

Introduction

Aurizon Network welcomes the opportunity to respond to the Queensland Competition Authority's (QCA) Issues Paper (**Issue Paper**) as part of its review of its inflation forecasting approach. As the QCA has recognised, this has been the subject of some discussion in recent regulatory reviews, including Aurizon Network's 2017 Draft Access Undertaking (**the 2017 DAU**). This has similarly been an issue of focus in other regulatory regimes in Australia.

Forecasting error is an inherent feature of setting regulated revenue and prices for a future regulatory period based on forecasts or expected values of key parameters. In terms of inflation, the objective is to produce the best unbiased estimate of future inflation that minimises the risk of forecast error, recognising that a degree of error is likely to always remain.

Historically, most Australian regulators including the QCA have based their methodology on the Reserve Bank of Australia's (RBA) inflation forecasts. As it only forecasts inflation for the next two years (as published in its quarterly Statement on Monetary Policy), the forecast of inflation for the remaining years has been assumed to be 2.5% per annum, being the mid-point of its target band. For the purpose of this submission, this will be referred to as the RBA Forecast Method.

Since the end of 2014, actual headline inflation has largely remained below the 2% lower bound of the RBA's target band. As will be outlined within this submission, the RBA Forecast Method has therefore consistently overstated inflation, largely because it assumes that inflation will be 2.5% from year three of the forecast onwards, regardless of market conditions and expectations. This has resulted in an upward bias in the forecast. This could similarly occur during periods of persistently higher inflation (i.e. the forecast could be subject to downward bias).

As will be discussed within this submission, this forecast error has had a significant impact on Aurizon Network. Therefore, it is likely to have materially impacted other businesses regulated by the QCA, albeit in potentially different ways depending on how inflation is treated in modelling their revenues and subsequent pricing.

This forecast error has also been an issue in other regulatory regimes. This has resulted in other regulators reviewing and potentially revising their preferred approach to forecasting inflation, including most recently, the Australian Energy Regulator (**AER**). Along with other regulators, the AER considered a number of alternative methods, including market-based measures. The QCA has also examined these in the past, including in the review of Aurizon Network's 2017 DAU. Aurizon Network considers it important that the QCA's current review involves a full investigation of all of the alternative measures, informed by all relevant market data and evidence.

In responding to the QCA's Issues Paper, it is also important to highlight that Aurizon Network must consult with its customers on any matters that relate to the design and/or implementation of the regulatory framework. This is consistent with the negotiated position underpinning its current 2017 Access Undertaking (**UT5**), noting that any changes to the inflation forecasting approach will have longer term implications beyond the term of UT5.

This limits the extent to which Aurizon Network will put forward firm positions on aspects of the Issues Paper that could involve changes to the regulatory framework. In any case, Aurizon Network's preference is to negotiate any changes directly with its customers, rather than indirectly via a cross-industry review. This is particularly relevant in terms of how inflation is modelled in the regulatory framework, rather than how forecasts of expected inflation are determined.

Objectives

The objectives for the QCA review are very important as they will also serve as the decision criteria used to evaluate the alternatives.

The overarching objective for the inflation forecasting approach should be to produce the best unbiased forecast of expected inflation. To achieve this, Aurizon Network agrees with the criteria specified in the Issues Paper, which are that it needs to be accurate, robust, simple, transparent and replicable.¹

Aurizon Network strongly advocates for an approach that is 'enduring', which was similarly emphasised by the AER in its recent review.² This is acknowledged by the QCA in stating that the approach needs to be robust, that is "the method should produce high quality estimates of expected inflation under all economic circumstances".³ The current market circumstances are unusual in the context of economic history (both domestically and globally) in terms of the persistence of very low inflation. The method needs to be able to appropriately respond to these circumstances without being unduly sensitive. Similarly, the approach needs to respond to periods of high inflation.

Regulatory certainty and predictability are important to Aurizon Network and its customers. Aurizon Network considers it very important and timely for the QCA to be undertaking this review as it has become evident that the RBA Forecast Method, as currently applied, will not produce high quality estimates of expected inflation under all economic conditions. Any changes to the approach needs to 'stand the test of time' and minimise the need for any future adjustments to the regulatory framework. This necessitates testing the performance of the approach under a range of scenarios. To the extent possible, the approach also needs to be independent and minimise the need for the application of judgement. However, the method also needs to be pragmatic and appropriately responsive to economic shocks and unanticipated changes to assumed relationships and/or parameter assumptions that underpinned that method. In the case of inflation, this includes the RBA's monetary policy settings. This is demonstrated further within this submission.

Inflation in the regulatory framework

There are two key issues in relation to inflation in the regulatory framework. The first is how inflation is modelled i.e. where and how does it impact revenue and prices ('the modelling approach'). This in turn impacts how inflation risk is allocated between the business and its customers. The second issue is how to forecast expected inflation, which is the subject of the QCA's review.

¹ Queensland Competition Authority (2021). Issues Paper. Methods for Estimating Expected Inflation, March, p.7.

² Australian Energy Regulator (2020). Final Position. Regulatory Treatment of Inflation, December.

³ Queensland Competition Authority (2021). p.7.

While the modelling approach is not within the scope of the QCA's inflation forecasting review (as set out in its Issues Paper), it does impact the way in which inflation forecast error impacts the regulated business and its customers.

Aurizon Network's regulatory framework currently targets a real rate of return. This is achieved through the application of a nominal rate of return to a Regulated Asset Base (**RAB**) that is indexed for actual inflation (via the annual roll-forward).

Consistent with the principle of financial capital maintenance, the current approach applied to Aurizon Network maintains the real value of the RAB. As inflation influences the price path for the recovery of that RAB value, it corresponds to the choice of depreciation policy. That is, it primarily influences the timing of the cashflows.

As highlighted by Schmalensee, where a regulated business is protected from competition and not otherwise exposed to the risk of asset stranding, any depreciation method is efficient to the extent that it only impacts the timing of the recovery of costs (not whether those costs are recovered).⁴ Businesses should therefore be able to have the opportunity to agree that depreciation policy with their customers – and hence the way in which inflation impacts the profile for recovery of its costs.

In the Issues Paper, the QCA notes that it targets a real rate of return, consistent with other Australian regulators, including the AER.⁵ In saying this, the appropriateness of this approach has not historically been interrogated by the QCA in any detail, at least from a cross-industry perspective.

The AER's modelling approach is currently mandated under the National Electricity Rules (**NER**). In its recent review of its inflation approach, the AER did not consider that a change to the current real rate of return framework was necessary for a number of reasons, including (but not limited to):

- it aligns network prices paid by consumers with their income and wages (i.e. these prices remain a constant proportion of disposable income);
- investors in long life assets (such as those in the electricity and gas sectors) have a preference for maintaining the value of the RAB in real terms; and
- there is an automatic adjustment for movements in actual inflation, which mitigates a key source of risk.

While there are some commonalities across regulated infrastructure sectors, there are also some key differences, particularly in terms of the customer base for regulated services. In the case of users of coal export infrastructure assets, for example, while these assets also have a long economic life, they are also at risk of stranding. This can result in a different pricing profile, including the application of accelerated depreciation.

The customer base for coal export infrastructure services also comprises a comparatively small number of large, sophisticated organisations. This presents more opportunities for achieving commercially negotiated outcomes, including in relation to the allocation and management of inflation risk, which as outlined above, corresponds to a choice of depreciation policy.

⁴ Schmalensee, R. (1989). An Expository Note on Depreciation and Profitability Under Rate-of-Return Regulation. *Journal of Regulatory Economics*, Vol 1, pp.293-298.

⁵ Queensland Competition Authority (2021). p.4.

Aurizon Network considers it appropriate that the modelling framework is not within the scope Issues Paper. To the extent the QCA refers to the modelling approach, it should not otherwise be assumed to be a 'one size fits all' framework that is appropriate for all industries and businesses. Where feasible and appropriate, regulated businesses should retain the ability to negotiate key matters impacting revenue and prices – including the treatment of inflation – having regard to the circumstances of the relevant industry and the market environment in which they operate.

Response to questions in the Issues Paper

Question 1. Over what term should we forecast the inflationary gain deduction we use to derive the 'return on capital' component of allowable revenues?

Aurizon Network considers that the horizon of the forecast for the inflationary gain deduction should match the horizon of the RAB roll-forward (or the horizon over which prices are being set).

The term of Aurizon Network's regulatory period, or the term over which prices are set, is currently four years. The regulatory periods applying to businesses regulated by the QCA are of varying lengths and can also change over time. It is therefore important that the forecasting methodology does not depend upon that term.

Consistent with the conclusions made by the AER, Aurizon Network considers that under a *post-tax nominal modelling framework*, the horizon of the inflation forecast should match the term of the regulatory period. This will mean that the expected inflationary gain on the RAB will match the amount of the gain that is deducted from annual revenues – at least at the start of the period. While this is known to create a mismatch with the term of the risk-free rate, the AER considered that addressing the mismatch between the term of the inflation forecast and the term of the RAB roll-forward "is the more critical mismatch to resolve."⁶ Ultimately, if the objective is to align the term of inflation expectations with the term of the nominal risk free rate to obtain a real risk free rate, then it would be more appropriate to apply a *real pre-tax modelling framework* to align with that objective.

The AER also considered that matching the term of the inflation forecast to the length of the regulatory period results in a forecast that is more responsive to changes in market circumstances. That is, it "diminishes reliance on the assumption that investors anchor expectations to the mid-point of the RBA's target band in the long-term."⁷ In any case, as will be outlined within this submission, there is insufficient evidence to support the presumption that inflation expectations 'return' to 2.5% per annum over the medium- to long-term.

Question 2. Should we use the same expected inflation estimate (including the use of the same inflation forecasting term) for all purposes when modelling prices, or should we derive a different forecast inflation estimate for each purpose? Under what circumstances should we apply an input cost escalator that differs from our expected CPI inflation measure?

Aurizon Network considers that the treatment of inflation within the regulatory framework – including whether this requires the adoption of different measures for different purposes – depends on the framework applied to each business. It therefore should be addressed in that context.

⁶ Australian Energy Regulator (2020). p.6.

⁷ Australian Energy Regulator (2020). p.38.

As outlined previously, the treatment of inflation in the regulatory framework (i.e. the modelling approach) varies across businesses and industries. This includes where and how it is applied, as well as how relevant cost forecasts are determined. For example, as highlighted by the QCA in the case of Gladstone Area Water Board and irrigation price reviews, expected inflation is used in deriving smoothed prices over the relevant period.

In terms of escalators applied to forecast operating and maintenance expenditure, the approach depends on the extent to which these forecasts are accounted for independently of other key elements of allowed revenue, including the RAB roll-forward. It also depends on whether the forecasts are specified in nominal or real terms.

In Aurizon Network's case, prior to the UT5 Customer Agreement Draft Amending Access Undertaking (DAAU), a specific escalator has been developed for its maintenance cost forecasts – the Maintenance Cost Index (MCI). Introduced in 2010, this is a composite index that better reflects the underlying cost drivers for key resources and materials employed in maintenance work.

Aurizon Network therefore considers that the QCA should retain the flexibility to apply different forecasts of inflation that is best suited to the purpose. This could vary between industries and businesses depending on its regulatory framework and market circumstances.

Question 3. Should we maintain our existing approach to estimating expected inflation?

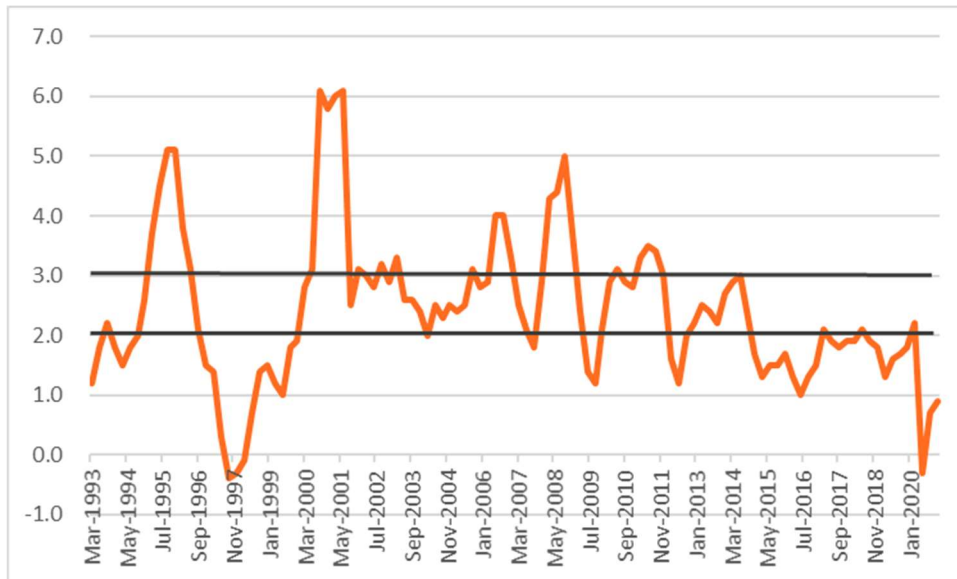
Aurizon Network does not consider that the RBA Forecast Method should continue to be applied in its current form. The main reason for this is that it will produce a biased estimate of forecast inflation, particularly in prolonged periods of low or high inflation. This is because the estimate of expected inflation from year three of the forecast onwards is assumed to be 2.5%, regardless of market conditions or expectations. Addressing this will not eliminate the risk of forecast error but should aim to eliminate bias as a contributor to that error.

The RBA's monetary policy target

A key premise of the use of the RBA Forecast Method is the RBA's monetary policy target of maintaining inflation between 2% and 3% per annum. This was introduced in the early 1990s, with the RBA specifying this as "a specific final objective" in 1993.⁸ Figure 1 shows actual year-end inflation since 1993.

⁸ Grenville, S. (1997). The Evolution of Monetary Policy: From Money Targets to Inflation Targets, Reserve Bank of Australia, <https://www.rba.gov.au/publications/confs/1997/grenville.html>

Figure 1 Year ended inflation (Australia)



Source: Reserve Bank of Australia. Consumer Price Inflation. <https://www.rba.gov.au/statistics/tables/#inflation-expectations>.

This shows that there have been a number of periods where inflation has been outside of the target band. However, this tends to be for comparatively short periods. With inflation now (mostly) below the lower target band for the last six years.

With most of the major central banks grappling with low inflation, benign wages growth and historically low interest rates, it is uncertain as to when inflation in Australia will sustainably return to within the target band. In announcing its monetary policy decision in April 2021, the RBA Governor indicated that this could take at least three years.⁹

“The Board is committed to maintaining highly supportive monetary conditions until its goals are achieved. The Board will not increase the cash rate until actual inflation is sustainably within the 2 to 3 per cent target range. For this to occur, wages growth will have to be materially higher than it is currently. This will require significant gains in employment and a return to a tight labour market. The Board does not expect these conditions to be met until 2024 at the earliest.”

To the extent that inflation does not return to the 2% to 3% band until at least 2024, this would mean that inflation will have been (mainly) below that band for nearly ten years.

The other important point to note is that the RBA’s monetary policy target is to maintain inflation between 2% and 3% - it does not specifically target 2.5%. The RBA’s expectation that inflation may return to the target band in 2024 is not that it will be 2.5%, but somewhere between 2% and 3%. The QCA acknowledges that the RBA “has defined its inflation target as a medium-term average rather than as a rate (or band of rates) that must be held at all times”¹⁰. However, at any point in time, the RBA Forecast Method assumes that actual inflation will be 2.5% in year three of the forecast, or that inflation expectations are anchored to this point.

⁹ Reserve Bank of Australia (2021). Statement by Phillip Lowe, Governor: Monetary Policy Decision, 6 April 2021. <https://www.rba.gov.au/media-releases/2021/mr-21-04.html>

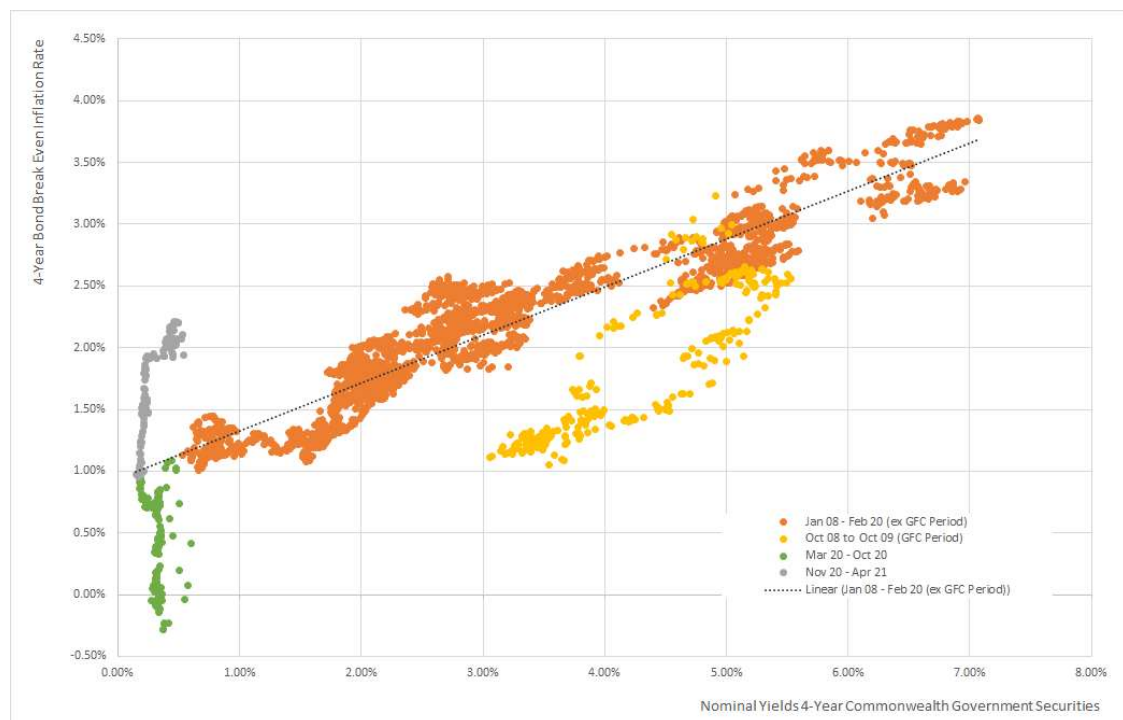
¹⁰ Queensland Competition Authority (2021). p.9.

The potential breakdown in assumed relationships in periods of unusual economic conditions is also apparent when assessing the relationship between the four-year nominal yields on Australian Government Securities (**AGS**) and the four-year bond break even inflation rate since 2008, as shown in Figure 2.

Under normal economic conditions there is a well-defined and statistically significant relationship between nominal interest rates and market expectations for inflation. However, there are clear departures from this established relationship as evident in the following periods:

- the Global Financial Crisis (**GFC**), comprising the period from the initial cash rate reduction in October 2008 to the next increase in the cash rate in October 2009;
- the commencement of the COVID-19 pandemic and the introduction by the RBA of a target yield of 25 basis points on the 3-year AGS from March 2020 to November 2020; and
- the continuation of monetary policy support measures and a further reduction in the target yield for the 3-year AGS to 10 basis points (from November 2020 to the present).

Figure 2 Relationship between Nominal Interest Rates and Inflation Expectations



Source: Aurizon analysis of RBA Statistics: Indicative Mid Rates of AGS – F16

The current period from November 2020 is of particular significance as the RBA has indicated that it will not seek to remove the 3 year target yield or increase the cash rate until *actual* inflation is sustainably within its target range of 2 to 3%. This is a significant policy shift in terms of its impact on the relationship between nominal interest rates and market expectations of inflation and has the practical effect of suppressing the yield on shorter term AGS, as noted in the following comments by the Deputy Governor of the RBA¹¹:

¹¹ Debelles, G (2021) Monetary Policy During COVID, Speech to Shannon Memorial Lecture on 6 May 2021, Transcript, p. 10. Available at: <https://www.rba.gov.au/speeches/2021/pdf/sp-dg-2021-05-06.pdf>

“In the past couple of months, while the 3-year government bond rate has remained very close to the Board’s target, the 3-year swap rate has risen relative to the 3-year government bond rate.

The market is assigning some probability to the scenario that the cash rate could be higher in 2024 than the Board’s current forward guidance. This expectation is being reflected in the swap rate, but not in the April 2024 bond rate, because the Bank is ensuring the bond rate remains at the target.

This move upward in the swap rate will put some upward pressure on longer-term household and business borrowing rates. Moreover, the 3-year yield target is still playing a significant role in anchoring that part of the curve. If the yield target wasn’t there, the government bond curve and swap rates would be higher still.”

The Deputy Governor’s statements can be reasonably interpreted as the yields on shorter term AGS not being representative of the risk-free rate as applied in the Capital Asset Pricing Model. Under these circumstances, the inflation forecasting approach needs to be able to respond to changes in economic conditions, including monetary policy settings.

Issues with the current approach

Source of bias

Forecasting expected inflation (as with a number of other parameters) will always be subject to a degree of error. If the forecast is unbiased, there is an equal likelihood that actual inflation will be higher or lower than the forecast. Under Aurizon Network’s regulatory framework, when actual inflation is below the QCA forecast, it will be under-compensated for inflation. When it is above the QCA forecast, it will be over-compensated. In theory, over the longer term the impact should be neutral.

Aurizon Network’s key concern with the current RBA Forecast Method is that it is not unbiased. This is because the approach assumes that expected inflation will be 2.5% from year three of the forecast, regardless of market conditions or expectations. It is not considered appropriate to set a forecast where it is known to be highly unlikely that the parameters underpinning that forecast will be incorrect. Further, as outlined above, the RBA does not target a point estimate for inflation. Consistent with its ongoing objective, the RBA’s goal is for inflation to “sustainably” return to the 2% to 3% range, not 2.5%.

As will be outlined below, one key source of disagreement that Aurizon Network has with the AER’s approach is that it constantly refers to the presumption that inflation expectations will “return” to 2.5% in the medium-term. The AER referred to evidence presented by Deloitte that inflation expectations “trend to the mid-point of the RBA’s target band in the medium-term.”¹² While Deloitte cites evidence that inflation expectations remain anchored within the RBA’s target band, it also stated that:¹³

“However, there remain significant limitations in the current academic literature. Most notably, there are few studies that examine inflation expectations in 2019 and 2020 – the period in which some measures of Australian inflation expectations have shown signs of movement. The most recent studies on inflation expectations also focus on countries other than Australia and tend to

¹² Australian Energy Regulator (2020). p.53.

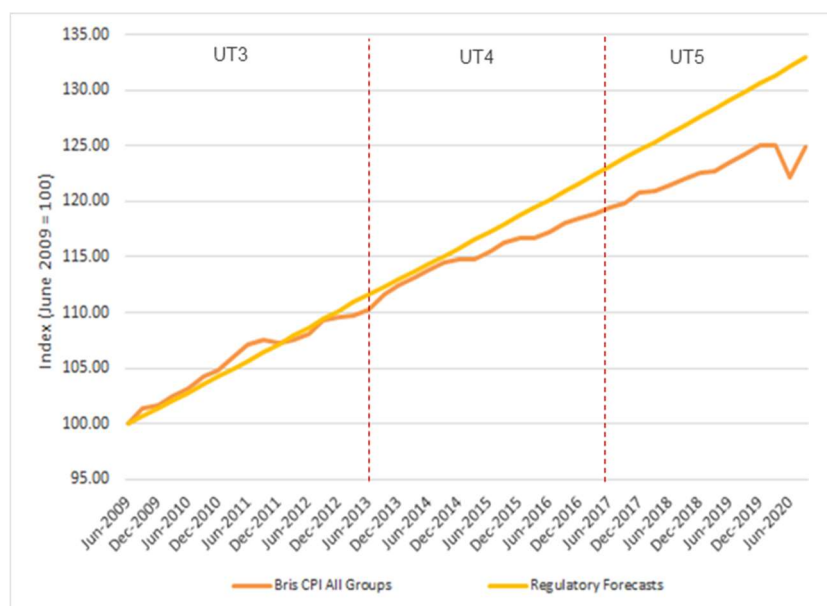
¹³ Deloitte (2020). Review of the Regulatory Treatment of Inflation. Prepared for the Australian Energy Regulator, 30 June. p.7.

analyse data over several years (which may cloud potential insights into recent changes in inflation expectations).”

The RBA itself has acknowledged that the persistence of low inflation across a number of major economies (and below central bank targets) “may have contributed to a reduction in inflation expectations.”¹⁴ Aurizon Network therefore questions the evidence relied upon by the AER in anchoring medium-term inflation expectations to the mid-point of the RBA’s target band.

In recent years, the consequence of the application of a biased forecast has been that actual inflation has remained persistently below the QCA’s forecasts using the RBA Forecast Method. This has been the case within Aurizon Network’s regulatory framework for the last ten years, as shown below.

Figure 3 Aurizon Network: Actual inflation versus QCA forecast



Over the last ten years, average actual inflation has been 1.9%, which is just below the lower bound of the RBA’s target band.

This is also highlighted in comparing the actual inflation outcome for Aurizon Network’s current UT5 period compared to the QCA’s approved forecast.

Table 1 UT5: QCA forecast versus actual inflation

Aurizon Network proposed ^a	QCA approved forecast (a)	Actual CPI: 1 July 2017 to March 2021 ^b (b)	Forecast error (a)-(b)
1.84%	2.37%	Jun 18: 2.1%	Jun 18: 0.27%
		Jun 19: 1.6%	Jun 19: 0.77%
		Jun 20: -0.3%	Jun 20: 2.67%
		Mar 21: 1.1%	Mar 21: 1.27%

^a As submitted in Aurizon Network’s Response to the QCA’s Draft Decision

^b Percentage change from corresponding quarter of previous year, All Groups, Australia. Australian Bureau of Statistics (2021). 6401.0: Consumer Price Index, Australia.

¹⁴ Reserve Bank of Australia (2019). Statement on Monetary Policy, May 2019. p.28.

This persistent or systemic error highlights that the QCA’s RBA Forecast Method is not unbiased. As the QCA stated in its Final Decision for the 2017 DAU:¹⁵

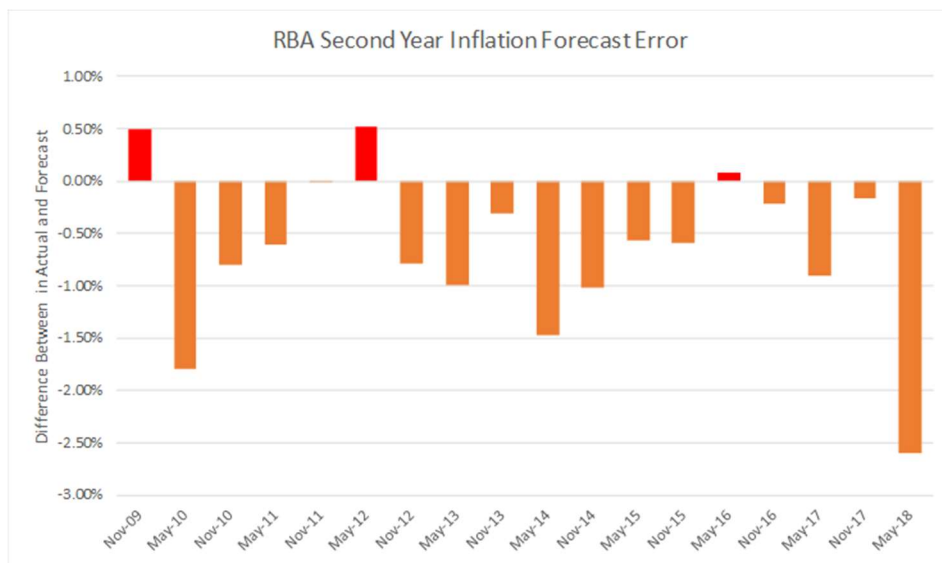
“As a general principle, in the interests of stability and regulatory certainty, it is desirable that the chosen method of forecasting inflation minimises differences between forecast and actual over the regulatory period. That is, the key issue is whether the forecast inflation method provides the best unbiased estimate of the inflation rate over the regulatory period.”

Further, any assumption that the impacts of inflation forecast error will be neutral over the long-term relies on their being an equal likelihood of under- or over-estimation. This assumption will not hold if the forecast is subject to bias.

The RBA’s second year forecasts are also not unbiased

The assumption that inflation will be 2.5% in year three is not the only source of bias. Evidence suggests that the RBA’s second year inflation forecasts in its Statement on Monetary Policy have systematically overstated the inflation forecast. For the forecast to be unbiased, the forecasting errors should be evenly distributed between positive and negative errors – that is, the cumulative error should be zero. The forecast error associated with each estimate is shown below, based on the difference between actual and forecast. A negative error means that the forecast has over-estimated inflation.

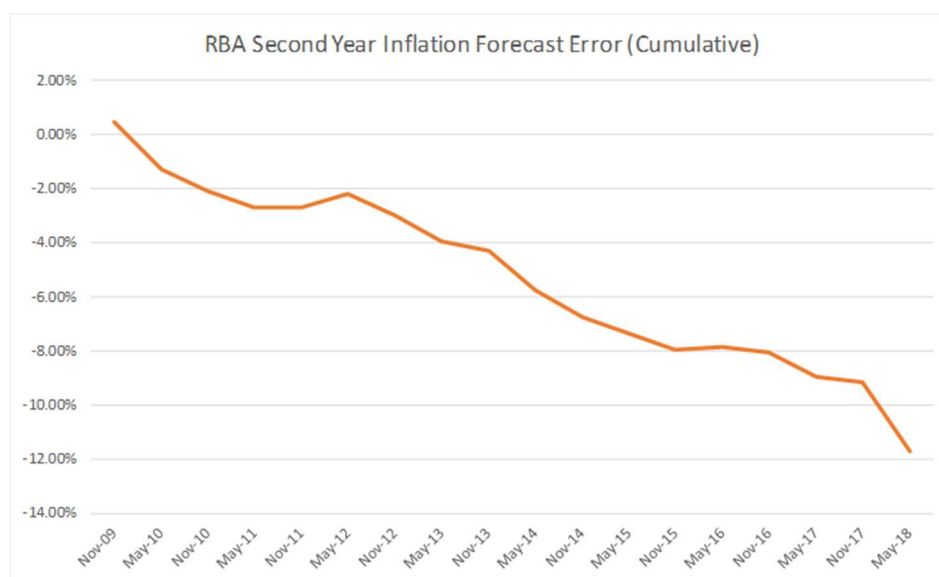
Figure 4 RBA second year inflation forecasts as published in the Statement on Monetary Policy: forecast error since end of 2009



The cumulative forecast error is shown in figure 5.

¹⁵ Queensland Competition Authority (2018). Decision: Aurizon Network’s 2017 Draft Access Undertaking, p.56.

Figure 5 RBA second year inflation forecasts as published in the Statement on Monetary Policy: cumulative forecast error since end of 2009



This shows that on a cumulative basis, since 2009 the RBA’s second year forecasts in its Statement of Monetary Policy have provided a cumulative over-estimation of inflation by almost 12%. This data is only up to and including actual CPI outcomes to June 2020. The last observation in June 2020 will reflect the impact of COVID-19. If that observation is excluded, the cumulative error over this evaluation period is approximately 9.5%.

This further questions the reliability of assuming that inflation will revert to the mid-point of the RBA’s target band by year three.

The effectiveness of monetary policy

The QCA has previously stated that:¹⁶

“While inflation targeting by the RBA remains effective, the RBA forecast method provides the best unbiased estimator of inflation.”

The situation of persistently low inflation and interest rates faced by the RBA and other central banks has challenged their continued effectiveness in using monetary policy to stimulate economic activity. The cash rate in Australia is now at a record low of 0.1%. As highlighted by the RBA:¹⁷

“A lower neutral interest rate increases the likelihood that the nominal cash rate will reach an effective lower bound (ELB), the rate below which changes in the cash rate have a diminishing effect on borrowing and lending rates...The key consequence of having the policy rate constrained by its ELB is that conventional monetary policy is unable to provide further stimulus to fully offset negative shocks.”

¹⁶ Queensland Competition Authority (2018). Decision: Aurizon Network’s 2017 Draft Access Undertaking, December. p.67.

¹⁷ R. Guttman, D. Lawson and P. Rickards (2020). The Economic Effects of Low Interest Rates and Unconventional Monetary Policy. RBA Bulletin, September. p.22.

Conventional monetary policy targeting is clearly less effective at the current time. Noting that these challenges had already emerged pre-COVID, despite the more recent signs of economic recovery it is uncertain as to how long they will continue to have an impact.

Further, the practical constraint that the RBA and other central banks face in relation to the effectiveness of monetary policy is not symmetric – while there might be a lower bound for the cash rate, there is not similarly an upper bound should it need to increase cash rates in response to persistently high inflation. This problem has been recognised by the International Monetary Fund (IMF):¹⁸

“If constraints on monetary policy are the source of the increased sensitivity of inflation expectations, this sensitivity should be higher for negative shocks than for positive ones—a central bank constrained by the effective lower bound on policy rates can always respond to higher inflation by raising the policy interest rate, but has little scope to reduce it when inflation is declining. This creates an unavoidable asymmetry in the ability of the monetary authority to handle downward and upward inflation shocks.”

This observation was also made by the IMF in 2016, where it noted that by 2015, inflation rates in a broad sample of over 120 economies were below long-term expectations. It also suggested that prolonged periods of below-target inflation “may lead to a belief that the central bank is willing to accept low inflation for longer”.¹⁹ It further highlighted that “faith in central banks’ ability to combat persistent disinflationary forces might be diminishing”.²⁰

There are a number of conclusions that can be drawn from the above. First, while it is not suggested that inflation targeting may be abandoned, it is evident that there can be periods of time for which it becomes considerably less effective. Further, recent history has shown that it is not appropriate to assume that this is a ‘short-term’ problem that might only impact a business over a single regulatory period.

Second, it would also be incorrect to assume that the impact of this is ‘neutral’ over the longer term based on an assumption that there is an equal likelihood that could be countered by periods of persistently high inflation. Comments made by both the RBA and the IMF highlight that this is an asymmetric problem, with one of the key constraints on monetary policy effectiveness being the fact that there is a practical floor for the cash rate. Even if the cash rate was allowed to go negative, there will be a limit to how far this would be permitted. On the flip side, central banks are not similarly constrained in using cash rates to bring high inflation under control.

Relationship between expected inflation and the risk-free rate

It is not controversial that longer term government bond yields reflect the market’s expectations of expected future short-term rates i.e. the cash rate.²¹ Because the RBA sets the cash rate based on its monetary policy target of maintaining inflation within the 2% to 3% band²², this results in a direct link between expected inflation and the risk-free rate.

¹⁸ International Monetary Fund (2016). World Economic Outlook, October, p.139.

¹⁹ International Monetary Fund (2016). p.125.

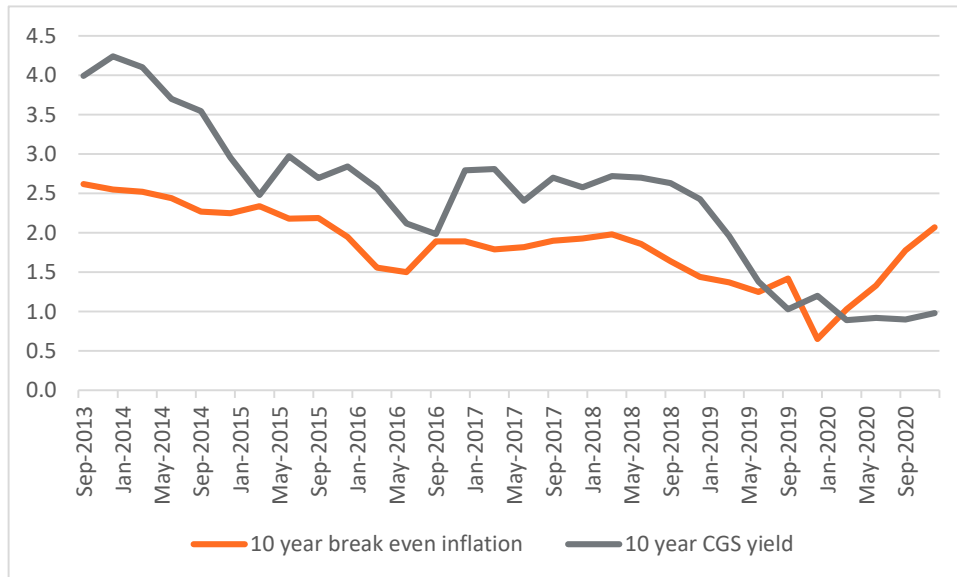
²⁰ International Monetary Fund (2016). p.142.

²¹ Reserve Bank of Australia. Bonds and the Yield Curve.
<https://www.rba.gov.au/education/resources/explainers/bonds-and-the-yield-curve.html>

²² This also operates with a lag, that is, it will take some time before changes in the cash rate flow through to economic activity and hence inflation.

The RBA publishes a number of measures of expected inflation, including ten year break-even inflation (which measures implied inflation from the yields on indexed and nominal government bonds).²³ Putting aside the issues associated with the different approaches used to measure inflation expectations, and noting the lag between changes in the cash rate and actual inflation, Figure 6 shows the relationship between the RBA's ten break-even inflation estimate and the risk-free rate.

Figure 6 10 year break even inflation and the risk-free rate



While the QCA's current RBA Forecast Method does reflect changes in the RBA's short-term inflation forecasts, beyond that horizon of the forecast, it is anchored to the mid-point of its target range. This means that as the risk-free rate has been falling, along with inflation expectations, the QCA's forecast of inflation has been less responsive. This also implies that investors are willing to receive a negative real return.

Aurizon Network therefore considers that the QCA's inflation forecasting approach needs to be more responsive to the medium-term outlook for inflation. This is necessary to maintain the relationship between the risk-free rate and expected inflation and hence better reflect the real rates of return required by investors. This in turn will result in a more accurate and robust measure.

Implications for the regulated business and its customers

Depending on the magnitude of the forecast error, the impact on the regulated business can be material. It can impact financeability in the short- to medium-term where intra-period revenues are adjusted for out-turn inflation and the regulated business is subject to nominal debt financing obligations.

While it will not necessarily impact financeability, similar issues could occur when inflation is very high. In that case, the regulated business will be over-compensated for inflation, with the impact ultimately borne by customers. Aurizon Network's concerns with the RBA Forecast Method are independent of the current inflation environment.

²³ <https://www.rba.gov.au/statistics/tables/#inflation-expectations>

Alternatively, where intra-period adjustments are not made for out-turn inflation but the RAB is rolled-forward for actual inflation outcomes, then significant deviations between actual and forecast inflation over a regulatory period can also result in more volatile revenue outcomes at the time of regulatory reset. This could also see more significant revenue and price changes between regulatory periods.

There are accepted approaches within the regulatory framework that can be used to address this, such as revenue smoothing or NPV neutral adjustments in the timing of revenue over the next regulatory period where revenue smoothing is not applied. Again, the approach/es applied should be a matter for each regulated business, which could also reflect outcomes agreed with customers.

In any case, to reduce the need for these adjustments, the objective should be to have an enduring approach that meets the overarching objective of producing the best unbiased forecast of expected inflation under all market conditions. While the QCA's current approach might meet the objectives of being simple, transparent and replicable, it is neither accurate nor robust.

Question 4. If we continue to use short-term RBA forecasts in our forecasting methodology, should we consider using a multi-year transition path to our estimate of long-term inflation expectations? If so, what factors should we consider in our choice of transition path?

Question 5. How should we derive medium to long-term inflationary expectations, particularly over a shorter forecasting period where expected inflation may not reach the midpoint of the RBA's target range?

Aurizon Network considers that if the QCA is to retain the use of short-term RBA forecasts, it should implement a framework enabling a multi-year transition path to long-term inflation expectations that is more responsive to market conditions. It is important that this transition path is based on an independent and objective approach that remains appropriate in all market conditions.

These two questions are closely related and can be considered together.

Is a transition path required, or should the remaining years be informed by other estimates of expected inflation?

Particularly if the length of the inflation forecast is over a shorter regulatory period, it is questioned whether the objective is to 'transition' over the remaining years to an estimate of medium- to long-term expected inflation. This is particularly the case if it is accepted that 2.5% is not necessarily the medium-term anchor point for expected inflation.

Currently, the RBA only forecasts inflation for the next two years. This forecast is informed by a range of measures of expected inflation, including surveys and market-based measures.²⁴ An alternative to assuming that the objective is to identify and transition to an 'anchor' point (reflecting medium- to long-term inflation expectations), is to use this same data to forecast inflation for the remaining years of the forecast period.

Aurizon Network recognises that this is an inherently challenging task for a regulator and would require a robust, transparent and objective methodology that is consistently applied

²⁴ A. Moore (2016). Measures of Inflation Expectations in Australia. RBA Bulletin. December Quarter.

through time. As with any aspects of regulatory decision-making, the application of judgment, while often necessary, reduces certainty and predictability. It can therefore also become very contentious.

By way of example, Aurizon Network highlights the methodology that the QCA has historically applied to estimating the market risk premium (**MRP**), which has been informed by a range of data sources. Historically, one of the key concerns expressed with this approach has been the lack of transparency, including the weights applied to each data source, which appears to have also varied through time.

Aurizon Network would not support an approach to forecasting inflation that results in similar transparency concerns. If it were to be applied, this would necessitate:

- identifying the data sources that will be used, which should be independent and objective;
- publishing the weights that will be applied to each measure, or alternatively, specifying how a point estimate will be selected from a range, which should not be varied outside of periodic methodology reviews; and
- full transparency in terms of any calculations or adjustments to data.

Application of a transition path

To the extent that the QCA continues to retain the use of short-term RBA forecasts in combination with an estimate of longer term inflation expectations, Aurizon Network supports a multi-year transition or 'glide path' approach, similar to the changes recently adopted by the AER and the Essential Services Commission of South Australia.

The introduction of the glide path by the AER acknowledged that "it may take a number of years for inflation to return to the mid-point of the RBA's target band following a substantial disturbance"²⁵, which could be periods of very high or low inflation. Aurizon Network's main source of disagreement with the AER's approach is the presumption that inflation will "return to the mid-point of the RBA's target band" by the end of the forecast horizon, for the reasons outlined above.

The AER has indicated that for a 'typical' five year regulatory period, it will use the RBA's short-term forecasts for the first two years, adopt glide path values for year three and four, and then assume 2.5% for year five.²⁶ The length of the glide path reflects its current assessment of how long expected inflation will take to 'return' to 2.5%, which has been informed by data such as surveys. This in turn reflects its assumption that 2.5% is the anchor point for inflation expectations in the medium-term. The AER states:²⁷

"Sometimes regulatory periods could be longer or shorter than five years. For shorter periods, we propose to use the relevant points from the RBA's forecasts and any applicable values from the linear glide-path. For longer regulatory periods, we propose to use the estimates noted above...plus the mid-point of the RBA's target band thereafter. The length of the glide path is informed by the available data so as to provide an unbiased estimate of expected inflation and is not linked to the length of the regulatory period."

As noted above, there is no strong evidence to suggest that 2.5% is the anchor point for inflation expectations in the medium- to long-term. In practice, inflation expectations could be anywhere within that target band, or in exceptional circumstances, could even continue to

²⁵ Australian Energy Regulator (2020). p.54.

²⁶ Australian Energy Regulator (2020). p.54-55.

²⁷ Australian Energy Regulator (2020). p.57.

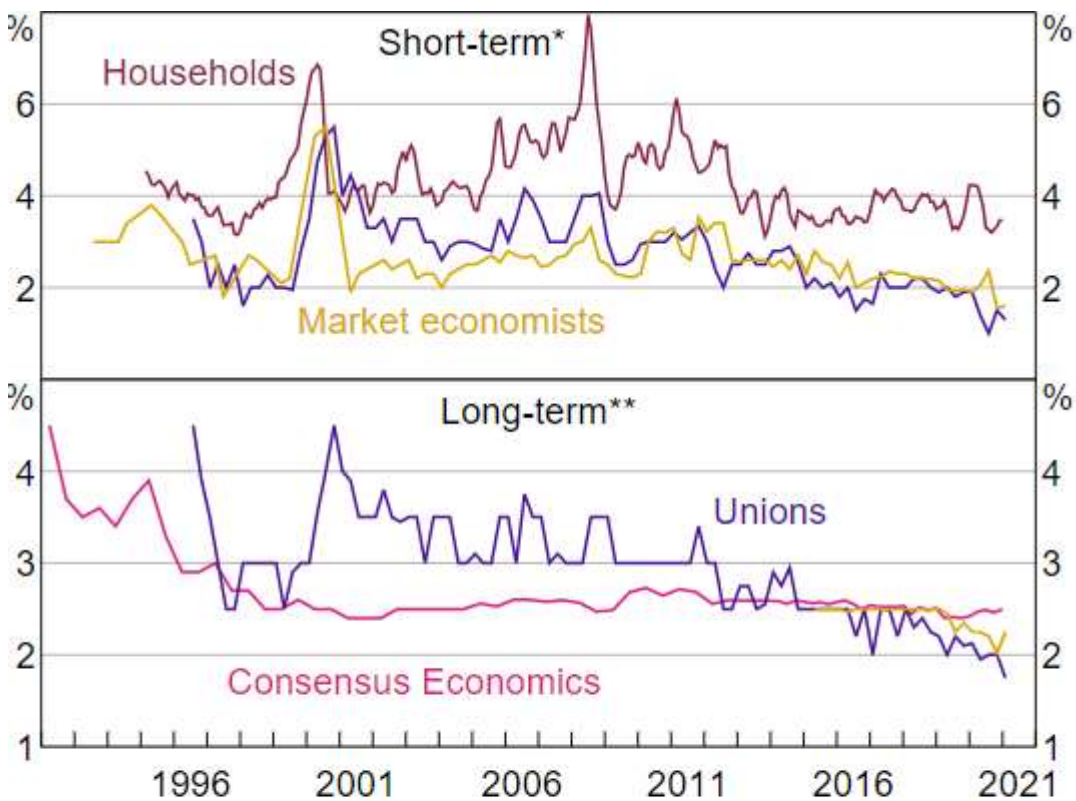
remain outside it. Particularly following an unusual period of very high or low inflation, it may be more likely that inflation expectations are in the upper or lower bound of the target band. This also means that depending on the term of the forecast, it may not be appropriate to assume that expected inflation will be 2.5% by the end of that forecast period.

If a transition path is applied, it could be informed by market-based measures

The application of a transition path assumes that there is an anchor or end point that is specified. With the AER’s approach, the question in setting that anchor point is how long it is expected to take for expected inflation to return to 2.5%. To the extent that 2.5% is not specified as the anchor point, the relevant question is where inflation expectations are forecast to be – relative to the RBA’s target band – in the last year of the forecast period.

The AER has referred to a range of measures in assessing how long it is forecast to take before expected inflation returns to 2.5%. This includes Consensus Economics surveys, which are also referred to by the RBA. The following chart shows the various surveys referred to by the RBA in its Statement on Monetary Policy.

Figure 7 RBA: Survey-based inflation expectations



* Over the year ahead

** Average over the next 5 to 10 years for market economists and unions; average over 6 to 10 years in the future for Consensus

Sources: Australian Council of Trade Unions; Consensus Economics; RBA; Workplace Research Centre

Source: Reserve Bank of Australia (2021). Statement on Monetary Policy, February 2021. p.56.

One thing that can be observed from this is that the Consensus Economics long-term forecasts appear comparatively stable around the mid-point of the RBA’s target band compared to the forecasts made by the unions and market economists (the latter only shown

since 2015). This raises the question as to how responsive the Consensus Forecast estimate is to changes in market conditions.

Each economist's forecast will be based on an underlying economic model. These models will be based on certain assumptions about economic relationships and key parameters, the details of which are unknown. It is also not known as to how well these individual models perform in all situations, including the current environment, where certain structural relationships that may have held in the past could have temporarily (or permanently) broken down.

Noting these concerns, Aurizon Network considers it important that the use of survey data is fully investigated by the QCA, along with other measures.

As outlined above, different data sources could similarly be considered to assess where inflation expectations are expected to be in the last year of the forecast period. Aurizon Network considers that more emphasis should be placed on market-based measures, which provide estimates of expected inflation over a number of different horizons. Any framework used to determine the transition path should be objective and transparent, and have the same features as specified above. Further consideration of the application of market-based measures is provided below.

Question 6. Should we consider the use of market-based measures of inflation expectations as either the primary estimation method or to derive long-term inflationary expectations?

While conceptually, market-based measures are considered the most appropriate way of estimating expected inflation, concerns have been expressed regarding biases and distortions. It is important for the QCA to re-evaluate these measures alongside other approaches, including the RBA Forecast Method, and over different time horizons. Aurizon Network notes that the AER's assessment of market-based measures was only made over longer horizons – it is important that this is also done over the medium term.

It remains open to the QCA for its inflation forecast to be informed by more than one approach, provided that: (1) this is considered the best and unbiased method for forecasting inflation expectations; and (2) this occurs within a transparent and objective framework that is consistently applied through time.

Conceptually, Aurizon Network considers that market-based measures are the most appropriate way of estimating expected inflation as these market prices reflect the views of sophisticated and informed market participants over a range of time periods, depending on the term of the relevant instrument. These measures are constantly updated through trading activity and as new information becomes available that is relevant to future expectations of inflation. However, it is also recognised that a number of issues have been identified with these measures in practice.

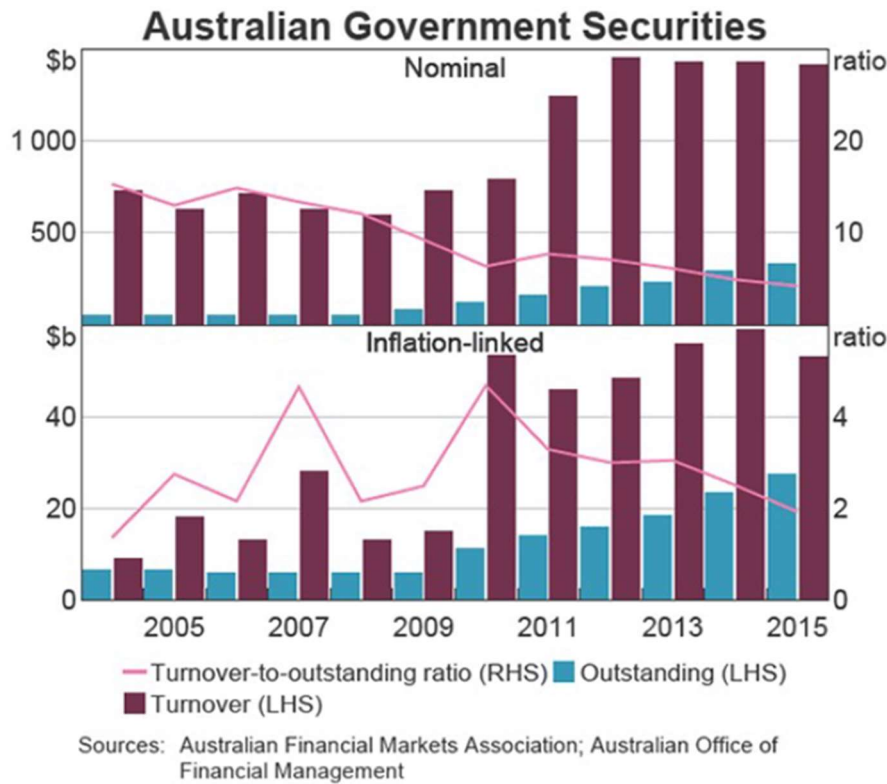
Do the potential issues with market-based measures preclude their use

The AER revisited the use of market-based measures (inflation swaps and break-even inflation) as part of its recent review. Its main concerns were that estimates using both approaches are likely to suffer from biases and distortions, due to hedging costs, liquidity

premium and other premiums.²⁸ Further, these are time varying. The QCA has expressed similar concerns in previous reviews.

One of the main concerns expressed with the break-even approach is the liquidity of the Australian indexed bond market. However, this is also influenced by reference to data prior to 2010. While turnover is still lower than nominal bonds (as a ratio of outstanding securities), it has improved materially since that time. In addition, the number of indexed bonds with differing maturities has also been extended over this period.

Figure 8 Improvements in inflation indexed bond liquidity



Source: A. Moore (2016). Measures of Inflation Expectations in Australia. RBA Bulletin. December Quarter, p.28.

The materiality of these premia and biases is also term-dependent. The focus of the AER's analysis was on the reliability of these measures over a longer (ten-year) term. While it contemplated – and eventually implemented – a shortening of its forecast horizon, it did not re-evaluate these measures in that context.

Further, it did not consider alternatives such as measuring expected inflation using market-based measures over the medium term, which could then be combined with another/other measure/s of longer-term expectations, such as the mid-point of the RBA's target range, or the use of survey data. This also reflects that inflation expectations can vary over the short-, medium- and long-term, which can justify the use of different measures (i.e. a hybrid approach). The QCA's current RBA Forecast Approach is a hybrid approach that uses different measures for the first two years and the remaining eight years of the forecast. This is similarly the case for the modified glide path approach finally adopted by the AER.

Aurizon Network therefore submits that in comprehensively reviewing the relative efficacy of market-based measures, the QCA should evaluate this over varying time horizons. In

²⁸ Australian Energy Regulator (2020).

particular, if it is contemplating shortening the horizon of the forecast to match the length of the regulatory period, it should evaluate the performance of market-based measures over shorter horizons, rather than drawing inferences from analyses conducted using longer term instruments. The analysis should be based on an examination of the cumulative error and root mean squared error of the different methods, including the RBA Forecast method.

For example, CEG undertook this analysis in a report prepared for Jemena in response to the AER’s inflation review. This compared the AER’s five-year glide path approach (which it ratified in its Final Decision), against the two market-based measures. It estimated this from June 2010 to June 2019. Its error statistics are reproduced below.

Table 2 CEG analysis: error statistics (half-yearly, June 2010-June 2019)

	Root Mean Squared Error			Mean absolute deviation			Median absolute deviation		
	AER/RBA	Swaps	Break-even	AER/RBA	Swaps	Break-even	AER/RBA	Swaps	Break-even
2 year forward	0.89%	0.74%	0.74%	0.81%	0.58%	0.57%	0.80%	0.54%	0.47%
5 year	0.83%	0.71%	0.49%	0.80%	0.68%	0.41%	0.87%	0.70%	0.36%

Source: Competition Economists Group (2020). Response to AER Draft Position Paper on Inflation. A Report for Jemena. November, p.25.

This showed that the market-based measures have less error (i.e. are more accurate) than the AER’s approach, with the break-even approach having the lowest error.

It is clear that all measures have their potential shortcomings. However, the evidence suggests that market-based measures should not be discounted as either a primary estimation method or to inform the estimate of long-term expected inflation. Further, it remains open to the QCA to adopt the most appropriate measure over the different time horizons – just as the current approach combines short-term RBA forecasts with the mid-point of the RBA’s target range for the medium- to long-term - depending on which approach performs best for each horizon.

Using a combination of approaches

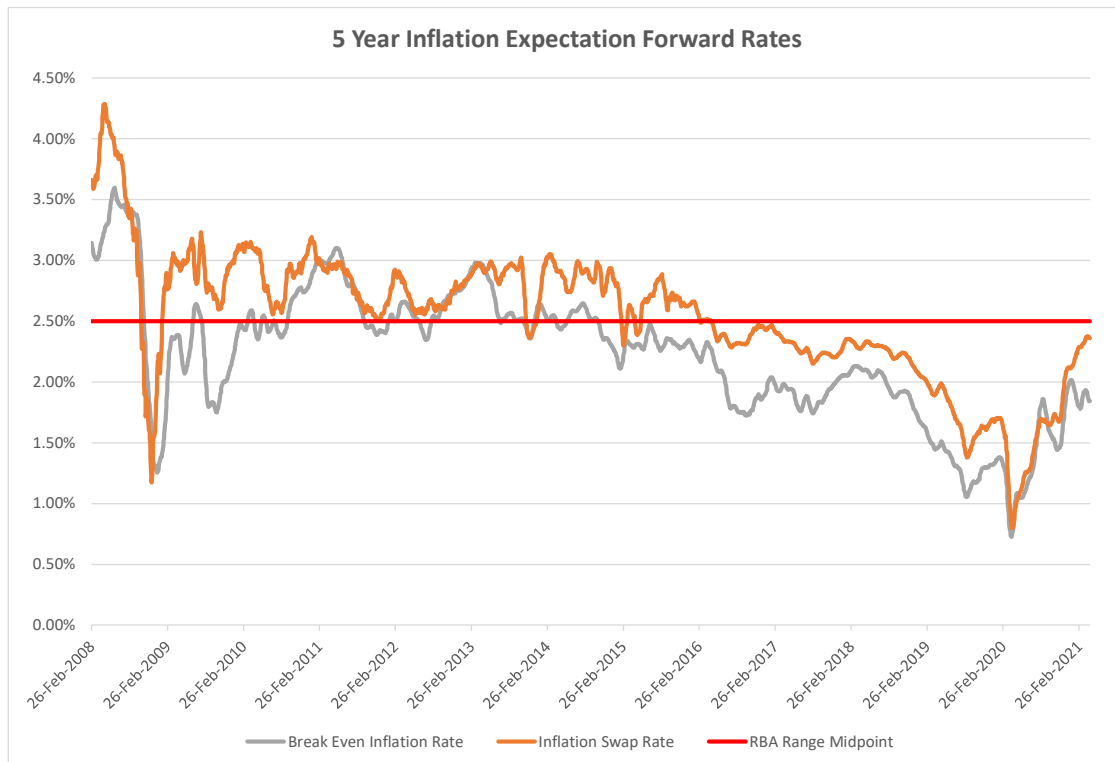
As noted above, the QCA’s current RBA Forecast Method is a hybrid method that combines the RBA’s short-term forecasts from its Statement on Monetary Policy with the mid-point of its target range. It should be open to the QCA to consider different methods depending on what might be the best and most unbiased measure of expected inflation over the short-, medium- and long-term.

Similarly, it may want to refer to more than one method in informing its inflation forecast over a certain horizon, including using both market-based measures (i.e. the break-even approach and inflation swaps). As noted previously, regardless of whether the QCA proposes to use one method alone or a combination of methods, Aurizon Network considers it important that full consideration is given to all possible methods. Ultimately, this should be based on an assessment of which approach is most likely to minimise forecast error in order to meet its objectives of a robust and accurate estimate.

Market-based measures could be used to determine the inflation forecast or to estimate long-term inflationary expectations, including as the ‘anchor point’ for a glide path approach. The following chart compares the forward rates for inflation expectations for Year 5, calculated

using the break-even approach and inflation swaps, against the mid-point of the RBA’s target range (2.5%).

Figure 9 Expected inflation using market-based measures and the RBA mid-point



Source: Aurizon analysis of RBA Statistics: Indicative Mid Rates of AGS – F16²⁹, Bloomberg Indexes [AUSWIT4 CMPN Curncy, AUSWIT5 CMPN Curncy]

This highlights that both measures have moved fairly well together in response to changing market conditions, although there has still been a difference between the two estimates, Both measures could be used to estimate long-term expected inflation.

If the QCA determines that it will continue to use 2.5% as the estimate of long-term expected inflation, an alternative that recognises the imprecision associated with forecasting expected inflation, is to use market data to determine whether long-term expected inflation is likely to be above or below 2.5% in the final year of the forecast. For example, if the current market-based estimates using the year five forward rates are more than one standard deviation from their long-term average, this could support a case for setting long-term expected inflation above or below the RBA mid-point.

For example, for the analysis period shown above, which is from 30 January 2008, the long-term average of expected inflation (measured daily), along with the standard deviation, is shown in the table below.

²⁹ Break-even inflation rates obtained from nominal and indexed bonds using Fischer equation $\pi = \frac{1+i}{1+r} - 1$, Year 5 Forward Rate of inflation obtained from term structure of 4 and 5 year break even inflation rates $\frac{4}{5}\pi = ((1 + \frac{1}{5}\pi)/(1 + \frac{1}{4}\pi))^5 - 1$

Table 3 Five year forward rates (daily, 30 January 2008 to 21 April 2021)

	Five year forward break-even rate	Five year forward inflation swaps rate
Mean	2.22%	2.53%
Standard deviation	0.55%	0.58%

This suggests that one standard deviation is between around 0.5% and 0.6% of the mean. By way of example, if the current forward estimates are:

- within one standard deviation of the mean, long-term expected inflation could be set at 2.5%;
- between one and two standard deviations of the mean, long-term expected inflation could be set at 2% (i.e. one standard deviation from 2.5%);
- between two and three standard deviations of the mean, long-term expected inflation could be set at 1.5% (and so on).

While this is not as precise as adopting the current market-based measures as the estimate of long-term expected inflation, this provides a simple, transparent and objective decision rule that is more responsive to changes in market conditions than the QCA's current approach.

In terms of reproducing estimates such as break-even inflation, Aurizon Network also considers that interpolating yields and bond break-even inflation rates from publicly available information published by the RBA is not an overly complex task.

To the extent that different measures are used, it is considered imperative that this is based on a transparent and objective framework that is consistently applied over time, including:

- identifying the data sources that will be used, which should be independent and objective;
- publishing the weights that will be applied to each measure, or alternatively, specifying how a point estimate will be selected from a range, which should not be varied outside of periodic methodology reviews; and
- full transparency in terms of any calculations or adjustments to data.

While Aurizon Network acknowledges that regulatory judgement may need to be applied, this should be minimised to the extent possible to provide appropriate predictability and certainty to the regulatory framework. It will also potentially reduce the likelihood that this will become another source of contention and debate at each review.

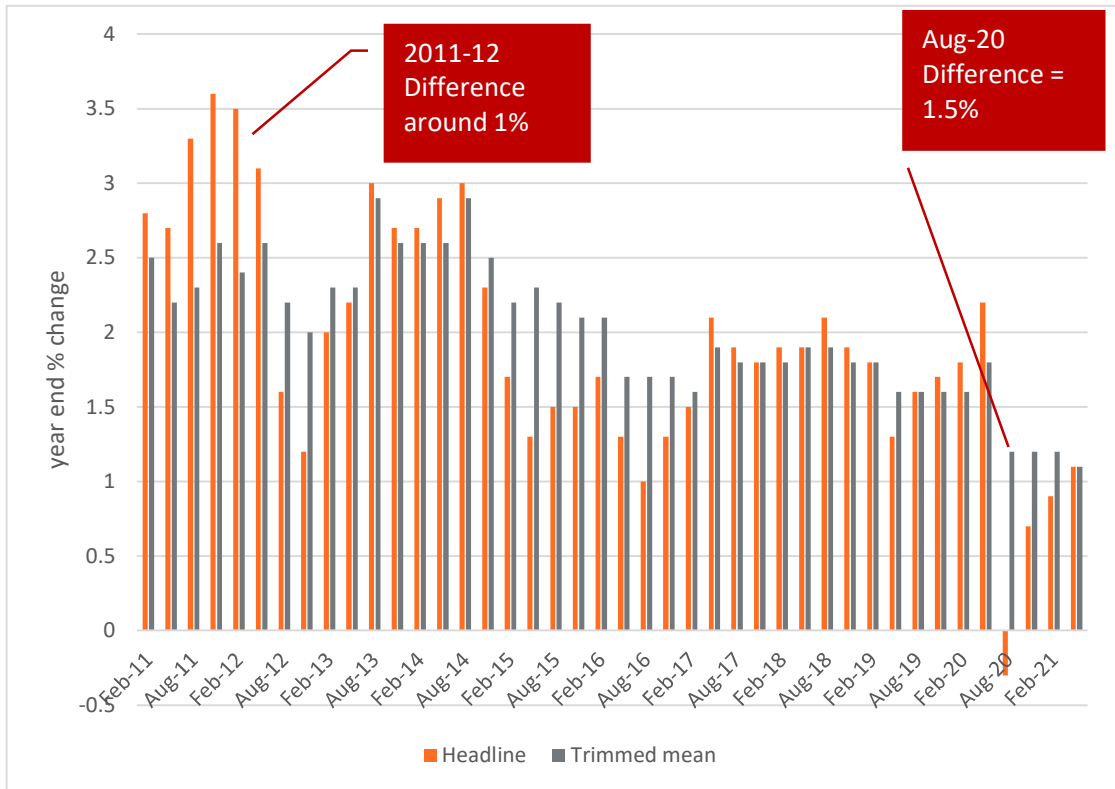
Question 7. If we continue to use RBA forecasts in our estimation methodology, are there certain circumstances where the RBA's trimmed mean forecast should be used?

There may be exceptional circumstances where replacing the RBA's headline forecast with the trimmed mean would produce a better forecast of expected inflation. An objective decision-rule should be applied before any adjustments are made, for example, where the difference between the headline and trimmed mean estimate is greater than 1%.

As noted by the QCA, the RBA's trimmed mean measure of inflation seeks to reduce the impact of potentially volatile or temporary price changes, resulting in a measure of underlying inflation (or 'core' inflation). From time to time, there can be significant deviations between headline and underlying inflation. The following chart shows actual headline and trimmed CPI

to the end of the most recent quarter as reported in the RBA's quarterly Statement on Monetary Policy.

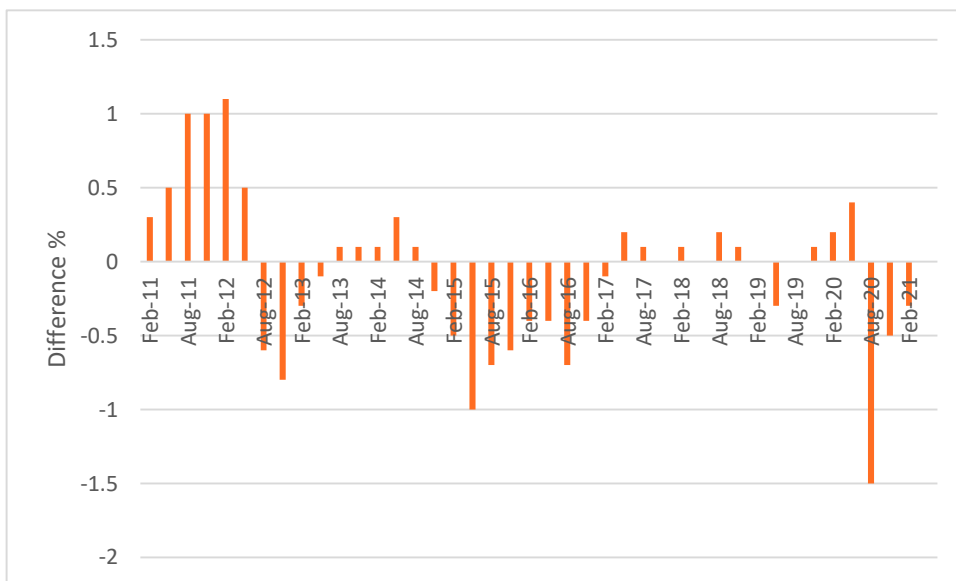
Figure 10 Headline and Trimmed Mean inflation (actual)



Source: Reserve Bank of Australia, Statement on Monetary Policy. <https://rba.gov.au/publications/smp/>. {Accessed 12 May 2021} The horizontal axis refers to the quarter of publication. Figures are year end for the most recent quarter as reported in each quarterly statement.

The difference between the headline and trimmed mean estimates is shown below.

Figure 11 Difference between headline and trimmed mean CPI



Source: Reserve Bank of Australia, Statement on Monetary Policy. <https://rba.gov.au/publications/smp/>. {Accessed 12 May 2021} The horizontal axis refers to the quarter of publication. Figures are year end for the most recent quarter as reported in each quarterly statement.

Over this period (and for the relevant quarters reported) the average difference between actual headline and underlying inflation has been around 0.07%. However, there have been occasions where the difference was more significant.

The most recent was for the year ended June 2020, as reported in the August 2020 Statement on Monetary Policy, where headline inflation was -0.3% while the trimmed mean was 1.2% (a difference of 1.5%). This reflects the impacts of COVID-19. It is noted that in the May 2020 Statement on Monetary Policy, the forecast headline inflation for the June 2020 quarter was -1%, whereas the trimmed mean forecast was 1.5% (an overall difference of 2.5%). It is also evident that this was temporary. This estimate would have had a material impact on a forecast estimated over this period.

The AER has previously applied the trimmed mean however only in exceptional circumstances, for example, as part of recent determinations where forecasts were heavily impacted by COVID-19.³⁰ Aurizon Network sees merit in allowing for the application of the trimmed mean in exceptional circumstances. As noted by the RBA:³¹

“These ‘exclusion’ measures of underlying inflation remove the direct effect of movements in the prices of those items on the rationale that they tend to be volatile and often not reflective of the underlying or persistent inflation pressures in the economy. However, exclusion measures of underlying inflation may not always be appropriate. For example, there may be large temporary movements in other components of the CPI that are not excluded from such measures of core inflation. In addition, there may indeed be information about underlying inflation pressures in the food and energy components, but such information will be lost in an exclusion measure.”

The AER has determined that it will retain the flexibility to apply the trimmed mean in exceptional circumstances by not specifying the form of inflation measure that it will use.³²

As with other aspects of the framework, an objective decision rule should be applied before any adjustments are made, for example, where the difference between the headline and trimmed mean estimate is greater than 1%. As noted above, the average difference in actual terms (in the quarters sampled) over the last ten years above has been around 0.07%, with the difference only having exceeded 1% in two quarters over the period.

Question 8. When using expected inflation measures for the different purposes in revenue and price modelling, are there local considerations that could make the Brisbane CPI preferable to the national CPI?

There may be circumstances where a measure reflect local market conditions is more appropriate, for example when escalating input costs. However, this should be assessed in the context of the regulatory framework applied to each business, having regard to the way inflation is applied as well as the market environment in which it operates.

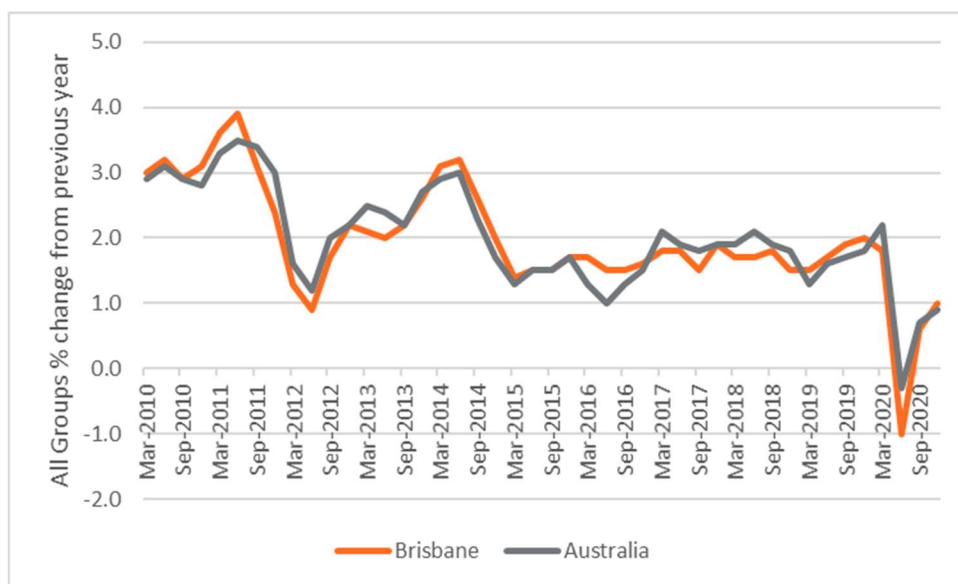
Historically, the All Groups CPI for Brisbane and Australia has tracked reasonably closely over the last decade, as shown in the figure below.

³⁰ For example, refer: Australian Energy Regulator (2020). Final Decision. Energex Distribution Determination 2020 to 2025: Overview. June.

³¹ A. Brischetto and A. Richards (2006). The Performance of Trimmed Mean Measures of Underlying Inflation. Research Discussion Paper, RDP 2006-10. pp.7-8.

³² Australian Energy Regulator (2020).

Figure 12 All Groups CPI Brisbane and Australia: % change from corresponding quarter of previous year



Source: Australian Bureau of Statistics (2020). Consumer Price Index, Australia. <https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/consumer-price-index-australia/latest-release#data-download>. {Accessed 26 April 2020}

There have been some deviations between the two series, which have not been persistent. However, to the extent that a forecast is being estimated over a period that captures these deviations, it could have a more material impact.

Aurizon Network considers that the choice of measure depends on where it is being applied. For example, for the inflation forecast that is used to index the RAB (and determine the corresponding adjustment to MAR for the inflationary gain), using the national measure is more consistent with the estimate of the risk-free rate, which is measured from Commonwealth Government bond yields.

To the extent that it is being used to escalate costs such as operating and maintenance expenditure forecasts, it may be more appropriate to use a measure that is more reflective of local economic conditions. In Aurizon Network’s case, a number of its input costs reflect conditions in Central Queensland. Noting that there are no published forecasts of inflation on a regional basis, the Brisbane estimate may be more reflective of local conditions than the national measure. As noted above, Aurizon Network’s maintenance costs are escalated based on a specially constructed Maintenance Cost Index.

The benefit of the national measure is that forecasts are updated and published by the AER on a quarterly basis. Queensland Treasury produces forecasts of Queensland CPI, which are published annually as part of the State budget papers.³³ The most recent forecast could therefore be out of date. There are other sources of State-based forecasts, for example those produced by Deloitte Access Economics, however they are not readily accessible or transparent.

This is another situation where a ‘one size fits all’ approach cannot be determined. Aurizon Network’s view is that this needs to be assessed in the context of the regulatory framework applied to each business, having regard to the way inflation is applied as well as the market environment in which it operates.

³³ For example, refer: <https://budget.qld.gov.au/budget-papers/#budget-paper-2>