for all of those methods would be dominated by the assumption of a 2.5 per cent inflation rate in years 3 to 5.³⁴

Table 3.2: Outturn inflation since 2015 and 5-year ahead inflation forecasts as at, June 2014, using alternative forecasting methods

Forecast at 30 June 2014 for year ending:	RBA	DTF	Survey (economists)	Inflation Swaps	Actual CPI
30 June 2015	2.75%	2.25%	2.60%	2.31%	1.51%
30 June 2016	2.50%	2.50%	2.70%	2.46%	1.02%
30 June 2017	2.50%	2.50%	2.50%	2.53%	1.93%
30 June 2018	2.50%	2.50%	2.50%	2.59%	2.08%
30 June 2019	2.50%	2.50%	2.50%	2.67%	1.59%
Geometric mean	2.55%	2.45%	2.56%	2.51%	1.58%

³¹ At this time March 2015 would be the last date at which 5-year forecasts applying the AER Method can be tested against outcomes for the 5 years up to March, 2020. We have restricted our consideration to December 2019 in or to avoid the March 2020 quarter, which includes the effects of the Covid-19 pandemic.

³² We have used June 2014, as a DTF forecast was available at that time, and could be matched to the other methods.

³³ In Appendix B we show that the DTF Method provides very similar 1 and 2-year inflation estimates to both surveys and the RBA.

³⁴ For the same reason, a glide path approach is likely to provide almost the same result as an immediate jump to 2.5 Per cent.

Source: Bloomberg, RBA and Incenta analysis

Further details regarding the *ex post* performance of potential inflation forecasting Appendix B.

3.5 The RBA's target inflation rate is the band, not its midpoint

If the Australia-based non-market inflation forecasting methods outlined above assume that inflation for each of the remaining years (3, 4 and 5) be assumed to be 2.5 per cent (middle of the RBA's target inflation band), it is this assumption that dominates the outcome.³⁵ The AER Method applies a 2.5 per cent inflation as if this is the target that the RBA seeks to achieve with its monetary policy. However, the RBA's website indicates that this not the case:³⁶

The Governor and the Treasurer have agreed that the appropriate target for monetary policy in Australia is to achieve an inflation rate of 2-3 per cent, on average, over time. This is a rate of inflation sufficiently low that it does not materially distort decisions in the community. Seeking this rate, on average, provides discipline for monetary policy decision-making, and serves as an anchor for private-sector inflation expectations.

The inflation target is defined as a medium-term average rather than as a rate (or band of rates) that must be held at all times. This formulation allows for the inevitable uncertainties that are involved in forecasting, and lags in the effects of monetary policy on the economy. Experience in Australia and elsewhere has shown that inflation is difficult to fine-tune within a narrow band. The inflation target is also, necessarily forward-looking. This approach allows a role for monetary policy in dampening the fluctuations in output over the course of the cycle. When aggregate demand in the economy is weak, for example, inflationary pressures are likely to be diminished and monetary policy can be eased, which will give a short-term stimulus to economic activity.

The RBA never mentions a target 2.5 percent inflation rate and suggests that such a target would be neither achievable nor desirable. Instead, the target is a broad range of 2 per cent to 3 per cent, implying that monetary policy would let the economy run its course on either side of 2.5 per cent as long as it remains within the band. In this way, we could expect the RBA not to intervene if the inflation rate stayed at approximately 2 per cent (or 3 per cent) for a number of years.

In contrast to the RBA's stated policy, the Reserve Bank of New Zealand (RBNZ) does apply an explicit inflation target (of 2 per cent) within a target range. In a recent letter the RBNZ stated that its "operational objective" is to:³⁷

Keep future annual inflation between 1 and 3 percent over the medium term, with a focus on keeping future inflation near the 2 percent mid-point.

³⁵ That is, differences in the methods used to obtain the years 1 and 2 forecasts are not as important, and the geometric average inflation rate over 5 years (and even more over 10 years) remains close to 2.5 per cent. In the case of ESCOSA's new method there is a glide path to the IMF's 5-year inflation forecast, which is currently 2.5 per cent.

³⁶ See <https://www.rba.gov.au/monetary-policy/inflation-target.html>

³⁷ Minister of Finance and Governor of the RBNZ (14 February, 2019), *Letter - The remit for the Monetary Policy Committee, Reserve Bank of New Zealand.*

While the RBA method would be applicable in New Zealand, it does not have institutional support in Australia. In Australia it cannot be assumed that if inflation is at close to 2 per cent the RBA will intervene to push it towards 2.5 per cent.

3.6 The RBA's May 2020 "Statement on Monetary Policy"

On 8 May, 2020, the RBA published its regular *Statement on Monetary Policy*. This is an important document given the high degree of economic uncertainty that exists in the midst of the Covid-19 pandemic. In its 'Overview' the RBA suggests that its baseline scenario is for inflation to remain "low" and "below 2 per cent for some time." We consider this to imply that on a timeframe of 3 to 5 years inflation would be unlikely to achieve the mid-point of the RBA's target band:

Trimmed mean inflation is also expected to be lower (but still positive) in the June quarter, to be around 1½ per cent over the year. Declines (or delayed increases) in a number of administered prices will also contribute to inflation remaining low in the near term. From this low point, inflation is likely to increase gradually, but in this baseline scenario it is likely to remain below 2 per cent for some time, for a number of reasons. The ongoing spare capacity in the labour market is likely to result in a period of slower growth in wages and thus labour costs. (p.5)

Further along on the same page of the "Overview" we read that:

The Board will not increase the cash rate target until progress is being made towards full employment and it is confident that inflation will be sustainably within the 2–3 per cent target band.

However, this statement should be viewed in the context of the RBA Governor's opinion that the target band should not be adjusted just because it is difficult to achieve at this point. In addition, the statement appears to relate to the RBA's long-term view. On page 10 there are further statements supporting a different view about the medium term:

Global inflation is expected to be subdued. In the short term, weaker demand and very low oil prices will reduce inflation despite the disruptions to global supply chains and the temporary upward price pressures on staple goods. In the medium term, spare capacity in the labour market will lead to ongoing downward pressure on inflation. Inflation is likely to remain below most central bank targets for an extended period.

With respect to the long-term inflation expected by market economists and unions, the RBA suggests that:

Long-term survey-based measures of inflation expectations are little changed around 2-2½ per cent and remain consistent with the Bank's medium-term inflation target.

However, Graph 5.10 (page 82) of the RBA's recent statement divides the forecasting periods into:

- Short-term – defined as "over the year ahead" – ranging from 1 per cent for Unions and 2 per cent for market economists; and

- Long-term – defined as “average over the next five to ten years for market economists and unions; average over six to ten years in the future for Consensus [Economics]” – ranging from 2 per cent for Unions, through 2.25 per cent for market economists to approximately 2.5 per cent for Consensus Economics.

What is missing from these charts is a consideration of the “medium term” (3 to 5 years) that is of primary interest to Melbourne Water. The RBA’s May, 2020 forecasts include a short term bump in inflation in the year to June 2021 owing to a stronger CPI in the second half of 2020 following deflation in the first half of calendar 2020, and then inflation of 1.25 per cent in the 12 months to December 2021 and 1.5 per cent in the 12 months to June 2022.

Whilst we agree with the views expressed in the recent market surveys that inflation is likely to be in the range of 2 per cent to 2.5 per cent over the long term (6 to 10 years), given the RBA’s other statements about the likely path of inflation, and its views about inflation 1 to 2 years ahead being in the range of 1.25 per cent to 1.5 per cent, we consider that a medium term (3 to 5 years) assumption of 2 per cent is reasonable.

3.7 Recommendations

The predominant regulatory approach, which we have termed the AER Method, which is applied by the ACCC / AER, the QCA, and IPART, is to take a geometric average of two years of explicit RBA forecasts and the middle of the RBA target inflation band thereafter (2.5 per cent). ESCOSA has recently amended its approach to use 2 years of RBA forecasts, then to apply a glide path to the IMF’s 5-year inflation forecast for Australia, and the middle of the RBA target inflation band thereafter. The ERAWA is the only Australian regulator currently applying a market instrument-based measure – the BBIR.

As discussed in section 1 above, under its current regulatory approach Melbourne Water and its customers are exposed to the risk of inaccurate inflation forecasting. It is important that the ESC applies the best estimate of inflation, and while for several years there has been a high degree of uncertainty surrounding inflation expectations and forecasting, the advent of the Covid-19 pandemic has complicated matters further.

We therefore recommend the following method be applied:

- The RBA’s explicit 1 and 2-year inflation forecasts should be applied. The RBA’s 1 and 2-year forecasts are relatively accurate, In addition, the RBA’s subject to on-going research and scrutiny. With respect to the DTF’s 1 and 2-year forecasts, we consider that they would be likely to provide similar inflation forecasts to those RBA or surveys of economists. However, the DTF’s forecasts are less frequent and less transparent than the RBA’s forecasts, and subject to less scrutiny and on-going public research than the RBA’s forecasts. In addition, the DTF forecasts estimate the Melbourne CPI rather than the Australia CPI, which is the correct target for regulatory purposes.
- Rather than applying an assumption that the RBA will achieve an inflation rate in the middle of its target range over the medium-term horizon (years 3, 4 and 5), we consider it more reasonable to assume that the RBA will be able to achieve inflation outcomes near the lower bound of its target range (i.e. at 2 per cent).

- In addition, we recommend that an assumption about the medium-term trend be kept under review up until the ESC prepares its final decision. Specifically, we recommend that current and future RBA *Statements on Monetary Policy* be carefully read up to the time the decision is made in order to confirm that the recommended medium-term trend remains reasonable.
 - Under one scenario economic growth may become sufficiently stimulated as a consequence of post Covid-19 measures that it would again be reasonable to assume that inflation reverts more quickly to the midpoint of the RBA target band.
 - However, the more likely scenario is that economic conditions may worsen to the point that the RBA may take an extended period to stimulate inflation to the lower band (in which case a longer trend to the lower band may be more consistent with the RBA’s statements).

A Inflation forecasting methodologies applied by other regulators

In this appendix we review the analysis that was performed by regulators to reach their conclusions and the inflation forecasting methods they have implemented. They are presented in approximate chronological order. We note that whilst different regulators have adopted alternative approaches, over time regulators do influence each other, although there remain exceptions, which means there is not one uniform approach to inflation forecasting. In almost all cases however, in recent years the approach adopted by Australian regulators for the medium to long term view of inflation has been to adopt the middle of the RBA's target band.

A.1 IPART (2014)

A.1.1 IPART's 2014 guidance

In December, 2014 the Independent Pricing and Regulation Tribunal (IPART) set out its revised approach to inflation forecasting in a *Fact Sheet*.³⁸ It would be using that estimate of inflation to convert the nominal Weighted Average Cost of Capital (WACC) into a real WACC. Since 2009 IPART had been estimating expected inflation by reference to the swap-implied inflation rate. After reviewing a number of options, IPART determined to apply a method that calculates the geometric mean of:

- the RBA's short-term forecasts for the first two years; and
- the midpoint of the RBA's target inflation band (2.5 per cent) for the next 8 years.

A.1.2 Inflation forecasting options assessed by IPART

In reaching its conclusion IPART assessed the following options:

- the 10-year yield-to-maturity of the swap market implied inflation,
- the middle of the RBA's target band of inflation, i.e., 2.5 per cent,
- an approach that uses the RBA's forecast of underlying inflation obtained from their quarterly statement on Monetary Policy for one year and the middle of the RBA's target band of inflation, i.e., 2.5 per cent, for the remaining nine years,
- an approach that uses the RBA's forecast of underlying inflation for the first two years, and the middle of the RBA's target band of inflation for the remaining eight years, and
- break-even inflation based on data from inflation indexed and nominal Commonwealth Government bonds.

³⁸ IPART (December, 2014), *Fact Sheet: New approach to forecasting the WACC inflation adjustment*.

A.1.3 IPART's analysis

The core of IPART's analysis of alternative inflation forecasting options was to assess "the accuracy of each of these forecasting options using historical data on inflation" (CPI) between 2009 and 2014.³⁹ Over the period January 2009 to December 2014 the average CPI was 2.58 per cent. The findings may be summarised as follows:

- Swap-implied inflation – this method over-estimated CPI by 21 basis points (2.79 per cent). This might be a better reflection of businesses that purchase inflation swaps than a reflection of economy-wide inflation.⁴⁰
- Midpoint of the RBA's target range – this method is simple, transparent and provided a very good estimate of average CPI over the period (differing by only 8 basis points). However, IPART noted that this measure "may not provide a good forecast of inflation over a 4-year regulatory period" because "actual inflation could be materially different from 2.5 per cent."⁴¹
- One year of RBA forecasts and midpoint of target range thereafter – this measure was only 9 basis points above the actual CPI over the period. It is robust, transparent and easy to measure. IPART considered the mid-point of the RBA's target range was a reasonable estimate because this is where rates tend to revert to owing to the RBA "actively managing monetary policy to keep inflation within their target band." In addition, the RBA's research indicated that the "substantial explanatory power for inflation over the first forecast year" tends to break down in the second year.⁴²
- Two years of RBA forecasts and midpoint of target range thereafter – this measure was considered to be superior to having only one year of explicit forecasts because it "better reflects the time it takes for inflation to revert to a 2.5% average compared to using only a 1-year forecast. In addition, IPART considered that the explanatory power of two years of explicit forecasts (2.63 per cent) was acceptable.
- Break-even inflation – while providing only a fractionally higher inflation estimate over the test period (2.64 per cent) than the preferred approach, IPART considered that "there is a wide body of research indicating bias in the inflation forecast derived from break-even inflation."⁴³

A.2 AER (2017)

The Australian Energy Regulator (AER) published an extensive position paper on the regulatory treatment of inflation in December 2017.⁴⁴ The review was informed by consultations with

³⁹ IPART (December, 2014), p.2.

⁴⁰ This view appears to assume that companies engaging in inflation swap transactions do so with specific price indices of their operations (e.g. wages and materials) rather than the aggregate CPI which is important for investors' capital maintenance.

⁴¹ IPART (December, 2014), p.5.

⁴² Peter Tulip and Stephanie Wallace (November, 2012), *Estimates of Uncertainty around the RBA's Forecasts*, RBA Research Discussion Paper 2012-07. In this paper greater "explanatory power" referred to a lower inflation forecasting error.

⁴³ IPART (December, 2014), p.7.

⁴⁴ AER (11 February, 2018), *Regulatory treatment of inflation: Final position*.

stakeholders, the RBA and a comprehensive joint ACCC / AER study that examined technical issues.⁴⁵

A.2.1 The AER's analysis

The AER considered there are only four possible approaches to estimate expected inflation:

- The RBA method – The method that the AER termed the “RBA method” consists of calculating the geometric average of the RBA’s explicit inflation forecasts for the first 2 years, and the middle of the target inflation band (2.5 per cent) for the next 8 years. The ACCC/AER working paper ranked this method the highest among the alternatives considered. The AER considered this a simple, transparent and easily replicable by stakeholders.
- The bond breakeven approach (BBIR) – This approach, also known as the “bond break-even inflation rate” approach, depends on calculating the (Fisher relation adjusted) differential between nominal and CPI-linked Commonwealth government bonds. This approach was applied by the AER prior to 2008, when a number of issues surfaced, and stakeholders voiced concerns. These concerns included time-varying biases and premiums, as well as falling liquidity of inflation-linked bonds. In addition, the RBA advised the AER that this method is “probably unviable”.⁴⁶
- The swaps method – The AER considered that inflation estimates based on inflation swaps data has a number of positive attributes as it is simple to calculate, is available on a daily basis and is arguably subject to fewer biases than the break-even approach. However, the AER concluded that it was unviable based on the RBA’s advice,⁴⁷ which reflects a number of time-varying biases and distortions (including hedging costs and a liquidity premium).
- Surveys – The main problem that the AER identified with surveys of inflationary expectations was that long-term survey data is proprietary, and therefore not able to be used in a public regulatory process.

In addition to assessing the methods discussed above, the AER considered the New Zealand Commerce Commission’s “glide path approach”, which assumes that inflation returns to the middle of the target inflation band over a number of years. Using Consensus Economics’ survey data, the AER found that the average path of expectations has historically reverted to the middle of the target band

⁴⁵ ACCC / AER (11 February, 2017), *Best estimates of expected inflation: a comparative assessment of four methods*, ACCC/AER Working Paper Series, Working Paper No. 11.

⁴⁶ RBA (5 July, 2017), *Letter re: Regulatory treatment of inflation – inflationary expectations*, p.1. We note that the opening paragraph of the RBA’s letter also considered that “The AER’s current approach, while fairly transparent and simple, would not capture a change in long-term inflation expectations if that were to occur.” The RBA’s letter suggested that long-term inflation expectations reflected in surveys of market economists provided a better alternative to reliance on the mid-point of the RBA’s target band but noted concerns about proprietary data. The letter did not consider forecasts over the medium term (3 to 5 years).

⁴⁷ RBA (5 July, 2017), p.1. The same caveats as in footnote 37 apply.

within 2 years. In other words, it failed to find evidence that there is a glide path longer than the 2 years over which the AER relies on the RBA’s explicit forecasts.⁴⁸

A.2.2 AER’s conclusion

Based on its analysis of alternative inflation forecasting methods the AER decided to continue to apply its existing method, which is the “RBA method.”

A.3 QCA (2018)

The Queensland Competition Authority (QCA) addressed the question of inflation forecasting in the context of Aurizon Network’s 2017 draft access undertaking.⁴⁹

A.3.1 Aurizon Network’s proposal

Aurizon Network proposed an inflation forecast of **1.62 per cent** based on its adviser’s analysis, which was the four-year break-even inflation rate for the nominated averaging period (20 days prior to 1 July 2017).⁵⁰

Aurizon Network’s preference for the market determined four-year break-even rate was based on the idea that the market’s forecast is the outcome of the opinions of thousands of bond market participants who have ‘skin in the game’. Accordingly, the break-even rate forecast of inflation is the probability weighted outcome, while the midpoint of the RBA’s target band is a median value. In addition, the bond yields that underpin the break-even rate provide the foundation of the rate of return estimate.

A.3.2 The QCA’s analysis

The QCA considered that as a general principle it is important to maintain stability and regulatory certainty, and that the inflation forecasting methodology chosen should therefore minimise the differential between forecast and actual inflation over the regulatory period. It assessed three alternative methodologies:

- The market instruments and forecasts approach proposed by Aurizon Network;⁵¹
- The RBA’s inflation target method – i.e. the midpoint of the RBA’s target inflation band (2.5 per cent); and

⁴⁸ We note that this approach assumes that the opinions of market economists are an accurate reflection of market views about inflation. These opinions may not reflect the market’s actual views on inflation, just as investment bank analyst views may diverge from market prices.

⁴⁹ QCA (December, 2018), *Decision: Aurizon Network’s 2017 draft access undertaking*, Chapter 4: Inflation forecast and RAB indexation, pp.56-71.

⁵⁰ Competition Economists Group (March, 2018), *Expected inflation estimate for Aurizon*.

⁵¹ Aurizon Network proposed an equal weighting be applied to the 4-year BBIR, 4-year inflation swaps rate and 4-year inflation forecasts. See QCA (December, 2018), Table 25, p.63.

- The RBA forecast method – i.e. the geometric mean of the RBA’s short-term forecasts for the first two years, and the midpoint of the RBA’s target inflation band (2.5 per cent) for the next two years;

Market instruments

Whilst accepting that the BBIR forecast of inflation could in principle provide an unbiased estimate of inflation, the QCA rejected it owing to the following issues:

- In practice several market distortions would be likely to introduce bias to the estimates obtained using this approach.
- The break-even approach assumes that nominal and indexed bonds are available with the same maturity dates, have the same liquidity and that investors are indifferent to inflation risk on nominal bonds.⁵²
- It is reasonable to assume a positive (sometimes negative) inflation risk premium built into the yield on nominal bonds, so the break-even approach will over-estimate inflation.⁵³
- Indexed bonds are materially less liquid than nominal bonds, which implies they carry a premium for lower liquidity, which would result in an under-estimate of inflation using the break-even method.
- While these biases run counter to each other the net effect is difficult to estimate, and the RBA has noted that adjustments would be complex and be themselves subject to error.⁵⁴
- The RBA (2017) stated that market-based methodologies have several shortcomings that make them unviable alternatives to its own approach.⁵⁵

With respect to inflation swaps the QCA noted that in such a contract:⁵⁶

both parties are exposed to inflation risk and therefore the fixed price of the contract is not an unbiased estimator of expected inflation. Using such contracts would then potentially result in a material bias in the estimate of expected inflation. The AER recently reached the same conclusion.

⁵² This is not an issue for inflation swaps.

⁵³ This only follows if the premium is positive, but the figures below suggest the QCA has assumed a negative inflation risk premium.

⁵⁴ Finlay and Wende (2012) estimated the net effect of these biases to vary from -1.0 to +2.5 percentage points in Australia between 1992 and 2010. See Richard Finlay and Sebastian Wende (June, 2012), “Estimating inflation expectations with a limited number of inflation-indexed bonds”, *International Journal of Central Banking*, pp.111-142.

⁵⁵ RBA (2017) 'Regulatory treatment of inflation—inflation expectations', *letter to the Australian Energy Regulator*, 5 July, <https://www.aer.gov.au/system/files/Letter%20from%20the%20RBA%20to%20AER%20-%2025%20July%202017.pdf>. We have commented on this matter in footnote 37 above.

⁵⁶ See QCA (December, 2018), footnote 183, p.63.

RBA's forecasting methodology

The QCA's reasons for adopting the RBA's inflation forecasting methodology were:

- It is used by other Australian regulators, including the AER.
- The RBA's targeting band will influence the long-term average of outturn inflation, and evidence suggests that the RBA's control of interest rates influences inflationary expectations and outturn inflation.
- Tulip and Wallace (2012) found that the RBA's inflation forecasts out to 2 years have been marginally more accurate than the average of private sector forecasters.⁵⁷
- It is simple, transparent and replicable.
- Since inflation targeting began in 1993 the geometric average inflation rate until June 2018 was 2.49 per cent, which is close to the 2.5 per cent midpoint of the RBA's target band.

Aurizon Network's adviser acknowledged that a 2.5 per cent inflation rate forecast would be appropriate for a long-term forecast, but it would be unrealistic to expect investors to hold that view over the term of a regulatory period. Aurizon Network also considered it unrealistic to expect an inflation rate of 2.37 per cent (derived using the RBA approach) implying a real return of -0.46 per cent, as the same investor could obtain inflation protection using inflation-protected government bonds and earn a positive return.

The QCA agreed that the expected long term inflation rate may not be achieved within a given regulatory period, but noted that for 2 of the 4 years of Aurizon Network's regulatory period an explicit RBA forecast could be used, which would be expected to reduce and differential. The QCA disagreed with the notion that a negative return was implied if an expected inflation rate of 2.37 per cent was adopted. If it was assumed that the inflation risk premium was -0.45 per cent on nominal bonds and inflation protected bonds had an illiquidity premium of 0.5 per cent a real rate of return of 0.48 per cent would be earned.⁵⁸

A.3.3 QCA's adopted methodology

After considering Aurizon Network's proposal and assessing the evidence, the QCA applied a **2.37 per cent** inflation forecast by using "the midpoint of short term RBA forecasts, where available, and the midpoint of the RBA target band for the years for which forecasts are not available."⁵⁹ The QCA's inflation forecast was calculated by taking the geometric average of the:

- RBA's forecast for June 2018, of 2.0 per cent;
- RBA's forecast for June 2019, of 2.5 per cent;

⁵⁷ Peter Tulip and Stephanie Wallace (July, 2012), "Estimates of Uncertainty around the RBA's Forecasts," *Reserve Bank of Australia: Research Discussion Paper*, RDP 2012-07, p.30.

⁵⁸ These assumptions were drawn from research conducted by Richard Finlay and Sebastian Wende (June, 2012).

⁵⁹ QCA (December, 2017), p.56.

- Midpoint of the RBA target range, 2020, of 2.5 per cent; and
- Midpoint of the RBA target range, 2021, of 2.5 per cent.

A.4 ESCOSA (2019)

The Essential Services Commission of South Australia (ESCOSA) published its review of inflation forecasting in its *Guidance Paper 6* (June 2019).⁶⁰ ESCOSA’s existing approach that combined:

- The RBA’s forecasts of inflation in the short term (one year ahead); and
- An assumption of long-term expectations based on the mid-point of the RBA’s medium-term inflation target for the nine years thereafter.

ESCOSA noted that it uses a 10-year forecasting term “to be consistent with the term of the market instruments used to arrive at the nominal WACC.” While it also considered the alternative of forecasting over the 4 year regulatory period, ESCOSA considered that this required a balancing of extra accuracy from using a shorter time horizon against potential inconsistency with the (unobserved) long term inflation expectations that would be impounded into capital investment decisions and the 10-year market instruments assumed in calculating the Weighted Average Cost of Capital (WACC).

However, SA Water raised concerns about ESCOSA’s approach in its submission to ESCOSA’s review, noting that:⁶¹

The current rate of return methodology has a misalignment between the inflation allowance in the calculation and the actual rate of inflation. This misalignment creates a risk of over or under recovery of revenue based upon whether the actual rate is above or below the Reserve Bank of Australia's (RBA) long term forecast.

A.4.1 ESCOSA’s analysis

Four inflation forecasting methods were assessed by ESCOSA:

- ESCOSA’s current method,
- The long-term bond breakeven rate
- The fixed rate on long term inflation swaps, and
- Survey-based estimation of expected inflation.

At the beginning of its analysis ESCOSA examined the relative performance of each of these methods against the outturn inflation experienced during the 2013 (SAW RD13) and 2016 (SAW RD16)

⁶⁰ ESCOSA (June, 2019), *SA Water Regulatory Determination 2020: Guidance Paper 6* (technical paper).

⁶¹ SA Water (6 November, 2018), *Re: Submission on Guidance Papers for the SA Water Regulatory Determination 2020*, p. 2, available at <https://www.escosa.sa.gov.au/ArticleDocuments/11293/20181206-Water-SAWRD20-GuidancePapersSubmission-SAWater.pdf.aspx?Embed=Y>.

regulatory periods. This analysis showed that while the long-term break-even rate method had a lower degree of error than ESCOSA’s current method (0.2 per cent vs 0.6 per cent) in the 2016 period, it had a higher degree of error in the earlier period (0.8 per cent vs 0.6 per cent).

ESCOSA pointed research by Tulip and Wallace (2012) and Tawadros (2013) who found that the RBA’s one year ahead forecasts of inflation were superior to those obtained from surveys of commercial economists and other market participants, while the two years ahead forecast was about as accurate as adoption of the middle of the target inflation band (2.5 per cent).⁶² Hence the current approach was deemed to be “simple, transparent and consistent with a number of research findings.” Reference was also made to the research findings of Adeney, Arsov and Evans (2017), whose analysis indicated that using Root Mean Squared Error (RMSE) as the measure of forecasting accuracy, in Australia over the period 2005 to 2016:

- for a 1-year-ahead forecast - the RBA forecast error (0.93 per cent average) was most accurate, and while not statistically significantly more accurate (with 90 per cent confidence) than the forecasts of professional forecasters (1.00 per cent average error), it was statistically significantly more accurate than the market implied forecast (and 1.09 per cent average error using inflation swaps as the market measure); and
- for a 4-5-years-ahead forecast - the RBA forecast error (0.64 per average) was statistically significantly more accurate (95 per cent confidence) than professional forecasters (0.68) and at a higher 99 per cent confidence level statistically significantly more accurate than the market implied measure (0.81 average error).

ESCOSA interpreted these findings as providing support for its existing method, which relied on the RBA’s explicit one-year forward forecast, and reliance on the RBA benchmark thereafter (i.e. middle of the RBA’s target inflation band). However, this analysis only examined the first two years of forecasts.

A.4.2 ESCOSA’s (2019) conclusion

Having reviewed the evidence, ESCOSA decided to retain its existing approach since, in its words:⁶³

- *the current approach is simple, transparent and supported by research (and there is probably limited additional forecast accuracy to be gained from using an alternative approach),*
- *an approach that uses market-based measures is transparent and grounded in theory, but may have significant practical limitations, and*
- *an approach that uses surveys of professional forecasters’ long-term inflation expectations is simple and supported by research, but may raise practical issues (such as limiting the Commission’s ability to publish these specific figures due to proprietary restrictions).*

⁶² George B. Tawadros (2013), “The information content of the Reserve Bank of Australia’s inflation forecasts,” *Applied Economics*, Vol. 45, pp.623-628.

⁶³ ESCOSA (June, 2019), p.15.

A.5 ESCOSA (2020)

In its recent SA Water regulatory determination, ESCOSA further developed its views on inflation forecasting to include a glide path approach.⁶⁴

A.5.1 ESCOSA's analysis

ESCOSA considered a range of methods for estimating long-term inflation expectations, including:⁶⁵

- SA Water's proposal, which, in effect, proposes to use the lower number of either the RBA's one-year inflation forecast, or the 60-day average of nominal yields on the 10-year government bond rate minus 0.15 percentage points,
- market-based approaches: the 10-year bond breakeven rate, calculated as the difference in yields between nominal and inflation-indexed bonds; and, the 10-year inflation swaps rate, which is a type of financial derivative product,
- surveys of professional forecasters' long-term inflation expectations, and
- the Commission's approach outlined in Guidance Paper 5, which takes the RBA's one-year inflation forecast and assumes an inflation expectation of 2.5 percent for the nine years thereafter, and then calculates a geometric average of the ten observations.

ESCOSA rejected SA Water's adviser Frontier Economics' (Frontier) view that market measures are more accurate predictors of future inflation, since Frontier only reported data from 2010.⁶⁶ It also considered that all of the RBA's statements that Frontier quoted were directed at short term inflation forecasts rather than the long-term. While Frontier proposed that the correct term over which inflation should be estimated is 5 years, ESCOSA considered that 10 years was the correct term as this coincided with the assumed term to maturity of the risk-free rate.

A.5.2 ESCOSA's (2020) conclusion

To match more closely what it perceived was a change in market conditions ESCOSA's (2020) draft report on SA Water proposed a 10-year average inflation expectation, calculated in three parts as:

- the RBA's inflation forecasts for two years,
- a linear glide path to the IMF's medium-term (5 year) projection of consumer price inflation in Australia, and
- the mid-point of the RBA's inflation targeting band thereafter.

⁶⁴ ESCOSA (March, 2020), *SA Water Regulatory Determination 2020 – Draft Determination: Statement of reasons*.

⁶⁵ ESCOSA (March, 2020), p. 159.

⁶⁶ Frontier Economics (3 February, 2020), *Review of ESCOSA's approach to estimating inflation and the return on equity*.

For its final determination on SA Water concluded as follows:⁶⁷

The Commission has adopted a 10-year average inflation expectation, calculated using the Reserve Bank of Australia’s (RBA) trimmed mean Consumer Price Index (CPI) inflation forecasts for two years and a linear glide path to the mid-point of the RBA’s inflation targeting band by 2026-27, remaining at 2.5 percent thereafter. This medium-term glide path approach is a departure from the approach used in SAW RD16, which used RBA’s one-year inflation forecast and the mid-point of the RBA’s inflation target band from years two to 10. The change reflects the current uncertainty about the speed in which inflation might return sustainably within the RBA’s two to three percent target inflation range.

A.6 ERAWA (2019)

Whilst not setting out its views on inflation forecasting methodology in a separate document like other Australian regulators, the ERAWA has considered the issues in the course of regulatory decisions, in particular its Goldfields Gas Pipeline and Freight, Urban Networks and Pilbara railways decisions.⁶⁸ The forecast inflation estimate was obtained so that it could “be used to translate the nominal post-tax WACC to a real post-tax WACC.”

In both of these decisions the ERAWA adopted the same methodology, which it refers to as the “Treasury bond implied inflation approach”. As noted by the ERAWA, this approach “is based on the premise that the yield on Commonwealth Government Securities and the yield on Treasury bonds differ by an inflation component” which can be expressed as:

$$\pi = \frac{(1 + R_f)}{(1 + R_{Rf})} - 1$$

Where,

π is the expected inflation rate

R_f is the 10-year nominal risk-free rate of return estimated on Treasury Bonds

R_{Rf} is the 10-year real risk-free rate of return estimated on Treasury Bonds

The ERAWA considered that its estimate of expected inflation was consistent with the risk-free rate that it adopted by applying the same averaging period. Its decisions were:

- Forecast inflation of 1.28 per cent for the 20-day period to 29 March 2019 in the case of Goldfields Gas Pipelines; and
- Forecasts inflation rates of 1.95 per cent and 1.46 per cent respectively for 40 business days to 30 June 2018 and 30 June 2019 respectively for the three rail businesses covered by the decision.

⁶⁷ ESCOSA (June 2020), *SA Water Regulatory Determination 2020*, p.5.

⁶⁸ ERAWA (31 July, 2019), *Draft Decision on Proposed Revisions to the Goldfields Gas Pipeline Access Arrangement for 2020 to 2024*, pp.118-119; and ERAWA (22 August, 2019), *Final Determination – 2018 and 2019 Weighted Average Cost of Capital, For the Freight and Urban Networks and the Pilbara railways*, pp.79-80.

A.7 New Zealand Commerce Commission

A.7.1 The NZCC's approach

The inflation forecasting methodology applied by the New Zealand Commerce Commission (NZCC) consists of two parts:

- The Reserve Bank of New Zealand's (RBNZ) explicit inflation forecasts are applied for the first two years of a regulatory period; and
- The forecasts for the next 3 years of a 5-year regulatory period are determined by the glide path between the last RBNZ explicit forecast and the RBNZ's inflation target of 2 per cent.

A.7.2 NZCC 2016 review

The NZCC's approach was reviewed in 2016 in connection with several regulatory determinations in the regulated infrastructure sectors.⁶⁹ Industry participants expressed concerns that there was material risk exposure in being compensated for nominal debt costs through a real return when the RBNZ-based inflation forecasting method had over-estimated inflation. Whilst outturn inflation had been lower than the RBNZ forecasts had predicted, the NZCC rejected the view that they were biased, and instead maintained that they were the best estimates available, and provided businesses with an *ex ante* opportunity to earn the required return on investment. In any case, the NZCC maintained, any over- or under-compensation due to inflation forecasting error was likely to wash out over successive regulatory periods.

In response to Vector's proposal to adopt the break-even market methodology to forecast inflation, the NZCC replied that a number of factors suggested that approach would provide less accurate / more biased estimates of inflation since:

There were only three New Zealand Government CPI-indexed bonds on issue with the shortest maturity term being 2025, which implied a term to maturity that was well in excess of a 5-year regulatory period commencing in 2016;

- Impounded in the yields on nominal government bonds is an inflation risk premium that could distort the implied inflation estimate; and
- CPI-indexed bonds can incorporate a liquidity premium owing to their relative scarcity compared with nominal government bonds, and this can also distort the implied inflation forecast.

As presented in a more recent NZCC decision on electricity distribution businesses, a key tenet of the NZCC's position is that there is no reason to consider that the RBNZ inflation forecasts "are unreasonable or out of line with the inflation expectations of other forecasters."⁷⁰ This was supported

⁶⁹ NZCC (20 December, 2016), *Input methodologies review decisions – Topic paper 1: Form of control and the RAB indexation for EDBs, GPBs and Transpower*.

⁷⁰ NZCC (27 November, 2019), *Default price-quality paths for electricity distribution businesses from 1 April 2020 – Final decision*, p.242.

with a chart showing that RBNZ forecasts lay within the bounds of other forecasts made major New Zealand banks and others.

B. Empirical analysis of alternative inflation forecasting methods

B.1 Alternative methods

In this appendix we examine the historical inflation forecasts determined by a number of alternative inflation-forecasting methods.

B.2 Inflation forecasts of market economists

The economic research departments of investment banks and other financial market participants continually generate publicly available inflation forecasts. In section 3 we saw that regulators have dismissed these as not appropriate based on selection criteria. In particular, the concern has been that longer-term forecasts (beyond 3 years) have been proprietary, and therefore do not pass the transparency test.

Another reason that the forecasts of professional economists have not been considered further is the fact that they do not appear to provide better predictions than those generated by the RBA. After examining the period June 1993 to December 2010, Tawadros (2011) concluded that “The empirical results show that the RBA had superior predictive information, over the recent inflation targeting period...”⁷¹ RBA researchers Finlay and Wende (March, 2011) came to a similar conclusion.

We find (see section B.5 below) that the 1 and 2-year forecasts made by professional economists are not fundamentally different from those of the RBA, or the DTF.

B.3 Victorian Department of Treasury and Finance (DTF) Method

As noted in section 2 above, the ESC’s Guidance Paper suggested that it is considering applying Victorian Department of Treasury and Finance (DTF). As discussed in section 2, DTF applies an econometric model to forecast inflation. We know that break-even market estimates of inflation are an input to that model, as is the middle of the RBA’s inflation target range (2.5 per cent). However, the model is neither simple nor transparent and is not replicable by stakeholders.⁷²

Figure B.1 below draws on the 5 year forward inflation forecasts made by the Victorian Government in its budgets, and budget updates since 2008/09. The dashed line represents outturn inflation in the previous year. Processes that are observable in the figure include:

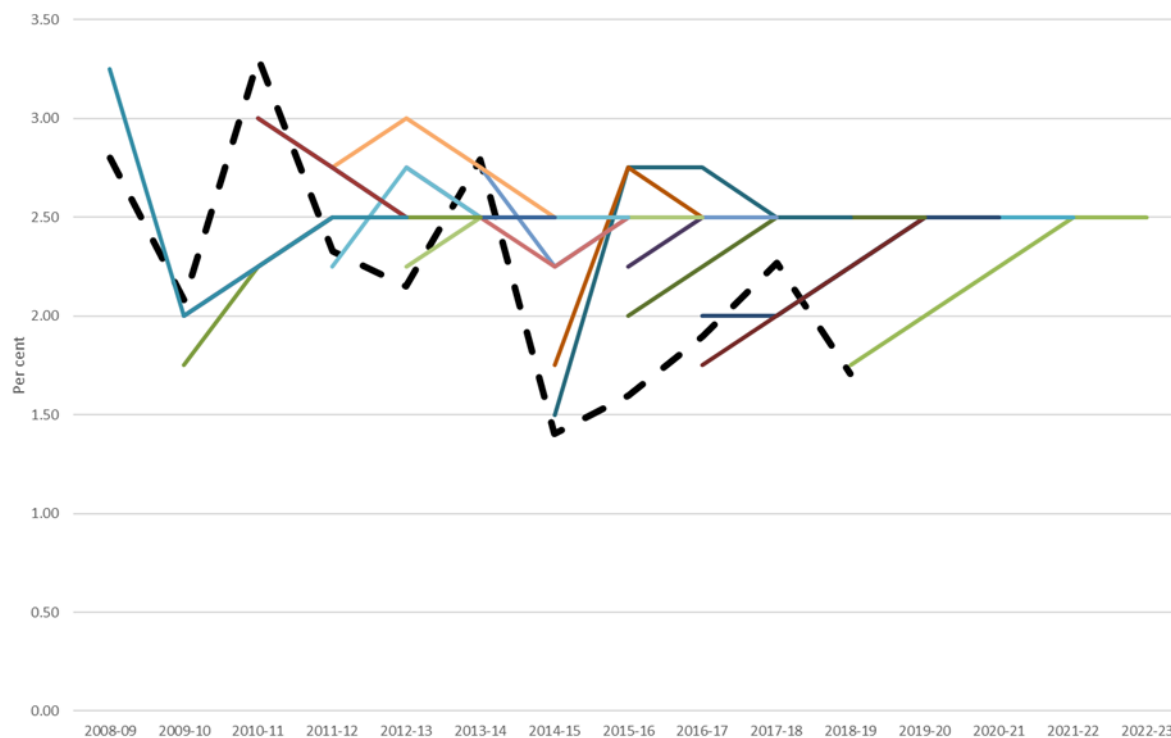
- The longer-term forecast is the middle of the RBA inflation target band (2.5 per cent) irrespective of whether the outturn inflation has been above or below that level;
- Two to three years of explicit model-generated inflation forecast are provided before reversion to the middle of the RBA inflation target band; and

⁷¹ George B. Tawadros (2013), “The information content of the Reserve Bank of Australia’s inflation forecasts,” *Applied Economics*, 45:5, pp.623-628.

⁷² The same could be said about the RBA’s forecasting method, however the RBA is subject to more peer review and scrutiny and undertakes and publishes research findings about inflation expectations.

- When actual inflation has been below the 2.5 per cent target, as it has been in recent years, a relatively rapid and direct reversion to the target is forecast.

Figure B.1: Victorian DTF – forecasts of inflation since 2008/9



Source: DTF. Note: dashed line shows actual inflation

Predictive ability – DTF forecasts

As shown in Figure B.2 in section B.5 below, the DTF’s explicit inflation forecasts have been relatively close to those that would have been obtained by applying RBA forecasts (AER Method), or survey estimates, and to those based on inflation swaps up to June 2014. Table 3.2 in the main body shows that for 5-year inflation forecasts made in June 2014, almost the same 5-year inflation value (geometric mean) would have been applied whether the RBA, DTF or survey estimates were used for years 1 and 2.

B.4 Market based measures

In this sub-section we assess the potential of the market-based measures, specifically inflation swaps and the break-even method, to forecast inflation.

Bond break-even rates (BBIR)

Most Australian regulators (including the ACCC/AER and ESC) initially derived estimates of inflationary expectations at a 10-year term using break-even rates, and we have seen that ERAWA still does so for the regulatory term (usually 5 years).

Data issues

As noted in section 3 above, regulators such as the AER and IPART decided to discontinue using break-even rates as the issuance of further CPI-linked government debt was low and expected to dry up completely before the global financial crisis. In fact, after the global financial crisis issuance of CPI-indexed debt markedly increased, this did not alleviate data quality issues in calculating break-even rates.⁷³ Figure 3.1 in the main body shows 5-year break-even rates together with 5-year inflation swap rates since 2008. The Bloomberg 5-year break-even series has been consistent since the beginning of 2015, but before then was absent for most of the period from 2008 to 2015. The 10-year series (which was used by IPART and the ESCV and AER in earlier times) was more uniformly available during the period 2008 to 2020. We also find that compared with inflation swaps, the break-even estimates of 5-year ahead inflation were approximately 18 basis points lower in the period 2010 to 2011, but that differential has increased to 38 basis points in the last 5 years (August 2014 to December 2019).

Predictive ability – BBIR

Due to data limitations for Bloomberg generated BBIR at terms to maturity of 1 and 2 years it is not possible to provide a well-informed analysis of the predictive ability of this method since 2008.

Inflation swaps

Inflation swaps are financial market instruments that enable businesses to hedge their inflation risk exposure over time. In Australia, market data for inflation swaps has been available since 2007, and as we saw in section 3 above, they were used up to 2014 by IPART. The ACCC / AER Working Paper considered that the pricing of zero-coupon inflation swaps holds a number of advantages over break-even rates.

Predictive ability – inflation swaps

For the past 11 years for which inflation swaps data are available they have provided a relatively accurate forecast of inflation for time horizons of 1 and 2 years. In the Figure B.2 below, we find that up to 2016 inflation swaps would still have over-estimated future inflation. It was only after 2016, when it is thought that a negative risk premium has biased the pricing of inflation swaps downward that its forecasts are materially closer to outcomes (even under-estimating actual inflation). As noted in the text, this shift is likely due to chance.

B.5 AER Method

Predictive ability – AER Method vs potential alternatives

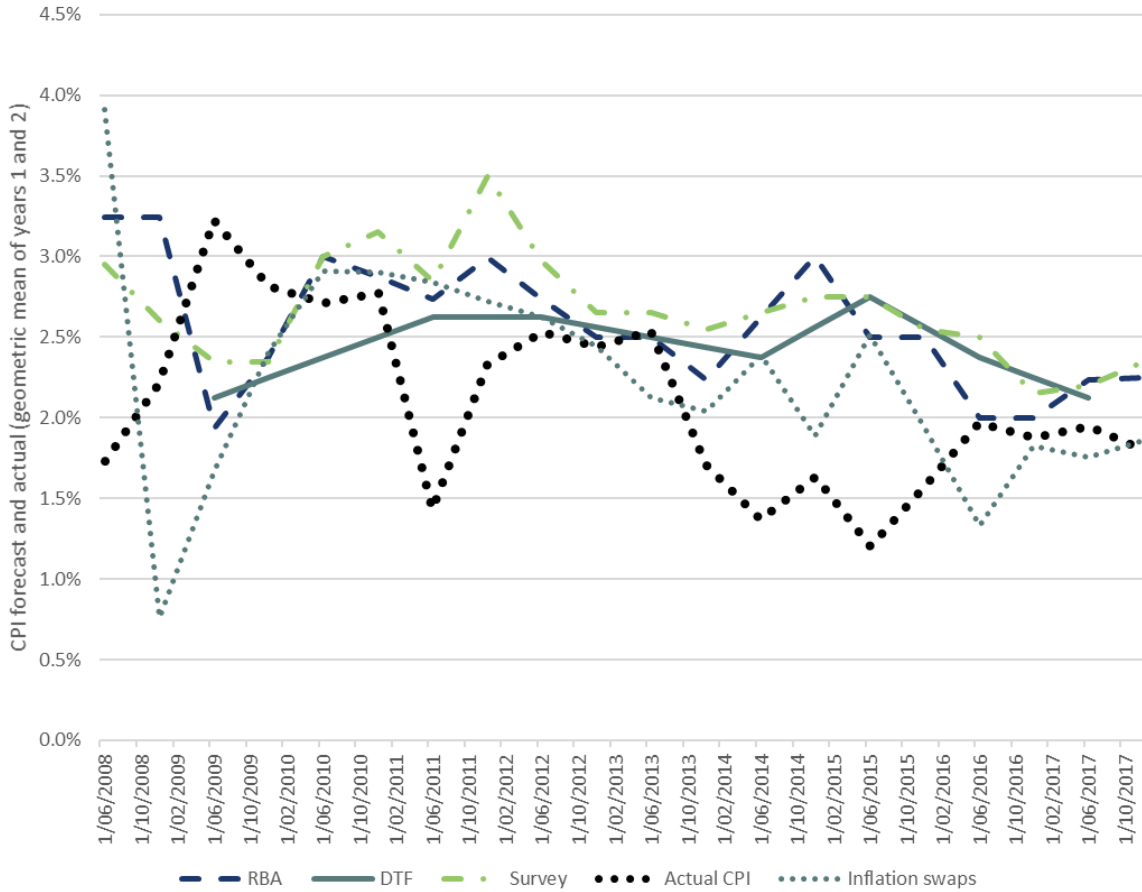
One of the advantages of the AER method that the AER (2017) and the ACCC/AER (2017) working paper relied upon was evidence suggesting that for 1 and 2-year forecasts the RBA's inflation forecasts are relatively consistent with the inflation expectations of market economists (Survey),⁷⁴ In

⁷³ Arguably the liquidity issues may be different for different terms if the initial focus was on providing volumes at longer tenors.

⁷⁴ This is also a tenet of the New Zealand Commerce Commission, which tests its inflation forecasts against those of market economists.

addition, we find that the RBA’s forecasts were relatively close to those made by the DTF and with swaps (excluding the global financial crisis and post-2016).⁷⁵

Figure B.2: Geometric mean of 1 and 2-year inflation forecasts using RBA, DTF, Surveys and Swaps vs actuals



Source: Bloomberg, RBA and Incenta analysis

⁷⁵

For market economist forecasts we used the file that is made available on the RBA website.