Review of the regulatory treatment of inflation

QUEENSLAND TREASURY CORPORATION

SUBMISSION TO THE AER DISCUSSION PAPER – 29 JULY 2020

1 Summary

The allowed return on equity

- QTC supports targeting a real allowed return on equity, however a market estimate of inflation should be used to make the revenue deductions in the post-tax revenue model (PTRM) for inflation on the equity-funded portion of the regulated asset base (RAB).
- A market estimate of inflation ensures the same amount of inflation compensation in the 10-year nominal Commonwealth Government Security (CGS) yield, which makes up part of the nominal allowed return on equity, is reflected in the revenue deductions in the PTRM. This will result in:
  - the equity providers not being compensated for inflation twice, and
  - the correct ex-ante real return on equity being reflected in the PTRM cash flows.
- The AER's expected inflation approach currently allows a large negative implied inflation risk premium to be reflected in the implied real CGS yield, however the same implied premium is excluded from the revenue deductions in the PTRM. This results in a material understatement of the real return on equity allowance, which is the main reason for the significantly negative net profits after tax (NPAT) that are currently occurring in the PTRM.
- As we demonstrate in this submission, the 10-year zero coupon inflation swap rate (ZCIS) is an upper bound for the market estimate of inflation that should be used to make the revenue deductions in the PTRM.

The allowed cost of debt

- QTC supports targeting a nominal allowed cost of debt by:
  - using an estimate of expected inflation to make revenue deductions in the PTRM for inflation on the debt-funded portion of the RAB, and
  - using the same estimate of expected inflation to index the debt-funded portion of the RAB in the roll-forward model (RFM).
- QTC considers this to be the best way of ensuring the PTRM and RFM jointly provide enough compensation for a benchmark service provider to service its efficiently incurred nominal cost of debt in each regulatory year. This outcome is consistent with the AER's reasons for moving from the previous 'on-the-day' cost of debt approach to an annually updated trailing average cost of debt approach.
- In contrast, targeting a real cost of debt interferes with the service provider's ability to meet its contractual obligations to its lenders because it creates a mismatch between the efficiently incurred nominal cost of debt and the compensation for the cost of debt in the PTRM and RFM.

Other points

- The Discussion Paper notes the AER has not formed a view on whether there is a better approach to estimating expected inflation than its current approach. Subsequent to this, two of the AER's consultants have provided advice suggesting a 'glide path' as a potential alternative. This submission shows that a market estimate of 10-year inflation is appropriate for making revenue deductions on the equity-funded portion of the RAB, so there is no need to consider a glide path.

2 The role of inflation in the regulatory framework

- The current objectives of the post-tax revenue model (PTRM) and the roll-forward model (RFM) are to:
  - target the initial ex-ante real rate of return, derived from a nominal rate of return less the AER's estimate of expected inflation, and
  - deliver the initial ex-ante real rate of return plus actual inflation.
- The AER calculates the nominal allowed return on equity by adding a 3.66 per cent equity risk premium to the prevailing 10-year nominal Commonwealth Government Security (CGS) yield.
- The nominal allowed return on equity and trailing average cost on debt are inputs in the PTRM. The target real rate of return is implicitly determined by making revenue deductions in the PTRM equal to the dollar value of the indexation of the regulated asset base (RAB) based on the AER's estimate of expected inflation.
- In our view, for this approach to be effective, the dollar value of the revenue deductions on the equity-funded portion of the RAB must be consistent with the total inflation compensation in the 10-year nominal CGS yield that makes up part of the nominal allowed return on equity.
- Different considerations apply to the revenue deductions on the debt-funded portion of the RAB because the benchmark service provider is assumed to fund itself with nominal debt. Due to the contractual nature of debt servicing costs there is no reason to remove an estimate of 10-year expected inflation from the PTRM cash flows and then add back 5-year actual inflation in the RFM. These issues are discussed further in Section 5.

2.1 The AER's current inflation approach

- The AER estimates 10-year expected inflation using Reserve Bank of Australia (RBA) inflation forecasts for years one and two, and the 2.5 per cent mid-point of the RBA target band for the following eight years. The approach assumes the RBA will be successful in using monetary policy to achieve its inflation targeting objectives, which should anchor long-term inflation expectations to the 2.5 per cent mid-point. As explained by the AER[1]:

  > *'For the AER's method to produce relatively congruent estimates of expected inflation, expectations must be anchored within the RBA inflation target band.* ***For such anchoring to occur the RBA's monetary policy must be, and is perceived to be, effective in managing economic activity and outturn inflation.****'*

- The average annual change in the Consumer Price Index (CPI) over the last 10 years is 1.8 per cent, which is below the bottom of the RBA's 2.0–3.0 per cent target band. This is the lowest 10-year average outcome on record, which is remarkable considering the unprecedented amount of monetary stimulus provided by the RBA. The official cash rate was 7.25 per cent in 2008. It now stands at just 0.25 per cent, which is the RBA's stated lower bound.
- With a 0.25 per cent cash rate the RBA is constrained in its ability to use monetary policy to manage or respond to further downside inflation risks or shocks. These constraints are reflected in market estimates of inflation:
  - The entire inflation swap curve from 1–30 years is significantly below the bottom of the RBA target band.
  - The 5-year implied forward 5-year inflation swap rate is commonly used to measure the market's confidence in a central bank's ability to meet its inflation target. The current forward rate is 1.87 per cent, which is 0.63 per cent below the mid-point of the RBA target band.
  - In QTC's view, there are no realistic inflation risk premium estimates that can reconcile estimates of 10-year expected inflation that assume a 2.5 per cent anchor with the implied-forward inflation swap rates.
- QTC continues to support the use of market estimates of inflation, so we do not consider it necessary for the AER to continue with the current approach for estimating expected inflation. However, for completeness Appendix A sets out our assessment of whether monetary policy is still perceived to be effective, and whether 2.5 per cent is still an anchor for long-term inflation expectations.

[1] ACCC/AER Working Paper No. 11, *Best estimate of expected inflation: a comparative assessment of four methods*, para. 202.

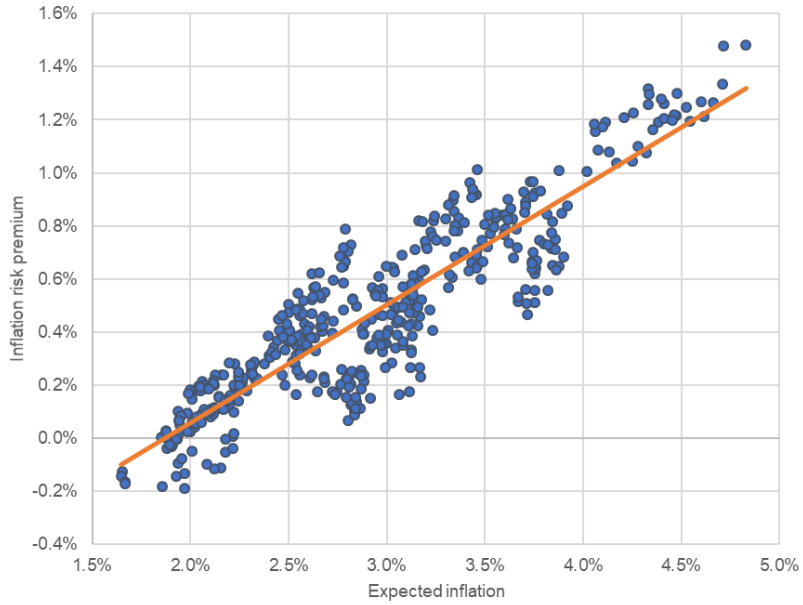
3 Market estimates of inflation

- The two market-based approaches for estimating inflation are the bond break-even inflation rate (BBIR) and the zero-coupon inflation swap rate (ZCIS).
  - The BBIR equals the difference between the observable nominal and real CGS yield for the same term to maturity. It measures the amount of actual inflation required to equate the realised returns on nominal and real CGS.
  - A ZCIS involves exchanging (at maturity) a notional cash flow that is indexed by a fixed inflation rate for a notional cash flow that is indexed by the actual change in the CPI over the term of the swap.
- In the 2017 inflation review the AER cited several academic papers which showed that the BBIR and ZCIS are affected by an inflation risk premium and various liquidity premiums, which the AER considers makes them unsuitable for estimating regulatory inflation.

3.1 Inflation risk premium

- The inflation risk premium makes up part of the 10-year nominal CGS yield and the 10-year ZCIS rate, and can be positive or negative. At a high level, the inflation risk premium reflects the expected covariance between inflation outcomes and the performance of the broader equity market:
  - A positive inflation risk premium exists when the expected covariance is negative (ie, high inflation coinciding with negative equity market performance and vice-versa).
  - A negative inflation risk premium is less common, and exists when the expected covariance is positive (ie, high inflation coinciding with positive equity market performance and vice-versa). A negative inflation risk premium typically reflects investor concerns about the risk of deflation or a deflationary recession.
  - The long-term average inflation risk premium has been positive which means it has been deducted from the market risk premium (MRP) used in the allowed return on equity.
- The first two points above suggest a positive relationship between expected inflation and the inflation risk premium. This is consistent with model-based estimates using U.S. Treasury bond data[2]. As shown in Figure 1, even a slightly negative inflation risk premium tends to be associated with significantly below average expected inflation. This is relevant to the current inflation review because the AER's recent determinations cite academic studies that conclude the inflation risk premium has turned negative. A negative inflation risk premium reduces the amount of inflation compensation in the nominal allowed return on equity, so it should also be included in the revenue deductions for inflation on the equity-funded portion of the RAB.

FIGURE 1: ESTIMATES OF U.S. EXPECTED INFLATION AND INFLATION RISK PREMIUM (1983–2020)



[2] Kim, Walsh & Wei, May 2019, *Tips from TIPS: Update and Discussions*, FEDS Notes. Washington: Board of Governors of the Federal Reserve System, May 21, 2019, https://doi.org/10.17016/2380-7172.2355.

3.1.1 Inflation compensation

- Total inflation compensation in the BBIR and ZCIS equals expected inflation plus the inflation risk premium. The observable real CGS yield does not reflect expected inflation or the inflation risk premium because its real return is not affected by actual inflation.
- The AER considers the inflation risk premium to be a source of bias because it prevents the BBIR and ZCIS rates from being viewed as a pure estimate of expected inflation. However, due to the way the nominal allowed return on equity is calculated, the net effect of the inflation risk premium on the PTRM cash flows is zero if a market estimate of inflation is used:
  - The nominal allowed return on equity is based on the 10-year nominal CGS yield. This means that expected inflation and the inflation risk premium are included in the nominal return on equity allowance in the PTRM.
  - If the revenue deductions for inflation on the equity-funded portion of the RAB are made using a market estimate of inflation, the same expected inflation and inflation risk premium will be deducted from the nominal return on equity allowance in the PTRM. The net effect of the inflation risk premium is zero.
- In QTC's view, using a market estimate of inflation to make revenue deductions on the equity-funded portion of the RAB ensures that:
  - equity providers are not compensated for inflation twice, and
  - the correct ex-ante real return on equity is reflected in the PTRM cash flows.

3.2 Liquidity risk premium

- Liquidity typically refers to the cost and ease of trading an asset, and includes factors such as transaction costs, bid/offer spreads and the market impact of executing relatively large transactions.
- A broader definition of liquidity captures any friction that drives a wedge between the observable yield and the yield that would prevail in a frictionless world[3]:

> *'Implicit in the usage of the word "premium" (or penalty) is the notion that a clean, unobserved price would prevail if only some, not necessarily well-identified, market microstructure frictions did not bias the prices actually observed. We define the absolute liquidity premium as the price difference between the observed and the unobservable "frictionless" market outcome of a given asset ... In this sense the liquidity premiums we derive represent the total cost of all frictions to trade (wider bid-ask spreads, lower trading volume, etc.) of the less liquid asset beyond those of the more liquid asset against which it is being compared.'*

- This broader definition is adopted in academic studies that use model-based approaches to estimate the liquidity premium. In these studies, liquidity is usually a residual term that reflects the combined value of all frictions that are not captured by factors common to nominal yields and real yields[4].
- The academic studies cited by the AER in the 2017 inflation review provide some evidence that observable real yields are biased upwards by frictions that are unrelated to inflation.
- Model-based liquidity premium estimates can be useful in identifying long-term trends, relationships and correlations with other premiums (eg, Figure 1), and determining what market conditions are likely to be associated with above/below average liquidity premiums. However, the point estimates are volatile and different studies produce different results depending on the time period considered and the underlying modelling assumptions.
- In contrast, model-free estimates of the real liquidity premium are much less volatile, simple to calculate and can be used to remove the liquidity premium from observable real yields, as we show in Appendix B[5].

[3] Christensen & Gillian, June 2012, *Could the U.S. Treasury Benefit from Issuing More TIPS?*, p. 7

[4] In previous submissions QTC has used a narrower definition of liquidity that only focuses on bid/offer spreads and market impact. In this submission we have adopted the broader definition of liquidity used in academic studies cited by the AER.

[5] Christensen & Gillian, June 2012, p. 13–15, and Andreasen, Christensen & Riddell, March 2018, *The TIPS Liquidity Premium*, p. 27–29.

4 Inflation and the allowed return on equity

The AER considers market estimates of inflation to be biased by an inflation risk premium in nominal CGS yields and the fixed ZCIS rates, and a liquidity premium in real CGS yields.

The AER's current inflation approach allows an implied inflation risk premium to be reflected in its implied real CGS yield, so it is also a biased estimate. Furthermore, the AER excludes the implied inflation risk premium from the revenue deductions for inflation on the equity-funded portion of the RAB. As a consequence, the real return on equity allowance in the PTRM is biased, and the bias is currently large and negative.

By using a market estimate of inflation, the same amount of inflation compensation in the nominal allowed return on equity is included in the revenue deductions. Therefore, the net effect of the inflation risk premium is zero, which means the correct ex-ante real return on equity is reflected in the PTRM cash flows.

A market estimate of inflation avoids the need to make separate estimates of expected inflation and the inflation risk premium, which simplifies the AER's task and eliminates the need to consider complex and contentious alternatives such as a glide path.

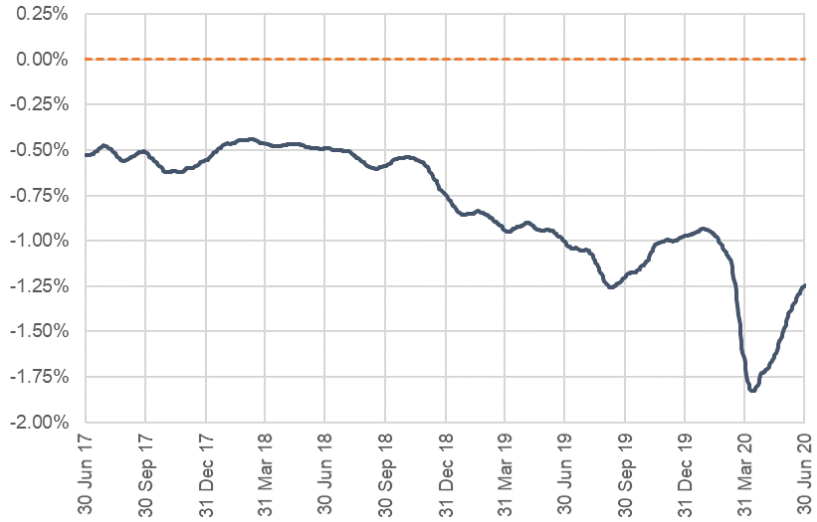
A simple and transparent approach, based on reasonable assumptions and used in the academic literature, can be used to estimate an upper bound for the real CGS liquidity premium. This estimate can be deducted from the observable real CGS yield to produce an unbiased real CGS yield. Taking a conservative approach and making the *maximum* deduction for liquidity is equivalent to using the 10-year ZCIS rate to make the revenue deductions for inflation in the PTRM on the equity-funded portion of the RAB.

- QTC considers the objective of making revenue deductions for inflation on the equity-funded portion of the RAB is to ensure that:
  - the equity providers are not compensated for inflation twice, and
  - the correct ex-ante real return on equity is reflected in the PTRM cash flows.
- In our view, since 2017 the AER's current inflation approach has produced real return on equity allowances that are biased downwards.

4.1 Significant downward bias in AER implied real CGS yields

- The best estimate of inflation is one that, when deducted from the observable 10-year nominal CGS yield, produces an unbiased 10-year real CGS yield. An unbiased real CGS yield is not affected by liquidity, expected inflation or the inflation risk premium.
  - The observable real CGS yield does not include compensation for expected inflation or the inflation risk premium, however it is biased upwards by a liquidity premium that varies over time.
  - The AER's implied real yield equals the observable 10-year nominal CGS yield minus AER 10-year expected inflation. The implied real CGS yield is not affected by a liquidity premium, but it does contain an 'implied' inflation risk premium, which means the AER's estimate is also biased.
    - > This is only a problem if the revenue deductions for inflation on the equity-funded portion of the RAB exclude the implied inflation risk premium. If the inflation risk premium is included in the revenue deductions the net effect on the real return on equity allowance in the PTRM is zero.
  - Therefore, delivering the correct real return on equity allowance requires an estimate of the combined value of expected inflation and the inflation risk premium, which is what market estimates of inflation measure. Individual estimates for expected inflation and the inflation risk premium are not necessary.
- Figure 2 shows the difference between the AER's implied real CGS yield and the observable real CGS yield. The sample period extends back to the last inflation review in 2017:

FIGURE 2: AER IMPLIED REAL YIELD MINUS OBSERVABLE REAL CGS YIELD



Source: Bloomberg, Yieldbroker. QTC calculations. 20-day averages.

- The increasing divergence between the AER implied and observed real CGS yields was raised as an issue in the revised revenue proposals from SA Power Networks (SAPN) and Energy Queensland Limited (EQL) in December 2019. The AER responded by stating that:

> *'We find a difference between the implied real return using nominal CGS and our estimate of forecast inflation and the real return on indexed CGS does not demonstrate an issue.* ***The difference is likely to be driven by a risk premium reflected in the YTM [yield to maturity] on indexed CGS*** *(due to differences in secondary market liquidity, etc.). As found in our 2017 inflation review, the risk premiums in indexed CGS can be substantial and time varying.'*

- The AER's current estimate of expected inflation is 2.27 per cent. Based on a 10-year nominal CGS yield of 0.92 per cent the AER's implied 10-year real CGS yield is -1.35 per cent[6]. This is 1.25 per cent lower than the -0.10 per cent observable 10-year real CGS yield. As such, the AER's implied position is that the real CGS liquidity premium is currently 1.25 per cent.
- Appendix B sets out a model-free approach for estimating a lower and upper bound for the real CGS liquidity premium. The approach is based on one of the academic papers cited by the AER in the 2017 inflation review and has been used as a proxy for liquidity in several other papers. The approach is simple, transparent and based on reasonable assumptions[7].
- QTC has used this approach to estimate unbiased (ie, liquidity-adjusted) real CGS yields and compared these to the AER's implied real CGS yields since the last inflation review in 2017.

4.1.1 Estimating the real CGS liquidity premium

- As shown in Appendix B, the maximum range for the real CGS liquidity premium is based on the following assumptions:
  - there is no liquidity premium in the observable nominal CGS yield
  - real CGS are no more liquid than nominal CGS, and
  - ZCIS are no more liquid than nominal CGS.
- If these assumptions hold Appendix B shows that the maximum range has:
  - a lower bound equal to **zero**, and
  - an upper bound equal to the difference between the ZCIS rate and the BBIR (**ie, ZCIS – BBIR).**

[6] Average values for the 20 days to 30 June 2020.

[7] QTC notes the concerns raised by Lally when making corrections for liquidity premiums in real CGS yields and ZCIS rates. These concerns have been addressed in Appendix B.

- The maximum range can be used to estimate the lower and upper bounds for other inflation-related parameters as shown in Table 1:

TABLE 1: LOWER AND UPPER BOUNDS FOR OTHER VARIABLES

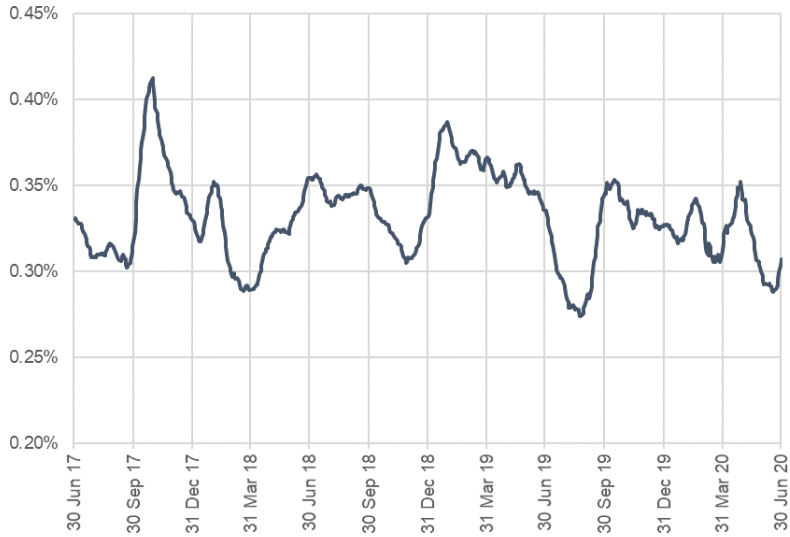
Parameter	Lower bound	Upper bound
Real CGS liquidity premium	Zero	**ZCIS – BBIR**
Unbiased real CGS yield	**Observable real CGS yield minus (ZCIS – BBIR)**	Observable real CGS yield
Unbiased BBIR	BBIR	**ZCIS**

- As explained in Appendix B there are sound reasons for why the unbiased real CGS yield is likely to be higher than the lower bound. However, to demonstrate the issues with the AER's current approach QTC has taken a conservative approach in this submission by assuming the *maximum* deduction for liquidity from the observable real CGS yield. Therefore:
  - the real CGS liquidity premium equals ZCIS – BBIR
  - the unbiased real CGS yield equals the observable real CGS yield – (ZCIS – BBIR), and
  - the unbiased BBIR equals the 10-year ZCIS rate.
- The unbiased BBIR is the estimate of inflation that should be used to make the revenue deductions for inflation on the equity-funded portion of the RAB.

4.1.2 Outcomes since the 2017 inflation review

- Figure 3 shows the upper bound for the real CGS liquidity premium:

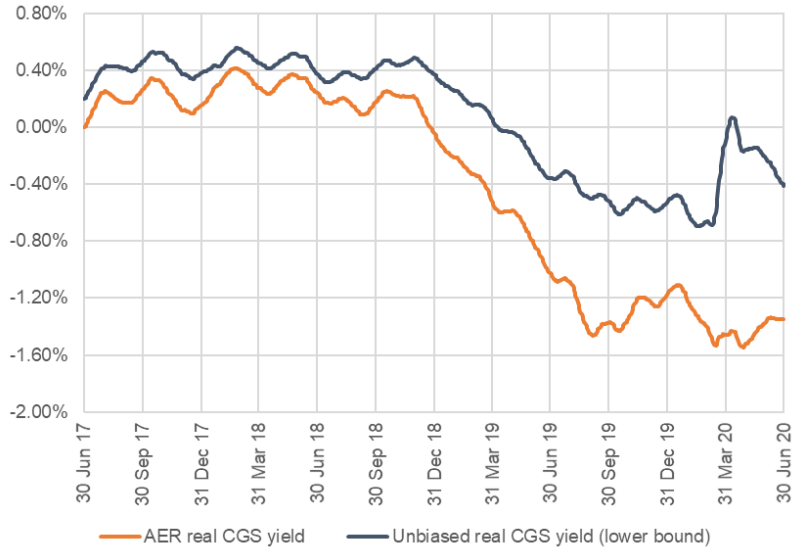
FIGURE 3: UPPER BOUND FOR THE REAL CGS LIQUIDITY PREMIUM



Source: Bloomberg, Yieldbroker. QTC calculations. 20-day averages.

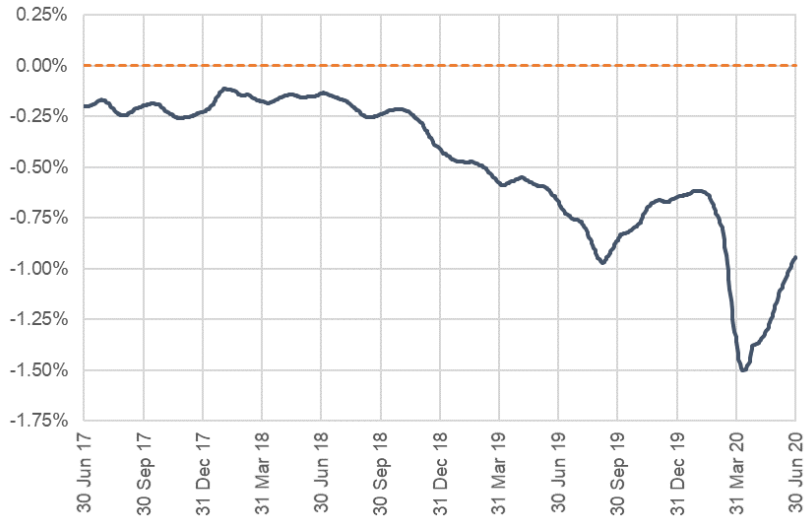
- The average liquidity premium for the 20 days to June 2020 is 0.31 per cent. The average liquidity premium since the last inflation review is 0.35 per cent, which is higher than the 0.26 per cent average liquidity premium based on U.S. BBIR and ZCIS rates over the same period.
- Figure 4 shows the AER implied real CGS yield and the lower bound for the unbiased real CGS yield. Figure 5 shows the difference between the two real yield estimates.

FIGURE 4: AER IMPLIED AND UNBIASED REAL CGS YIELDS



Source: Bloomberg, Yieldbroker. QTC calculations. 20-day averages.

FIGURE 5: AER IMPLIED REAL CGS YIELD MINUS UNBIASED REAL CGS YIELD



Source: Bloomberg, Yieldbroker. QTC calculations. 20-day averages.

- The main observations from Figures 4 and 5 are as follows:
  - Since the last inflation review the AER's real CGS yield has always been *below* the lower bound for the unbiased real CGS yield.
  - The average difference between June 2017–June 2020 is -0.50 per cent.
  - The difference has become increasingly more negative since December 2018.
  - Before COVID-19 started impacting the debt markets in February 2020 the AER's real yield was already 0.60 per cent below the lower bound.
  - The economic effects of COVID-19 had a significant impact in February and March 2020, however a large part of this has been reversed.
  - As at 30 June 2020 the AER's implied real yield was 0.94 per cent below the lower bound for the unbiased real CGS yield.
- Even after making the maximum deduction for liquidity from the observable real CGS yields, the AER's implied real CGS yields have been materially lower than the unbiased real CGS yields.

4.1.3 The need for internal consistency

- The AER's implied real CGS yield is currently 1.25 per cent lower than the observable real CGS yield, and the AER attributes this to the real CGS liquidity premium. However, the upper bound for the liquidity premium is only 0.31 per cent. This leaves a residual of 0.94 per cent, which is the negative implied inflation risk premium in the AER's implied real CGS yield.
- By definition, an unbiased real CGS yield does not contain an inflation risk premium, so the AER's real CGS yield is currently biased downwards by 0.94 per cent. To ensure the real return on equity allowance in the PTRM is completely free from inflation, the revenue deductions on the equity-funded portion of the RAB should be made using 1.33 per cent (ie, 2.27 per cent minus 0.94 percent). This is the current 10-year ZCIS rate.
- The same conclusion was reached in QTC's note to the AER Inflation Working Group in December 2019[8]. Although the example provided used the 10-year BBIR rather than the 10-year ZCIS rate, the reason for including the implied inflation risk premium in the revenue deductions remains the same.

4.2 Negative NPAT in the PTRM

The problems identified in Section 4.1 are producing significantly negative net profit after tax (NPAT) outcomes in the PTRM.

Incentive-based regulation does not guarantee equity returns or dividends. If a service provider spends inefficiently, adopts an overly aggressive capital structure or speculates unsuccessfully in the interest rate markets, the equity providers may incur losses. However, this is very different to having negative NPAT as the *expected outcome* in the PTRM because the benchmark service provider is assumed to spend efficiently, maintain benchmark gearing, and align its debt strategy with the trailing average return on debt approach.

Negative NPAT in the PTRM is a clear indication that the revenue deductions for inflation on the equity-funded portion of the RAB are excessive relative to the amount of inflation compensation in the nominal allowed return on equity. This is mostly due to the AER including a negative inflation risk premium in the nominal allowed return on equity but excluding the same negative premium from the revenue deductions in the PTRM.

- The allowed return on equity in the PTRM is delivered through dividends (ie, NPAT) and asset growth (ie, indexation of the RAB). Based on benchmark equity funding of 40 per cent this can be expressed as follows:
  - Nominal allowed return on equity = NPAT ÷ (opening RAB × 0.4) + (AER expected inflation ÷ 0.4)
- Based on AER expected inflation of 2.27 per cent and a nominal allowed return on equity of 4.58 per cent:
  - the return contribution from NPAT is -1.10 per cent, and
  - the return contribution from the assumed indexation of the RAB is 5.68 per cent.
- Most of the -1.10 per cent NPAT can be attributed to the -0.94 per cent inflation risk premium identified in Section 4.1. This demonstrates that the revenue deductions for inflation on the equity-funded portion of the RAB are excessive relative to the amount of inflation compensation in the nominal allowed return on equity.
- This issue was raised by SAPN and EQL in their revised regulatory proposals, to which the AER responded:

> *'We consider that the cash flow analysis presented does not consider all relevant cash flows and financing effects, and so reaches incorrect conclusions …. The calculations do not include the full return of capital building block (cash flow to equity investors) and the issuance of debt to maintain the benchmark gearing (also freeing up cash flow for equity investors).'*

- The AER's response implies that because the net cash flows to equity are positive, there may not be a problem with negative NPAT in the PTRM. This means the benchmark service provider is faced with the following choices:
  - use part of the return of its initial equity investment to cover the losses (ie, it should not be kept whole for its previous equity investments in network infrastructure)
  - reduce operating and/or capital expenditure to levels below those deemed to be efficient by the AER, which may have an adverse impact on the quality, safety and reliability and security of supply of electricity, or

[8] QTC, December 2019, *Issues raised by QTC at the AER Inflation Working Group meeting*, p. 2

- use some of the proceeds raised by borrowing against the RAB indexation to cover the losses (ie, borrow to cover the losses).

- QTC does not consider any of these options to be acceptable, and this is consistent with the following conclusion from Sapere in its advice to the AER:[9]

> *'… we note that* ***the sustained fall in inflation expectations*** *mean that the parameter estimates determined recently by the AER imply a negative cashflow return on equity for a benchmark efficient entity.* ***An assumption that the benchmark efficient entity would fund dividends (and growth) from depreciation cashflows—that is, spending less on replacement of real capital—would not be consistent with the efficient investment and efficient operation of an NSP****…'*

- QTC considers the negative NPAT outcomes in the PTRM to be strong evidence of a problem with the AER's current approach for calculating and applying inflation in the PTRM.

[9] Sapere, 30 June 2020, *Target return and inflation – Input to the AER Inflation Review 2020*, para 10.

5 Inflation and the allowed cost of debt

The efficiently incurred cost of debt for the benchmark service provider under the trailing average approach is a nominal cost. Targeting a real cost of debt interferes with the service provider's ability to meet its contractual obligations to its lenders because it creates a mismatch between the efficiently incurred nominal cost of debt and the compensation for the cost of debt in the PTRM and RFM. These mismatches must be funded as they occur – there is no option to rely on a possible averaging out of outcomes over time.

In QTC's view, the PTRM and RFM should jointly deliver enough compensation for the benchmark service provider to meet its efficiently incurred nominal debt costs in each regulatory year. This can be achieved by using the same estimate of expected inflation to make revenue deductions on the debt-funded portion of the RAB in the PTRM and to index the debt-funded portion of the RAB in the RFM at the end of the regulatory control period.

5.1 The trailing average approach

- The allowed cost of debt under the trailing average approach assumes the benchmark service provider maintains a portfolio of nominal fixed rate debt with remaining terms to maturity of 1–10 years. Each year 10 per cent of the debt matures and is refinanced with 10-year debt at the prevailing 10-year nominal BBB+ corporate yield. Over time the cost of debt produced by the benchmark portfolio equals a trailing average of 10-year BBB+ nominal corporate yields over the previous 10 years.
- The cost of debt changes each year when 10 per cent of the debt is refinanced at the prevailing yields. The decision to annually update the allowed cost of debt was made to ensure that the correct nominal compensation was provided in each regulatory year, not on average across multiple 5-year regulatory control periods.

5.2 Reasons for moving to the trailing average approach

- Prior to 2013 the AER used an 'on-the-day' approach to calculate the allowed cost of debt. The AER's decision to move to a trailing average approach was based on the observation that Australian corporates, especially those operating in capital intensive industries with above-average gearing, maintain portfolios of nominal debt with staggered maturities out to at least 10 years to keep refinancing risk at an acceptably low level.
- The trailing average approach also addressed consumer concerns about volatility in the allowed cost of debt and the random wealth transfers (ie, windfall gains and losses) that regularly occurred between consumers and service providers under the on-the-day approach.
- In the 2013 Final Rate of Return Guideline the AER concluded that[10]:

> *'The trailing average portfolio approach estimates the return on debt as 'the average* ***return that would have been required by debt investors in a benchmark efficient entity*** *if it raised debt over an historical period prior to the commencement of a regulatory year in the regulatory control period'. This reflects the forward–looking* ***return on debt that would be incurred by the benchmark efficient entity*** *for debt raised incrementally.'*

- The average return that 'would have been required by debt investors' is a nominal return, not a real return. The size of the inflation-linked corporate bond market in Australia is very small, with total outstandings of about $4.2 billion. This is significantly smaller than the total outstanding network service provider debt, so there can be no suggestion that the average return on debt referred to by the AER is a real return.
- Some debt investors might use inflation swaps to convert their nominal interest rates into real interest rates, however this does not affect the return on debt that 'would be incurred' by the benchmark service provider.
- In its Final Decision for the 2017 inflation review the AER stated[11]:

> *'When inflation causes the real return to equity holders to drop below the initial target, the real return to debt holders rises above the initial target—****this is a consequence of the decision to issue nominal debt****.'*

[10] AER, December 2013, *Rate of Return Guideline Explanatory Statement*, p. 107.

[11] AER, December 2017, *Regulatory treatment of inflation – Final position*, p. 88–89.

- A decision to issue nominal debt implies there was a viable alternative option of issuing inflation-linked debt, however as explained above this was not (and is still not) feasible due to the size of the corporate inflation-linked bond market. Regardless, there was never a suggestion when the trailing average approach was being considered in 2013 that it was efficient practice for a benchmark service provider to maintain a portfolio of inflation-linked debt with annual maturities from 1–10 years.

5.3 Debt is a legally binding contract

- In QTC's 2013 submission to the Rate of Return Guideline Consultation Paper we stated that[12]:

> *'The contractual nature of interest payments means that a service provider has no ability to change the size or timing of the payments, so any shortfalls relative to the return on debt allowance must be funded as they occur. For this reason,* ***QTC considers that the time series properties of efficient debt financing costs are just as important as the long-term average cost****.*
>
> *If the debt financing costs for an efficiently financed benchmark service provider change each year, the same annual change should also be reflected in the benchmark return on debt allowance.'*

- This comment was made in the context of whether the trailing average cost of debt should be updated annually, however the same reasoning applies to the current debate on what (if any) impact should the AER's estimate of 10-year expected inflation have on the allowed cost of debt:
  - Targeting a real cost of debt interferes with the service provider's ability to meet its contractual obligations to its lenders because it creates a mismatch between the efficiently incurred nominal cost of debt and the compensation for the cost of debt in the PTRM and RFM. These obligations require the benchmark service provider to pay a fixed nominal rate of interest for a 10-year term with payments to be made in full on pre-agreed dates.
  - Implicit in the 10-year nominal BBB+ interest rate is compensation for inflation, and this compensation is locked in when the fixed rate is set. This means the benchmark service provider is entering into a legally binding contract to pay a fixed amount of inflation compensation (in addition to a real yield, debt risk premium etc.) for the 10-year term of the loan.
  - If the trailing average cost of debt is an efficient cost of debt, then each component of the trailing average cost, including inflation compensation, is also an efficient cost. This is what the PTRM and RFM should provide sufficient compensation for in each regulatory year.
- There is no reason to deduct the AER's prevailing estimate of 10-year expected inflation (or any other estimate) from a series of contractual debt cash flows in the PTRM, which reflect efficiently incurred historical inflation compensation, and then add back 5-year actual inflation at the end of the regulatory control period in the RFM. Any difference between actual and expected inflation creates a mismatch between the cost of debt allowance and the efficiently incurred cost of debt for the benchmark service provider. However, one of the reasons for moving to the trailing average approach was that it[13]:

> *'… recognises 'the desirability of* ***minimising any difference between the return on debt and the return on debt of a benchmark efficient entity****…'*

- Creating a potential mismatch between the allowed cost of debt and the efficiently incurred cost of debt is also inconsistent with the AER's reason for annually updating the trailing average cost of debt rather than fixing it for the 5-year term of the regulatory control period[14]:

> *'… annual updating* ***minimises the potential mismatches between the benchmark efficient entity's return on debt and allowed return on debt during the regulatory control period****.'*

[12] QTC, June 2013, *Rate of Return Guidelines Consultation Paper*, p. 5

[13] AER, December 2013, *Rate of Return Guideline Explanatory Statement*, p. 109.

[14] AER, December 2013, *Rate of Return Guideline Explanatory Statement*, p. 112.

- Lenders do not provide borrowers with the flexibility to make debt service payments 'on average' over the term of the loan. Debt service payments are expected to be made on time and in full, and while some additional time might be afforded to the borrower, this will be measured in days or months, not years. This is why QTC emphasised the importance of the time series properties of the allowed cost of debt, which means providing the correct compensation for the nominal cost of debt in each regulatory year.
- This is just as relevant to the annual mismatches created by targeting a real cost of debt as it was to the volatility that would have occurred by not annually updating the trailing average cost of debt.
- In QTC's view, the contractual nature of debt and the AER's original assessment of the benefits of an annually updated trailing average cost of debt approach require targeting a nominal allowed cost of debt.

5.4 Targeting a nominal allowed cost of debt

- Sapere outlines an approach that includes the allowed cost of debt as a cash flow in the annual revenue requirement[15]. This is equivalent to making no revenue deductions for inflation in the PTRM and applying no indexation to the debt-funded portion of the RAB in the RFM.
- An alternative approach is to:
  - use an estimate of expected inflation to make revenue deductions in the PTRM on the debt-funded portion of the RAB, and
  - use the same estimate of expected inflation to index the debt-funded portion of the RAB in the RFM.
- This results in the real cost of debt allowance in the PTRM revenues and the proceeds from the new borrowings against the indexed RAB matching the nominal allowed cost of debt in each regulatory year.
- Targeting a nominal allowed cost of debt does not change the incentive for service providers to outperform the cost of debt allowance, nor does it protect the equity providers from inefficient or speculative debt management practices. Any difference between the nominal cost of debt allowance and a service provider's actual cost of debt is borne by equity, not consumers.

5.5 Targeting a real allowed cost of debt

- QTC does not support targeting a real cost of debt. However, if this objective is retained the approach should be designed to minimise the potential mismatches between the allowed cost of debt and the efficiently incurred nominal cost of debt during each 5-year regulatory control period.
- As explained in Section 5.4 part of the benchmark service provider's debt costs are paid with the proceeds from borrowing against the indexation of the debt-funded portion of the RAB. These additional borrowings are based on actual inflation during the 5-year regulatory control period.
- As such, a 5-year estimate of expected inflation should be used in the PTRM because it reflects the amount of inflation that is expected to be added to the RAB in the RFM. If the estimate is unbiased the expected internal rate of return (IRR) on the debt cash flows in the PTRM and RFM for each 5-year regulatory control period will equal the nominal allowed cost of debt.
- Because the term structure of expected inflation is usually upward sloping, using 10-year expected inflation will bias the debt IRR downwards and will prevent the benchmark service provider from recovering its efficiently incurred nominal cost of debt (on average).

5.6 Past compensation for inflation risk

- The Discussion Paper suggests inflation mismatch risk may have been compensated by the allowed return on equity[16]:

> *'… the equity beta, which is part of the return on equity, should reflect the systemic risk incurred by equity investors in Australian regulated energy utility firms. We estimate the beta using market data on the variability of returns for listed regulated energy networks in Australia.*
>
> ***If inflation risks due to regulation meant that the NSPs faced higher systemic risks, then the calculated equity betas in the Capital Asset Pricing Model (CAPM), would likely reflect this**. Given that our current approach to estimating expected inflation has been applied consistently for a number of years, the NSPs*

[15] Sapere, June 2020, para 126–131

[16] AER, May 2020, *Discussion paper – Regulatory treatment of inflation*, p. 29

would therefore be compensated for their current levels of inflation risks through the beta and the allowed rate of return.'

- In QTC's view, the cash flow mismatches created by targeting a real cost of debt are noise rather than systematic risk. Therefore, there is no reason to believe the historical beta has provided compensation for inflation mismatch risks due to regulation. Similarly, removing a source of non-systematic noise by targeting a nominal cost of debt should have no impact on the equity beta in the future.

6 Questions from the Discussion Paper

Should we continue to use our current approach to estimating expected inflation?

- In QTC's view, the AER should not continue with its current inflation approach:
  - The current approach was a response to a supply-related problem in the real CGS market that has not existed for at least 5 years.
  - The current approach is producing excessive revenue deductions for inflation on the RAB relative to the amount of inflation compensation in the nominal allowed return on equity. This is evident in the large negative NPAT outcomes that are currently occurring in the PTRM.
  - For the equity-funded portion of the RAB, using a market estimate of inflation will ensure that any inflation risk premium in the nominal allowed return on equity has no net effect on the real return on equity allowance in the PTRM.
  - This will simplify the AER's task and eliminates the need to consider complex and contentious alternatives such as a glide path.

Does our current approach deliver the target ex-ante expected real rate of return?

- The current approach produces a target ex-ante expected real rate of return that is materially biased downwards. The mathematical integrity of the PTRM and RFM will ensure the biased real rate of return is delivered.

Should we use an alternative approach to estimating expected inflation? If so, set out the alternative approach and its advantages over our current approach?

- As explained in Sections 4 and 5 QTC believes the AER should:
  - use the 10-year ZCIS rate to make the revenue deductions for inflation in the PTRM on the equity-funded portion of the RAB, and
  - use an estimate of expected inflation to make the revenue deductions in the PTRM on the debt-funded portion of the RAB, and use the same estimate of expected inflation to index the debt-funded portion of the RAB in the RFM.

Should we consider a glide path approach?

- In QTC's view, there is no need to consider a glide path approach because a market estimate of inflation should be used.
- As shown in Appendix A, even if an estimate of 10-year expected inflation was required, any glide path that assumes an anchor of 2.50 per cent over a 10-year period will produce unrealistically high estimates of 10-year expected inflation.

Should we switch to a nominal or hybrid approach to setting NSP revenues?

- For the reasons set out in Sections 4 and 5 QTC believes the AER should target a real return on equity and a nominal cost of debt.

How should this mechanism be implemented?

- For the equity-funded portion of the RAB use:
  - the 10-year ZCIS rate to make the revenue deductions for inflation in the PTRM, and
  - actual inflation in the RFM at the end of the regulatory control period.
- For the debt-funded portion of the RAB use:
  - an estimate of expected inflation to make the revenue deductions for inflation in the PTRM, and
  - the same estimate of expected inflation in the RFM at the end of the regulatory control period.

Why is it superior to our current approach?

- QTC's reasons are set out in Sections 4 and 5.

What is the best approach to incorporate inflation expectations into the trailing average return on debt? Explain why you consider your approach is the best approach.

- As explained in Section 5 there is no reason to incorporate an estimate of expected inflation into the trailing average cost of debt in the PTRM unless the same estimate is used in the RFM.
- By targeting a nominal cost of debt, the PTRM and RFM will jointly deliver enough cash compensation for the benchmark service provider to meet its efficiently incurred nominal debt costs in each regulatory year. This is consistent with original reason for adopting the trailing average cost of debt approach, and for making annual updates to the allowed cost of debt. Specifically, the trailing average approach[17]:

> *'… recognises 'the desirability of minimising any difference between the return on debt and the return on debt of a benchmark efficient entity…'*

and annual updating[18]:

> *'… minimises the potential mismatches between the benchmark efficient entity's return on debt and allowed return on debt during the regulatory control period.'*

- In contrast, the AER's current approach creates a mismatch between the efficiently incurred nominal cost of debt and the allowed cost of debt. These mismatches result in random wealth transfers (ie, windfall gains and losses) between consumers and service providers, which is inconsistent with the reason for adopting the trailing average approach.

6.1 Questions for the AER

- QTC would appreciate answers to the following questions from the AER and/or its consultants.

Question 1

- The current 10-year ZCIS rate is 1.33 per cent. Is this rate considered to be a biased estimate of the *combined value* of 10-year expected inflation and the 10-year inflation risk premium? If so, is the bias likely to be positive or negative?

Question 2

- Does the AER agree that using a market estimate of inflation to make revenue deductions for inflation on the equity-funded portion of the RAB will result in the inflation risk premium having a zero-net effect on the real return on equity allowance in the PTRM?

Question 3

- Does the AER agree that the large negative NPAT outcomes that are currently occurring in the PTRM are mostly due to a large implied negative inflation risk premium that is included in the nominal allowed return on equity, but excluded from the revenue deductions for inflation on the equity-funded portion of the RAB?

[17] AER, December 2013, *Rate of Return Guideline Explanatory Statement*, p. 109.

[18] AER, December 2013, *Rate of Return Guideline Explanatory Statement*, p. 112.

Appendix A: De-anchoring of long-term inflation expectations

With the official cash rate at the RBA's stated lower bound of 0.25 per cent the RBA is constrained in its ability to use monetary policy to manage or respond to further downside inflation risks or shocks. Although the RBA has been successful in using monetary policy to bring inflation down from a relatively high starting point in the mid-1990s, there is limited scope for further reductions in the cash rate to get inflation back into the target band. The RBA's public calls for fiscal policy to be used to stimulate economic activity is a further sign that monetary policy may have become less effective.

The spot and implied-forward inflation swap rates have fallen significantly since 2017 and are below the bottom of the RBA target band. This suggests the market's confidence in the RBA's ability to get inflation back within the target band has greatly diminished, and that 2.50 per cent is no longer an anchor for long-term inflation expectations.

The fall in the inflation swap curve may be partly due to a fall in the inflation risk premium. However, the implied inflation risk premiums required to reconcile a 2.50 per cent anchor with the implied-forward inflation swap rates are implausibly large and negative. This applies to the AER's current approach where average inflation in years 3–10 is 2.50 per cent and the Consensus Economics 6–10 year ahead inflation forecasts, which have been effectively unchanged at approximately 2.50 per cent for the last 20 years.

QTC continues to support the use of market estimates of inflation, so we do not consider it necessary for the AER to continue with the current approach for estimating expected inflation. However, the analysis in this section indicates that even if an estimate of 10-year expected inflation was required, a glide path that uses 2.50 per cent as an anchor will produce unrealistically high estimates, regardless of what type of path is followed.

A.1: Core assumption behind the AER's approach

- As explained by the AER, its current approach for estimating 10-year expected inflation is based on a single core assumption[19]:

> *'For the AER's method to produce relatively congruent estimates of expected inflation, expectations must be anchored within the RBA inflation target band.* ***For such anchoring to occur the RBA's monetary policy must be, and is perceived to be, effective in managing economic activity and outturn inflation.****''*

- If this assumption does not hold the AER acknowledges that other methods, which presumably includes market-based estimates of inflation, may produce better estimates[20]:

> *'The main disadvantage of the AER's current method is that it is not a market-based method that reflects daily mark-to market expectations of inflation over a 10 year horizon.* ***Therefore, the AER estimates may become less congruent with market expectations of inflation, vis-à-vis other methods, if monetary policy and inflation targeting are perceived to have lost their former effectiveness.****'*

A.2: The effectiveness of monetary policy

- The difficulty of inflation reaching central bank targets is not unique to Australia, it is a global issue. For example, in the U.S. (Euro area) inflation has been below the Federal Reserve's (European Central Bank's) target 90 per cent (50 per cent) of the time since the target was introduced in January 2012 (May 2003).
- While economic outcomes may have been worse without aggressive monetary policy actions, the consistency with which inflation has failed to reach central bank targets has led to questions about monetary policy effectiveness and prompted the U.S. Federal Reserve and the European Central Bank to launch monetary policy strategy reviews.
- While a similar review may be a few years away in Australia[21], it is already clear that inflation outcomes have become less consistent with the RBA's target over time. In a world that has changed profoundly in the last two decades, monetary policy may not be as effective as it once was. RBA Governor Philip Lowe acknowledged this when he noted that:[22]

[19] ACCC/AER Working Paper No. 11, para 202.

[20] ACCC/AER Working Paper No. 11, para 205.

[21] Australian Financial Review, 22 June 2020, *RBA's Lowe opens door to inflation target review*.

[22] Australian Financial Review, 24 September 2019, *RBA's Lowe say monetary policy less effective*.

'… monetary policy has become less effective at the margin.'

- The RBA has acknowledged that it may now be more difficult to consistently deliver average inflation equal to the mid-point of its target band. In doing so, it has stressed that its target is for inflation 'within' the target band, rather than mid-point of the band. In testimony to the House of Representatives Standing Committee on Economics in February 2020, Governor Lowe indicated a desire for inflation to be 'two point something' over time and for people's expectations to be consistent with this. Indeed, 'two point something' was referenced eight times in this context in his testimony.
- To further illustrate the challenges of achieving the mid-point of the target band, Dr Lowe – in that same testimony – outlined what cash rate cuts would be required to generate 2.50 per cent inflation by the end of 2021, roughly a two-year horizon:

*'… **to get inflation up to 2½ per cent, say, in two year's time, we would have to have interest rates—wait for it!—three or four percentage points lower than where we are now**, because the relationships between interest rates, output and inflation are quite weak at the moment. So, 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.'*

A.2.1: Fiscal policy

- With monetary policy less effective there have been calls for other policy instruments to do more. For example, RBA Governor Lowe noted in May 2020 that[23]:

*'I agree with [Treasury Secretary] Steven Kennedy that, going forward, fiscal policy will have to play a more significant role in managing the economic cycle than it has in the past. **For the last 20 years monetary policy has been the mainstream instrument…In the next little while there's not going to be very much scope at all to use monetary policy in that way.** So I think fiscal policy will have to be used, and that's going to require a change in mindset.'*

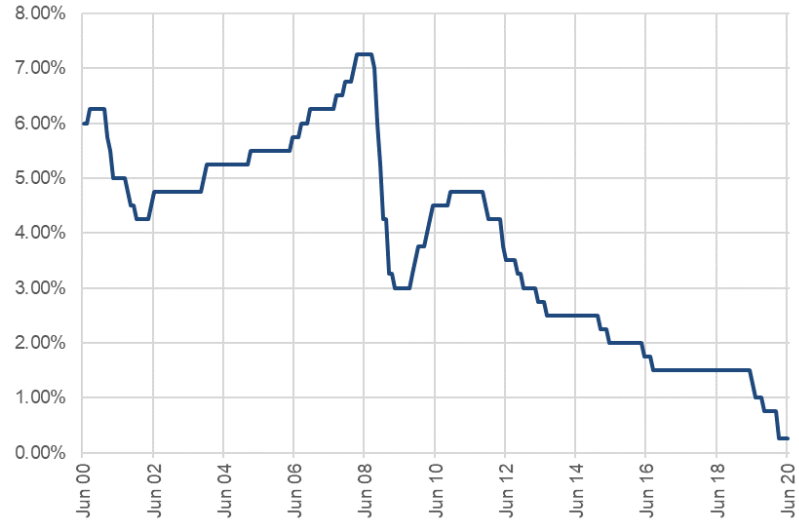
- Fiscal policy being called upon to be the primary tool to support the economy does not bode well for achieving the inflation target over time. This is because fiscal policy is not set with hitting a particular inflation outcome as an objective and is focussed on broader economic and social outcomes. Further, the implementation lags associated with the parliamentary budget cycle have meant that fiscal policy has generally not been considered the ideal tool for managing demand over the course of the cycle.
- If fiscal policy is not well suited as the primary tool of stabilisation policy, monetary policy has less scope to achieve its objectives with the cash rate already at its lower bound, it should be acknowledged that expectations of a 'reversion' to the middle of the RBA's target band, or even the bottom half of the band, may not be realistic.

A.3: Monetary policy and realised inflation

- Figure 6 shows the trajectory of the official cash rate over the last 20 years.

[23] Official Committee Hansard, 28 May 2020, Senate Select Committee on COVID-19, Australian Government's response to the COVID-19 pandemic.

FIGURE 6: RBA OFFICIAL CASH RATE



Source: RBA

- The average annual change in the CPI over the last 10 years is 1.8 per cent, which is below the bottom of the RBA's 2.0–3.0 per cent target band. This is the lowest 10-year average outcome on record, which is remarkable considering the unprecedented amount of monetary stimulus provided by the RBA (Figure 6). With the cash rate already at the RBA's stated lower bound, the RBA is constrained in its ability to use monetary policy to respond to further downside inflation risks.
- In May 2019 the RBA acknowledged that low actual inflation outcomes may be affecting inflation expectations[24]:

> *'In more recent years, a period where realised inflation outcomes have been below central bank targets in several major economies, despite unprecedented monetary stimulus, may also have contributed to a reduction in inflation expectations.'*

- This problem is likely to intensify with actual inflation having fallen further, and the cash rate now at its effective lower bound of 0.25 per cent. As explained by the International Monetary Fund (IMF) [25]:

> *'An analysis of the response of inflation expectations to positive and negative inflation shocks also points to constrained monetary policy as the underlying cause of a possible unanchoring of expectations. 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.**'*

- Although inflation has averaged about 2.5 per cent since 1994, this outcome was achieved when the RBA still had monetary levers to pull. As such, it is a conditional outcome that is unlikely to be repeated in the future in terms of getting inflation back above the bottom of the target band.
- Similarly, any statistical evidence of mean reversion in quarterly or annual rates of inflation that may be present in the historical data should also be viewed as a conditional outcome that is less likely to be repeated in the future while the official cash rate is at or close to its effective lower bound.
- The benign outlook for inflation has also been noted by market economists such as Deloitte Access Economics[26]:

> *'Australia and the world are 'printing money' hand over fist. But the very last thing you need to worry about is any lift in inflation. Demand is dead as a doornail, and wage gains – already weak – are set to*

[24] RBA, May 2019, Statement of Monetary Policy, *Why are long-term bond yields so low?,* Box B.

[25] IMF, October 2016, World Economic Outlook, pp. 139.

[26] Deloitte Access Economics, July 2020, *Business Outlook: Fast crisis, slow recovery*.

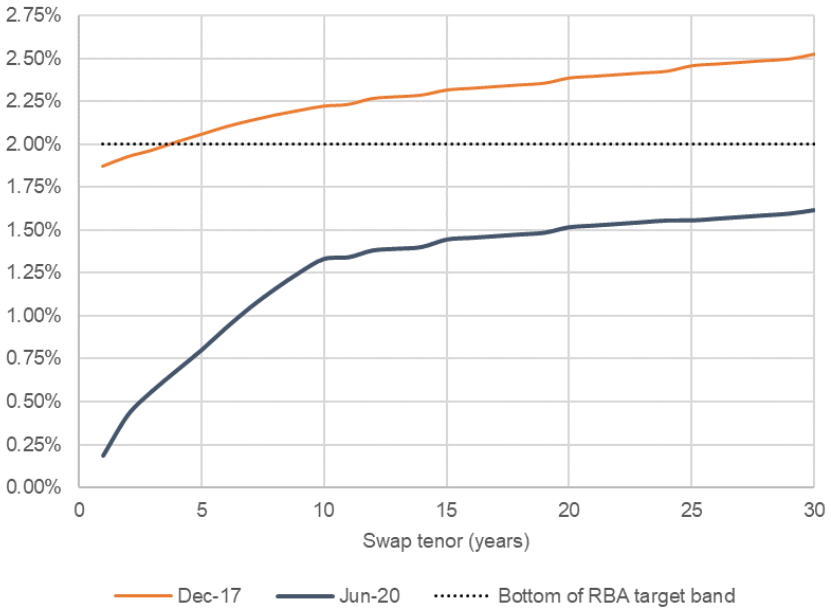
fade further. Globally and locally, interest rates will be nailed to the floor for years. That's because (1) this is a big recession, (2) inflation is as dead as a door nail…'

A.4: Market estimates of inflation

A.4.1: Inflation swap rates

- Since December 2017 the ZCIS curve has fallen and is significantly *below the bottom* of the RBA target band for all tenors from 1–30 years. The 10-year ZCIS rate, which is the relevant term for the AER's return on equity calculation, has fallen from 2.22 per cent to just 1.33 per cent (Figure 7):

FIGURE 7: ZCIS CURVE



Source: Bloomberg. 20-day averages.

A.4.2: Implied forward inflation swap rates

- Implied-forward inflation swap rates can be used to assess the market's confidence in the RBA's ability to return inflation within the 2.0–3.0 per cent target band[27]:

'… implied forward break-even inflation rates for distant horizons are often viewed as providing information about central bank credibility: if the central bank's commitment to maintaining price stability is fully credible, expected inflation in the distant future should remain at a level consistent with the central bank's inflation objective.'

- Table 2 shows the spot and implied-forward 10-year ZCIS rates for forward periods of 5–15 years:

TABLE 2: IMPLIED-FORWARD ZCIS RATES

Forward period	Last inflation review (Dec 2017) (%)	Current (Jun 2020) (%)	Current minus 2.5% (%)
0 years (spot)	2.22	**1.33**	**(1.17)**
5 years	2.45	**1.77**	**(0.73)**
10 years	2.55	**1.70**	**(0.80)**
15 years	2.67	**1.73**	**(0.67)**

Source: Bloomberg, QTC calculations

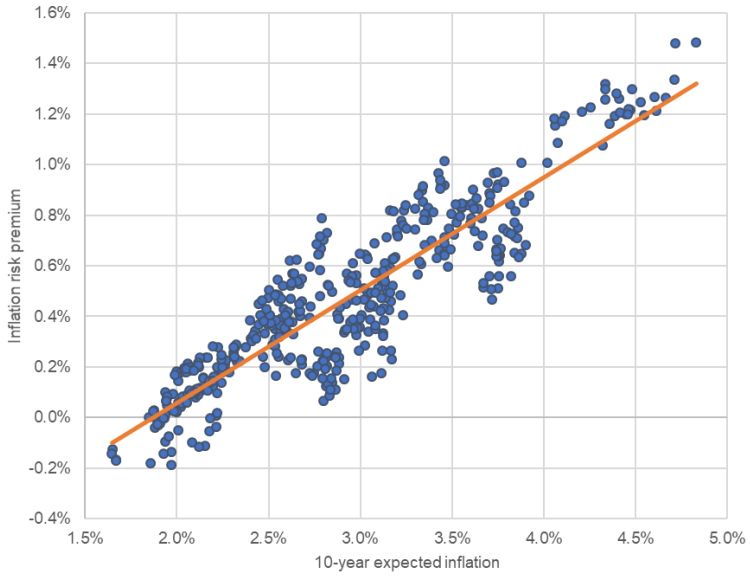
[27] BIS Quarterly Review, September 2008, *The inflation risk premium in the term structure of interest rates*, p. 23.

- Figure 7 and Table 2 indicate that the market does not believe the RBA's monetary policy will be effective in getting inflation back in the 2.0–3.0 per cent target band, let alone achieve an average rate of 2.50 per cent.

A.4.3: Inflation risk premium

- ZCIS rates equal the sum of expected inflation and the inflation risk premium. Therefore, the fall in the ZCIS curve could be due to a fall in expected inflation and/or a fall in the inflation risk premium.
- Although the inflation risk premium cannot be observed, an implied inflation risk premium can be determined by subtracting a given estimate of expected inflation from the observable ZCIS rate. The plausibility of the implied inflation risk premium can then be assessed.
- There are many expected inflation/inflation risk premium combinations that add up to the 10-year ZCIS rate, however only a few combinations are internally consistent and economically plausible. For example:
  - Based on the current 10-year ZCIS rate of 1.33 per cent and AER expected inflation of 2.27 per cent, the 10-year implied inflation risk premium is -0.94 per cent. A premium of this size would be consistent with investors paying a very high price premium to own nominal assets that perform well in a low inflation/deflationary scenario when other assets such as equities are expected to perform poorly.
  - It follows that investors would also assign a relatively high probability to low inflation/deflationary scenarios actually occurring, otherwise there would be no reason to pay a high price premium to buy nominal CGS. Therefore, the true probability-weighted average estimate of expected inflation would reflect the high weighting to these low inflation scenarios.
  - However, AER expected inflation of 2.27 per cent assumes average inflation in years 3–10 of 2.50 per cent, which is inconsistent with investors assigning a relatively high probability to low inflation/deflationary scenarios.
- It follows that a combination of 2.27 per cent expected inflation and a -0.94 per cent implied inflation risk premium is internally inconsistent.
- In general, a relatively low (high) inflation risk premium should be reflected in a relatively low (high) estimate of inflation. This is consistent with the strong positive relationship between model-based estimates of expected inflation and the inflation risk premium based on U.S. Treasury bond yields (Figure 8)[28]:

FIGURE 8: ESTIMATES OF U.S. 10-YEAR EXPECTED INFLATION AND INFLATION RISK PREMIUM (1983–2020)



Source: Kim et al, May 2019. Monthly data.

[28] Kim, Walsh & Wei, May 2019, *Tips from TIPS: Update and Discussions*, FEDS Notes. Washington: Board of Governors of the Federal Reserve System, May 21, 2019, https://doi.org/10.17016/2380-7172.2355.

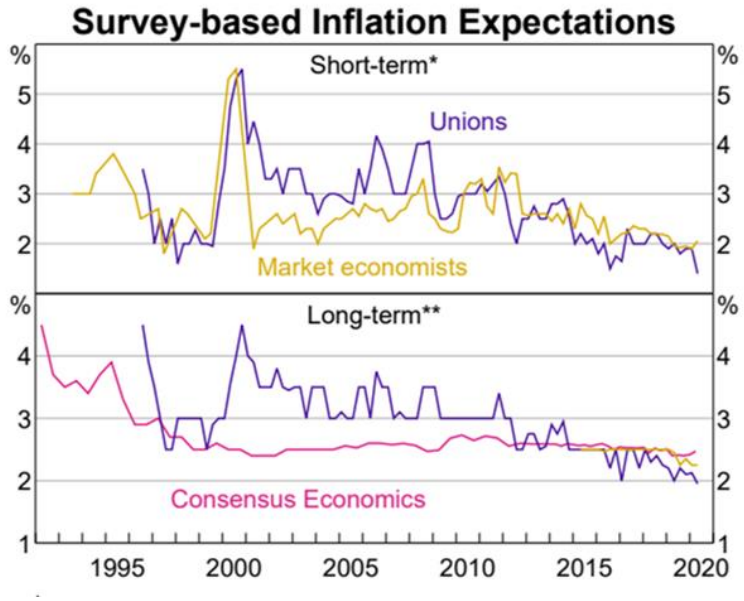
- The most recent estimate of the U.S. inflation risk premium in Figure 8 is -0.20 per cent. If this a reasonable proxy for the Australian inflation risk premium, implied 10-year expected inflation is just 1.53 per cent (ie, 1.33 per cent plus 0.20 per cent).

A.4.4: Consensus Economic forecasts

- The AER uses Consensus Economics (CE) inflation forecasts as a cross-check to determine if expected inflation is anchored to the mid-point of the RBA target band. In the final revenue determination for SAPN the AER stated that.[29]

> *'Consistent with the 2017 inflation review, we monitor survey data on long term inflation expectations to assess whether any de-anchoring of expectations from the RBA target band has occurred. With the current information available to us, we consider that the CE [Consensus Economics] quarterly survey is the best available measure of its type.* ***The CE data continues to suggest that long-term inflation expectations are set within the target band and consistent with our use of the midpoint.'***

- Although the CE forecasts are not publicly available, the RBA produced the following graph in the May 2020 Statement on Monetary Policy showing the CE 6–10 year ahead inflation forecasts (bottom panel):



Source: RBA Statement on Monetary Policy (May 2020), p. 82

- For the last 20 years the CE forecasts have been remarkably stable around 2.50 per cent. The AER interprets this as evidence that market estimates for expected inflation are also anchored to the 2.50 per cent mid-point of the RBA target band. However, before any conclusions can be reached it is necessary to test the 2.50 per cent anchor against market estimates of inflation. The CE forecasts should not be accepted at face value because:
  - the assumptions behind the forecasts are not disclosed
  - the survey respondents cannot be scrutinised
  - the number of respondents is relatively small and may not be representative of the marginal investor.
- Implied forward swap rates can be used to determine the inflation risk premium that is implied by the CE 2.50 per cent estimate of expected inflation. The plausibility of the implied inflation risk premium can then be assessed to see if it is consistent with expected inflation of 2.50 per cent.
- As the CE forecasts are for 6–10 year ahead inflation the relevant comparator rate is the 5-year implied forward inflation swap rate 5 years forward (5yr5yr). This rate measures the total inflation compensation for the same time horizon as the CE forecasts. The implied inflation risk premium is calculated by deducting 2.50 per cent from the 5yr5yr rate (Figure 9):

[29] SAPN Final Decision, June 2020, Attachment 3, p. 36–37.

FIGURE 9: IMPLIED INFLATION RISK PREMIUM BASED ON 2.5 PER CENT CONSENSUS ECONOMICS FORECASTS

Source: Bloomberg, QTC calculations. 20-day averages.

- The implied risk premium has become increasingly negative since 2018 and is currently -0.63 per cent (ie, 1.87 per cent minus 2.50 per cent), which implies investors are willing to pay a high price premium to own nominal assets that perform well in a low inflation/deflationary scenario. Using the same reasoning in Section A.4.3, a -0.64 per cent implied inflation risk premium is implausibly large and not internally consistent with 2.50 per cent expected inflation 6–10 years ahead.
- This conclusion is consistent with the model-based estimates of 5yr5yr expected inflation and the 5yr5yr inflation risk premium based on U.S. Treasury bond yields (Figure 10)

FIGURE 10: ESTIMATES OF U.S. 5YR-5YR EXPECTED INFLATION AND INFLATION RISK PREMIUM (1983–2020)

Source: Kim et al, May 2019. Monthly data.

- The most recent estimate of the 5yr5yr U.S. inflation risk premium in Figure 10 is -0.20 per cent. If this a reasonable proxy for the 5yr5yr Australian inflation risk premium, implied expected inflation 6–10 years forward is just 2.08 per cent (ie, 1.87 per cent plus 0.20 per cent).
- While the CE *forecasts* are firmly anchored to 2.50 per cent, the implied inflation risk premium analysis indicates that *market* expected inflation is no longer anchored to 2.50 per cent. This means that a glide path approach that

uses 2.50 per cent as an anchor will produce unrealistically high estimates of expected inflation regardless of the type of path followed.

- There has been a significant amount of new information over the last 20 years which indicates that 2.50 per cent is no longer an anchor for 10-year expected inflation (Table 4). This information appears to have been given very little weight in the CE forecasts.
- In QTC's view it is unrealistic to believe that long-term expected inflation is exactly the same today as it was 20 years ago.

TABLE 4: SUMMARY OF KEY CHANGES SINCE JUNE 2020

Parameter	June 2000	June 2020	Change
10-year nominal CGS (%)	6.30	0.90	**(5.40)**
10-year BBIR (%)	2.90	1.00	**(1.90)**
10-year ZCIS (%)	3.15	1.30	**(1.85)**
10-year realised inflation (% pa)	2.10	1.80	**(0.30)**
Official cash rate	6.00	0.25	**(5.75)**
Consensus Economics 6–10 year ahead inflation forecast (%)	**~2.50**	**~2.50**	**~0.00**

Appendix B: Estimating the liquidity premium in real CGS yields

B.1: Approach

- Christensen & Gillian 2012 use nominal and real zero-coupon US Treasury (UST) yields, and fixed zero-coupon inflation swap (ZCIS) rates to derive a maximum range for the liquidity premium in real UST yields[30]. The authors define 'liquidity' as a measure that captures any friction that drives a wedge between the observable yield and the yield that would prevail in a frictionless world.
- The maximum range for the liquidity premium is based on the following assumptions:
  - there is no liquidity premium in the observable nominal UST yield
  - real UST bonds are no more liquid than nominal UST bonds, and
  - ZCIS are no more liquid than nominal UST bonds.
- If the assumptions hold, the authors show that the difference between the observed ZCIS rate and the BBIR equals the *sum* of the liquidity premiums (ie, frictions) in the ZCIS rate and the real UST yield. The same logic can be applied to the CGS market using the terminology and descriptions in Table 5:

TABLE 5: PARAMETERS AND DEFINITIONS

Parameter	Definition
CGS[n]	Observable nominal CGS zero coupon yield
CGS[r]	Observable real CGS zero coupon yield
ZCIS	Observable zero-coupon inflation swap rate
BBIR	Bond break-even inflation rate
R	Real CGS yield in a frictionless market
S	Zero coupon inflation swap rate in a frictionless market
EI	Expected inflation
IRP	Inflation risk premium
L[r]	Real CGS liquidity premium (≥ 0)
L[s]	ZCIS liquidity premium (≥ 0)

- The maximum range for the real CGS liquidity premium is derived as follows:

CGS[n]	= R + EI + IRP
CGS[r]	= R + L[r]
BBIR	= CGS[n] - CGS[r]
	= R + EI + IRP - (R + L[r])
	= EI + IRP - L[r]
S	= EI + IRP
ZCIS	= EI + IRP + L[s]
ZCIS - BBIR	= EI + IRP + L[s] - (EI + IRP - L[r])
	= L[s] + L[r]

- The maximum range for the liquidity premium in observable real CGS yields can be established as follows:
  - the top of the range is **L[r] = (ZCIS - BBIR)** (ie, L[s] = 0), and

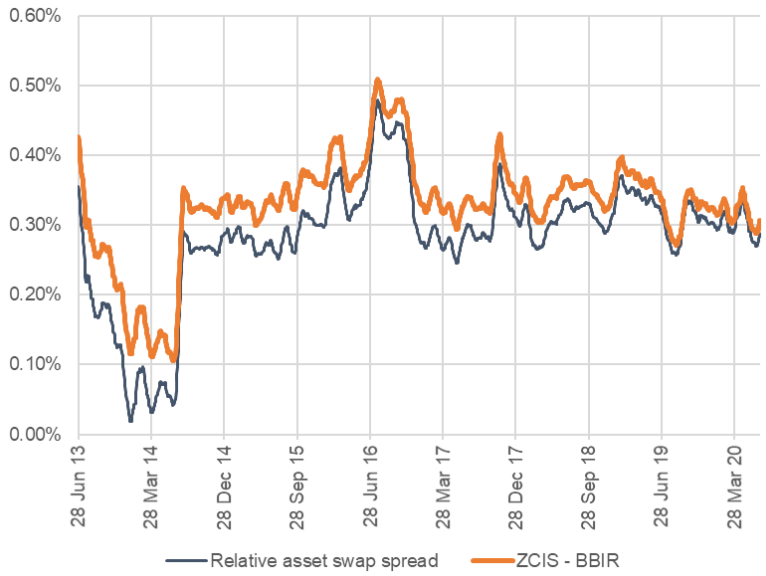
[30] Christensen & Gillian, June 2012, *Could the U.S. Treasury benefit from issuing more TIPS?*

  - the bottom of the range is **L[r] = 0** (ie, there is no liquidity risk premium in the observable real CGS yield).
- Based on the above, a maximum range can be established for the unbiased (ie, liquidity-adjusted) real CGS yield:
  - the top of the range is **CGS[r]**, and
  - the bottom of the range is **CGS[r] – (ZCIS – BBIR)**.

B.2: Relationship with asset swap spreads

- Christensen & Gillian use zero coupon real and nominal yields to derive the maximum range for the liquidity premium. However, real and nominal CGS pay quarterly and semi-annual coupons respectively. As such, the estimates of ZCIS–BBIR using CGS yields are not an exact replication of the Christensen & Gillian's estimates.
- A most appropriate estimate when the underlying bonds are coupon-paying bonds is the difference between the real and nominal CGS asset swap spreads.
- The 10-year real CGS asset swap spread is calculated as follows:
  - use the ZCIS curve to convert the real CGS cash flows (ie, coupons and principal payment at maturity) into nominal cash flows
  - use the nominal zero coupon swap curve from 1–10 years to calculate the present value of the projected nominal cash flows from the previous step, and
  - solve for the single margin that, when added to each nominal zero coupon swap rate, equates the present value of the cash flows from the step above with the current market price of the real CGS.
- The 10-year nominal CGS asset swap spread is calculated as follows:
  - use the nominal zero coupon swap curve from 1–10 years to calculate the present value of the nominal cash flows (ie, coupons and principal payment at maturity), and
  - solve for the single margin that, when added to each nominal zero coupon swap rate, equates the present value of the cash flows from the step above with the current market price of the nominal CGS.
- The relative asset swap spread is the real CGS asset swap spread minus the nominal CGS swap spread. This spread has the same interpretation as ZCIS – BBIR.
- The relative asset swap spread can be calculated more directly as follows:
  - use the ZCIS curve from 1–10 years to convert the 1–10 year nominal CGS zero coupon yields into real yields
  - use the real yields to calculate the 1–10 year real discount factors, and
  - use the real discount factors to calculate a 10-year par real CGS yield on a coupon paying bond.
- The relative asset swap spread is the difference between the observable 10-year real CGS yield and the 10-year par real CGS yield calculated above.
- QTC has used the nominal zero coupon CGS discount factors published on the RBA website and the ZCIS curve from 1–10 years to calculate the relative asset swap spread (Figure 11).

FIGURE 11: RELATIVE REAL/NOMINAL ASSET SWAP SPREADS



Source: Bloomberg, Yieldbroker. QTC calculations. 20-day averages.

- The average liquidity premiums are 0.23 per cent and 0.28 per cent for the relative asset swap spread and ZCIS–BBIR respectively, and the correlation between two series is 0.99. The correlation has been calculated using the daily estimates rather than the 20-day average estimates.
- Although the relative asset swap spread is the more appropriate estimate, the margin between ZCIS and the BBIR is simpler to calculate and the average difference between the two estimates is relatively small.
- Therefore, ZCIS–BBIR is a suitable proxy for the relative asset swap spread between real and nominal CGS.

B.3: Additional considerations

B.3.1: Convenience yields in nominal CGS yields

- Nominal yields on safe and relatively liquid assets such as US Treasury bonds and CGS reflect a 'convenience yield' during periods of heightened investor risk aversion and flight-to-quality/liquidity episodes such as the Global Financial Crisis on 2008–2009.
- The convenience yield (CY) is a friction that causes the observable nominal CGS yield to be *lower* than the sum of the frictionless real yield, expected inflation and the inflation risk premium:

CGS[n]	= R + EI + IRP – **CY**
CGS[r]	= R + L[r]
BBIR	= CGS[n] – CGS[r]
	= R + EI + IRP – **CY** – (R + L[r])
	= EI + IRP – **CY** – L[r]
S	= EI + IRP
ZCIS	= EI + IRP + L[s]
ZCIS - BBIR	= EI + IRP + L[s] – (EI + IRP – **CY** – L[r])
	= L[s] + L[r] + CY

- A positive value for CY will cause ZCIS – BBIR to over-state the maximum liquidity premium and under-state the lower bound for the adjusted real CGS yield.

B.3.2: Structure of the Australian inflation swap market

- There are sound structural reasons for why L[s] should be positive. The Australian inflation swap market is one-sided, with most investors wanting to pay fixed inflation and receive actual inflation. Because there are few natural payers of actual inflation, the swap counterparty (eg, a bank or hedge fund) will usually require a premium to take the other side of the more popular trade. This involves charging a fixed ZCIS rate that is higher than the frictionless swap rate (S), which means L[s] is positive. This is consistent with the (U.S. based) conclusions in To & Tran (2019) that: [31]

> *'… both TIPS and inflation swaps appear mispriced, and more significantly so for longer tenors: TIPS [Treasury Inflation Protected Securities] appear consistently under-priced and* ***inflation swaps consistently overpriced (to fixed rate payors) for contracts of 10 years or longer maturities.****'*

- Note that an underpricing in TIPS means the real yield is biased upwards whereas an overpricing in inflation swaps means the fixed rate is biased upwards. This is equivalent to L[r] and L[s] both having values greater than zero, which means the best estimate of the liquidity premium is not either extreme of the maximum range.
- Based on these additional considerations, it is reasonable to conclude that the unbiased real CGS yield should be higher than the lower bound of CGS[r] – (ZCIS – BBIR).

[31] To & Tran, April 2019, *Cheap TIPS or Expensive Inflation Swaps? Mispricing in Real Asset Markets*, p.2

B.4: Use in academic studies

- D'Amico, Kim & Wei (2016) use a term structure model for real and nominal US Treasury yields to estimate expected inflation, the inflation risk premium and the real yield liquidity premium. The authors regress the model-based liquidity premium estimates on a set of model-free liquidity proxies to test the reasonableness of the time-series properties of their estimates. Based on the regression results the authors conclude[32]:

> *'… the difference between the TIPS and nominal ASW [asset swap] spreads stands out as the most promising real-time, observable measure of TIPS liquidity premiums, at least based on data since 2006.'*

- As shown in Section B.2 there is a very strong positive correlation between ZCIS–BBIR and the relative asset swap spread referred to in the above quote.
- Other studies such as Pflueger & Viceira (2015)[33], Liu, Vangelista, Kaminska & Rellen (2015)[34] and Camba-Mendez & Werner (2017)[35] also use ZCIS–BBIR and/or the relative asset swap spread between real and nominal bonds as model-free proxies for liquidity.
- Fleckenstein et al (2012) adopt a trading strategy approach that uses inflation swaps to convert real TIPS cash flows into nominal cash flows, thereby creating a synthetic nominal U.S. Treasury bond[36]. The authors find the effective yield on the synthetic nominal U.S. Treasury bond is higher than the yield on a U.S. Treasury bond with exactly the same nominal cash flows. The yield difference is referred to as a 'mis-pricing' in the TIPS yield, however the authors also note that:[37]

> *'… the difference between what we term mispricing and what these papers call a liquidity risk premium is simply a semantic one, and there is no fundamental conflict between their results and ours.'*

- The yield differences in Fleckenstein et al have the same interpretation as the relative asset swap spread between real and nominal CGS, which is highly correlated with ZCIS–BBIR.

B.5: Issues raised by Lally

- Lally (2020) raises a number of concerns with the inflation risk premium and the liquidity premium in the BBIR and the ZCIS rates. Regarding the use of the BBIR to estimate expected inflation, Lally notes:[38]

> *'The most important of these problems are the liquidity premium on indexed bonds and the inflation risk premium on nominal bonds. The net effect of these two phenomena could be positive or negative, leading to either upward or downward bias in estimating expected inflation…'*

and

> *'Attempting to correct it for the effect of risk and illiquidity would also yield a poor estimator because the appropriate corrections for these two effects are very unclear.'*

- As explained in Section 4, the inflation risk premium is a only a source of 'bias' if it is included in the nominal allowed return on equity and excluded from the revenue deductions for inflation on the equity-funded portion of the RAB. If a market estimate of inflation is used the net effect of the inflation risk premium on the real return on equity allowance is zero. Only using expected inflation to make the revenue deductions will produce a biased real return on equity allowance and that bias is currently large and negative.

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[32] D'Amico, Kim & Wei, 2016, *Tips from TIPS: the Informational Content of Treasury Inflation-Protected Security Prices*, p. 30.

[33] Pflueger & Viceria, February 2015, *Return predictability in the Treasury Market: Real Rates, Inflation, and Liquidity*.

[34] Liu, Vangelista, Kaminska & Rellen, September 2015, *The informational content of market-based measures of inflation expectations derived from government bonds and inflation swaps in the United Kingdom*.

[35] Camba-Mendez & Werner, March 2017, *The inflation risk premium in the post-Lehman period.*

[36] Fleckenstein, Longstaff & Lustig, July 2012, *The TIPS–Treasury Bond Puzzle*.

[37] Fleckenstein et al, July 2012, p. 14–15.

[38] Lally, July 2020, *Review of the AER's inflation forecasting methodology*. p. 13–14.

- QTC considers the model-free approach in Section B.1 above to be an acceptable way of estimating the liquidity risk premium in the observable real CGS yield, which allows an unbiased (ie, liquidity-adjusted) BBIR to be estimated.
- Regarding the use of ZCIS to estimate expected inflation Lally notes[39]:

> *'As with the break-even rate, the two principal problems are premiums for inflation risk and illiquidity.'*

- As explained above, the inflation risk premium is not an issue if it is treated consistently in the nominal allowed return on equity and the revenue deductions in the PTRM.
- To the extent that illiquidity is an issue with observable ZCIS rates, the use of 20–40 day averages of the closing mid-rates as suggested in Moore (2016) should alleviate this problem[40].
- Finally, Lally reaches the following conclusion based on his reading of QTC's December 2019 note to the AER Inflation Working Group:

> *'QTC (2019) favours the ten-year break-even rate as a predictor of future inflation, leading to a significantly lower estimate of expected inflation than the AER. However, as argued earlier, this estimator is very poor in part because it is biased by the presence of an inflation risk premium within the yield on nominal CGS. Remarkably and perversely, QTC recognizes this particular problem despite promoting this break-even methodology.'*

- QTC did not propose the BBIR as a 'predictor' of future inflation. The purpose of QTC's note was to highlight the problems created by including an inflation risk premium in the nominal allowed return on equity and excluding the same inflation risk premium from the revenue deductions for inflation on the equity-funded portion of the RAB. The note shows that by using a market estimate of inflation to make the revenue deductions the net effect of the inflation risk premium on the real return on equity allowance in the PTRM is zero.
- As such, the inflation risk premium is only a 'problem' if it is treated inconsistently, which is what occurs when expected inflation is used to make the revenue deductions in the PTRM.

[39] Lally, July 2020, p. 16

[40] Moore, December 2016, *Measures of Inflation Expectations in Australia*, p. 29

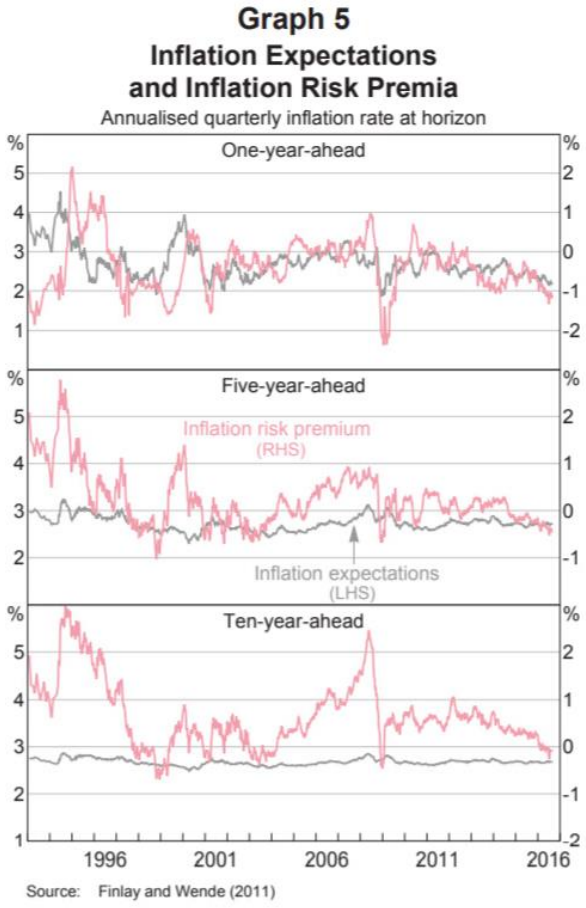
Appendix C: Recent AER comments on market estimates of inflation

C.1: Final revenue determination for SAPN

- SAPN's revised revenue proposal cited movements in market inflation estimates as an indication that market expected inflation may have fallen more than AER expected inflation. The AER responding by stating:[41]

> *'SA Power Networks stated that we did not quantify or adjust these biases in the 2017 inflation review. However, these biases were discussed at length in the 2017 inflation review. We referred to academic works where the bias is calculated such as Finlay and Wende (2011) and an updated version of their analysis published by the RBA in 2016.* ***The analysis showed that during some periods a premia (cause of bias) of over 2 percentage points premium was estimated. Such size of bias is consistent with the differences between our existing methodology and the unadjusted bond breakeven approach.*** *We do not attempt to quantify the size of future biases (due to their time varying nature).'*

- The AER's claim is based on the estimates in the bottom panel of following graph from Moore (2016)[42], which is the updated analysis by the RBA referred to in the above quote. These are model-based estimates of the inflation risk premium minus the real CGS liquidity premium (ie, IRP – L[r]). The AER is comparing these estimates to the difference between the unadjusted BBIR and AER expected inflation.



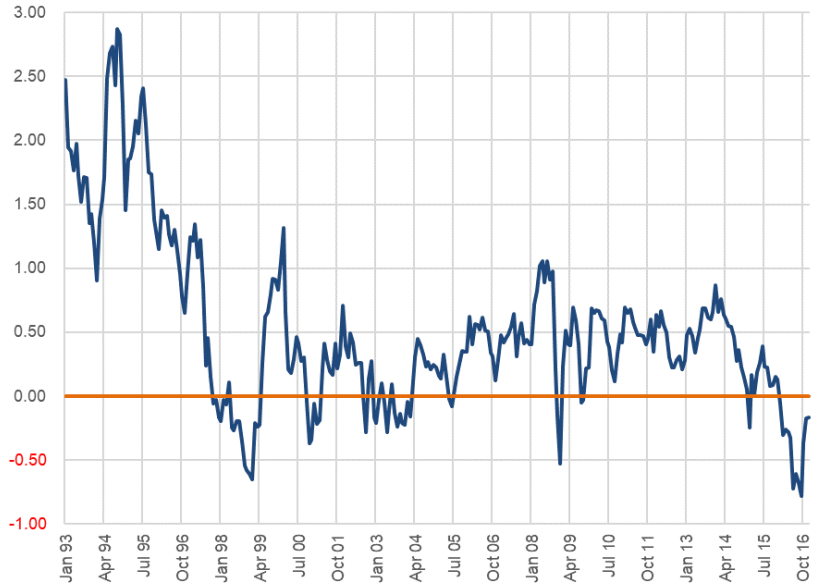
- Figure 12 is from a 2018 paper by Hambur & Finlay[43] that provides revised estimates of estimates of IRP – L[r]. Note that the estimates have been updated but the time period considered is the same:

[41] SAPN Final Decision, June 2020, Attachment 3, p. 29–30.

[42] Moore, December 2016, *Measures of Inflation Expectations in Australia*, p. 27

[43] Hambur & Finlay, February 2018, *Affine Endeavour: Estimating a Joint Model of the Nominal and Real Term Structures of Interest Rates in Australia*.

FIGURE 12: UPDATED ESTIMATES OF IRP – L[R]



Source: Hambur & Finlay (2018)

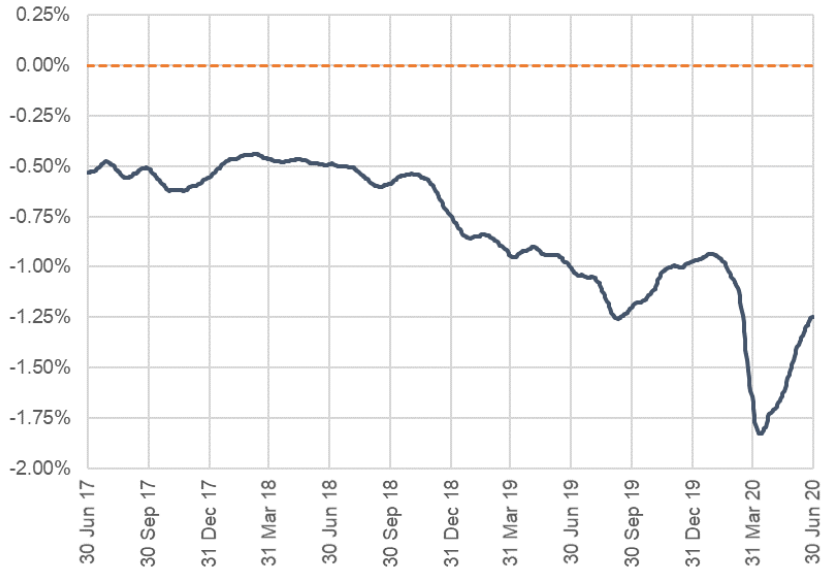
- SAPN's revised regulatory proposal was submitted in December 2019. At that time the difference between the BBIR and AER expected inflation was *negative* 1.00 per cent. This is significantly lower than any negative estimate in Figure 11.
- Negative estimates tend to be associated with flight-to-quality/liquidity episodes and other periods of heightened investor risk aversion. Liquidity premiums increase significantly during these periods, often to the point where L[r] is the higher than IRP, resulting in a negative estimate of IRP – L[r].
- The three most negative estimates of IRP – L[r] align with the events in Table 6, which can all by characterised as flight-to-quality/liquidity episodes:

TABLE 6: IRP – L[R] DURING CRISIS EVENTS

Date	Surrounding crisis event	IRP – L[r]
1998–99	Asian economic crisis, Russia debt default, collapse of Long-Term Capital Management	**(0.65)**
2008–09	Global Financial Crisis	**(0.53)**
2015–16	Broad sell-off in global stock markets	**(0.78)**

- December 2019 cannot be characterised as a flight-to-quality/liquidity episode or a period of heightened investor risk aversion, however the difference between the BBIR and AER expected inflation at that time (-1.00 per cent) was more negative than each 'crisis period' estimate of IRP – L[r] in Table 6. This indicates that the AER's estimate of expected inflation is too high.
- This observation is not isolated to December 2019. Figure 13 shows the difference between the BBIR and AER expected inflation back to 2017.

FIGURE 13: UNADJUSTED BBIR MINUS AER EXPECTED INFLATION



- The average difference for the 12 months to December 2019 is also negative 1.00 per cent. This period cannot be characterised as a flight-to-quality/liquidity episode or a period of heightened investor risk aversion, however the difference between the BBIR and AER expected inflation is also more negative than each crisis period estimate in Table 6.
- COVID-19 did not start impacting the debt market until late February 2020. Although COVID-19 had a significant, but short-lived impact on the difference, the problems with the AER's estimates were evident well before this event.
- In QTC's view, the differences between the unadjusted BBIR and the AER's inflation estimate are not consistent with the estimates from Moore (2016) or the updated estimates from Hambur and Finlay (2018). Rather, the differences indicate that the AER's estimate of expected inflation is too high.

C.2: Additional papers cited by the AER

- The AER cited additional papers to support its view that the fall in the inflation swap curve may not have been due to a fall in expected inflation:

> *'In addition, we have considered a number of more recent papers that considered biases in the swaps approach. Cassidy et al (2019) from the RBA found that financial market measures of expected inflation such as bonds and inflation swaps are problematic because of time-varying liquidity and inflation risk premium. Cassidy notes the movements in these measures are difficult to interpret because these markets are not particularly liquid in Australia. There are other papers by central banks that study negative liquidity in swaps include those by the European Central Band [sic] (2014, 2017 and the Federal Reserve (2016). These suggest that bias could be the cause of the current observed swap's term structure rather than falling expectations.'*

- The papers by the European Central Bank and the Federal Reserve study the inflation risk premium in inflation swaps and nominal US Treasury yield, not 'negative liquidity' in swaps as claimed by the AER. Each paper concludes that the inflation risk premium has turned negative.

C.2.1: Cassidy et al (2019)

- The paper presents no new analysis on the inflation risk premium or liquidity risk premium[44].

C.2.2: European Central Bank (2014)

- The most notable finding from this study is as follows:

[44] Cassidy, Rankin, Read & Seibold, June 2019, *Explaining Low Inflation Using Models*.

'To summarise, unlike in the period immediately following the collapse of Lehman Brothers, markets for inflation protection are currently functioning well and the role of liquidity effects appears limited. **The downward risks to inflation can therefore be interpreted partly as a negative inflation risk premium**. *This is related to the properties of nominal bonds in hedging against falling inflation versus those of inflation-linked bonds and swaps.* **Overall, the currently low level of inflation swap rates may reflect a combination of low inflation expectations and low demand for hedging against high inflation outcomes.**'[45]

C.2.3: European Central Bank (2017)

- The most notable findings from this study are as follows:

'Our results provide strong evidence, robust across business areas and measures for the inflation risk premium, that **the inflation risk premium turned negative, on both sides of the Atlantic, during the post-Lehman period.** *This confirms the recent finding by Campbell et al. (2016) that* **nominal bonds are no longer "inflation bet" but have turned into "deflation hedges"**.'[46]

...

'The decline in the inflation risk premium seems mostly related to **increased deflation fears and the belief that inflation will stay far away from the monetary policy target** *rather than declining inflation uncertainty.'*[47]

C.2.4: Federal Reserve (2016)

- The most notable findings from this study are as follows:

'... we examine the theoretical determinants of one **important component of inflation compensation, the inflation risk premium**, *and argue that* **a secular decline in the inflation risk premium may be responsible for a substantial portion of the decline in inflation compensation in recent years**.'[48]

...

'... this note points out that standard consumption-based asset pricing models and the capital asset pricing model suggest that **the long run inflation risk premium has trended down over time, and is likely to be negative in the current macroeconomic environment**. *Moreover, a nontrivial portion of the decline in far-forward inflation compensation over the past year may reflect a decline in the inflation risk premium rather than a drop in investors' expected inflation rate.'*[49]

A negative inflation risk premium reduces the amount of inflation compensation in the 10-year CGS yield and the nominal allowed return on equity. If the negative inflation risk premium is excluded from the revenue deductions for inflation on the equity-funded portion of the RAB, the real return on equity allowance in the PTRM will be biased downwards.

The additional papers cited by the AER suggest that the inflation risk premium has turned negative. This strengthens the case for using a market estimate of inflation rather than the AER's current expected inflation approach.

[45] European Central Bank, July 2014, Monthly Bulletin, p. 36

[46] Camba-Mendez & Werner, March 2017, *The inflation risk premium in the post-Lehman period*, p. 3

[47] Camba-Mendez & Werner, March 2017, p. 3

[48] Chen, Engstrom & Grishchenko, April 2016, *Has the inflation risk premium fallen? Is it now negative?*, p. 1

[49] Chen, Engstrom & Grishchenko, April 2016, p. 3