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REVIEW OF ESCOSA'S APPROACH TO ESTIMATING INFLATION AND THE RETURN ON EQUITY

A REPORT FOR SA WATER

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1 EXECUTIVE SUMMARY

Frontier Economics has been engaged by SA Water (SAW) to review the current approach used by the Essential Services Commission of South Australia (ESCOSA) to estimate expected inflation and set the allowed return on equity.

1.1 Background

In July 2018, ESCOSA established its framework and approach for SA Water Regulatory Determination 2020 (SAWRD20). Following this, ESCOSA published a series of eight Guidance Papers to explain the requirements, methodology and process that will apply to SAWRD20. These papers note that ESCOSA will adopt a cost-based (building block) approach to determine SAW's maximum allowed revenues.

The allowed return on equity is an important input to the calculation of the return on capital building block of regulated revenue. It should reflect the minimum return required by equity investors in order to commit capital to the business, and so should compensate for the risks associated with the investment and the opportunity cost of investors' funds. In order to maintain the real returns earned by equity investors, the regulated revenue should also compensate for inflation. Regulators typically achieve this in one of two ways:

- Some regulators compensate for inflation through indexation of the regulatory asset base (RAB) on which a real rate of return is allowed; and
- Other regulators include inflation expectations in a nominal rate of return that is applied to a real asset base.

ESCOSA has historically adopted the first approach, and proposes to do so again for SAWRD20.

SAW is concerned that changes in market conditions will mean that the approach adopted by ESCOSA to estimate the allowed return on equity and forecast inflation will mean that SAW will under-recover its efficient rate of return. These conditions include actual inflation outcomes that are quite different from (and much lower than) the Reserve Bank of Australia's (RBA's) long-term inflation target, as well as historically low interest rates. If, as a result of these market conditions, the allowed rate of return is set too low, then it will increase the risk that SAW will be unable to fund its efficient investment projects and meet expected performance targets.

In light of this, SAW has asked Frontier Economics to:

- review the approach adopted by ESCOSA to estimate inflation and the allowed return on equity;
- assess whether the approach adopted by ESCOSA to estimate these parameters will allow SAW to earn its efficient rate of return under current and future market conditions; and
- if current and future market conditions suggest that ESCOSA's approach to estimating inflation and the allowed return on equity will likely under-compensate SAW, to propose possible solutions that ESOCSA may consider as part of SAWRD20 to address the issue.

Our consideration of these issues is set out in the following sections.

1.2 Key findings

Primary conclusions and issues to address

- In the prevailing financial market conditions, ESCOSA's current approach will have the effect of locking in losses (negative net profit after tax) for every year of the forthcoming regulatory period. This has clear implications for the incentive for efficient investment, and consequently the ongoing quality of the regulated service.
- The cause of this outcome is the interaction between three components of ESCOSA's current approach:
  - ESCOSA's approach to expected inflation always produces an estimate very close to 2.5%, but in the prevailing market conditions such an estimate is implausible and inconsistent with all of the available evidence;
  - ESCOSA's approach to the allowed return on equity inconsistently pairs a prevailing risk-free rate with a long-run historical market risk premium. This produces implausibly low estimates of the required return on equity in the prevailing market conditions; and
  - The real cost of debt allowance set using ESCOSA's approach provides insufficient cash flows to cover the nominal interest payments that SAW is contractually required to make.
- The ESCOSA approach is premised on a view that inflation expectations should be assessed over a long-term horizon because ESCOSA sets the WACC allowance using 10-year yields. However, this premise is incorrect and fails to recognise the way in which the regulatory framework provides returns to investors. Under ESCOSA's regulatory framework, part of the total returns that investors require are provided in the form of a real cash return over the regulatory period. The remainder of the required returns are provided in the form of growth in the RAB over the regulatory period. The basis of inflation used to set these two sources of returns to investors should be consistent. The allowed RAB growth depends on actual inflation over the regulatory period. In order to be consistent, the real WACC allowance should be set using inflation expectations assessed over a horizon that corresponds to the length of the regulatory period.
- We make a number of recommendations for addressing the problems identified above, which have become more prominent in the prevailing market conditions.

ESCOSA's current approach to estimating expected inflation is producing very low estimates of the required real return on equity in present market conditions

- ESCOSA allows regulated business such as SAW to earn a real cash return on capital within each regulatory period.
- This real cash return is determined by first estimating an overall nominal WACC allowance, and then deducting an estimate of expected inflation.
- ESCOSA's proposed methodology for estimating expected inflation will always produce a figure very close to 2.5%, irrespective of economic conditions at the time.
- Market expectations of inflation vary as market conditions change. This means that in some periods ESCOSA's approach will over-estimate expected inflation, and in other periods it will under-estimate expected inflation—depending on prevailing market conditions.
- ESCOSA's current WACC approach, when applied to current market data, produces an historically low real allowed return on equity. This is because the nominal base risk-free rate is currently near its historical low and the essentially constant inflation estimate close to 2.5% is deducted from it.

The resulting under-compensation or over-compensation to regulated businesses can be very large

- The propensity for ESCOSA's proposed approach to guarantee an estimate of expected inflation close to 2.5%, regardless of market circumstances, means that in some regulatory periods (i.e., when the estimate of expected inflation is too high) SAW will be under-compensated and consumers will underpay relative to the efficient cost. Symmetrically, if the estimate of expected inflation is too low, SAW will be over-compensated and consumers will overpay.
- The scale of under-compensation or over-compensation to SAW (and, equivalently, underpayment or overpayment by consumers) can be material. Given plausible forecasts of SAW's asset base, the allowed nominal WACC, and reasonable inflation expectations, the extent of over-compensation or under-compensation over a single regulatory period could easily exceed $500 million.[1]

ESCOSA should choose regulatory approaches that compensate regulated businesses efficiently in every period, rather than relying on an assumption that outcomes will even out in the long-run

- ESCOSA's objective should be to ensure that *every* generation of consumers pays the efficient cost, rather than for some generations of consumers to be cross-subsidising others. That requires the best estimate of expected inflation, and consequently an efficient price, for *every* regulatory control period. It is not enough to simply hope that the periods of overpayment by one cohort of consumers might be offset by periods of underpayment by another cohort of consumers over the long-run.

The losses borne by equity investors under ESCOSA's inflation approach are amplified by the fact that ESCOSA provides SAW with a real (rather than nominal) return on debt allowance

- Equity investors will earn less than the real return on equity they require if ESCOSA's estimate of inflation expectations exceeds the market's true expectation of inflation and actual inflation outcomes.
- During periods of under-compensation to SAW (as is currently the case), the losses suffered by equity investors are exacerbated by the fact that ESCOSA provides SAW with cash flow to cover only the real return on capital. SAW, like most other businesses in Australia, issues nominal debt. This means SAW must make nominal interest payments to service its debt while receiving only a real cash return to cover those debt service obligations. If SAW is to avoid defaulting on its debt, its equity investor must step in to make up the cash shortfall by accepting lower cash returns. These already-compressed cash equity returns are squeezed even further when ESCOSA misestimates inflation expectations. Any resulting under-recovery is borne entirely by the shareholder, rather than being shared between equity and debt investors. That is, the debt holders will always receive their contracted nominal return in full (so long as SAW does not default) in which case any undercompensation is borne by the equity holder.
- Under ESCOSA's current approach, and in the current financial market conditions, there is a *negative* cash return to equity which manifests via ESCOSA's regulatory model producing negative net profit after tax (NPAT) for each year of the regulatory period.

Losses to equity investors are exacerbated further by ESCOSA's approach to setting the return on equity allowance

- ESCOSA's current WACC methodology produces estimates of the return on equity that move in lock-step with government bond yields.
- Such an approach can produce economically-implausible estimates of the return on equity—as revealed during the peak of the Global Financial Crisis (GFC). During the GFC, government bond yields dropped sharply as demand for safehaven assets (such as highly-rated government bonds) increased. ESCOSA's approach implies that the return demanded by equity investors fell during the GFC, when clearly it rose.

[1] See, for example, **Table 1** in Section 3.

- The key weakness with ESCOSA's approach to estimating the return on equity is that it inconsistently pairs a prevailing risk-free rate with a fixed, long-run estimate of the market risk premium (MRP). ESCOSA's estimates of the required return on equity would be more reasonable if it were to estimate and combine the risk-free rate and MRP consistently—as other regulators such as IPART do.
- Government bond yields are currently near their all-time-low. Consequently, ESCOSA's estimate of the required nominal return on equity is extremely low. When ESCOSA's very high estimate of expected inflation is deducted from this very low estimate of the required nominal return, the resulting real return on equity allowance for SAW is implausibly low.

There is compelling evidence from many sources that current inflation expectations are well below the estimates produced by ESCOSA's approach

- There is overwhelming evidence from a variety of sources that current market expectations of inflation are well below 2.5% — i.e., between 1.0% and 2.0%. ESCOSA's inflation approach assumes that inflation will revert to the midpoint of the RBA's inflation target range (i.e., 2.5%) after one year. In the current market conditions, there is no credible support from any source for that assumption.
- ESCOSA notes that the AER conducted a major review of its inflation methodology in 2017 and decided to retain an approach that resembles ESCOSA's approach closely. However, we note that market circumstances have changed very materially since 2017. In view of this, the AER is presently considering whether it should open a fresh review into its inflation methodology.

"Inflation risk" would be addressed more effectively by improving ESCOSA's approach to estimating expected inflation and the required return on equity, than by the solutions proposed by ESCOSA

- ESCOSA has suggested that the problem of "inflation risk" could be addressed via regulatory mechanisms (e.g., pass throughs) or financial products (presumably inflation swaps). Neither of these proposed solutions would address the underlying problem effectively:
  - Cost pass throughs (a) would not deal with cash flow shortfalls as revenues would be adjusted only in future periods; (b) may only be permitted by ESCOSA within narrow circumstances; and (c) would fail to address the problem of ESCOSA mis-estimating the required WACC allowance.
  - Inflation swaps (a) involve a financial cost—which would ultimately be borne by consumers and/or shareholders. Consumers and shareholders should not need to shoulder costs imposed by a flawed regulatory approach; (b) cannot feasibly hedge the under-recovery or over-recovery of revenues created by ESCOSA's present inflation approach; and (c) may be available to some regulated businesses but are not available to consumers. ESCOSA's inflation approach imposes symmetric inflation risk on consumers as well as SAW.
- The problem of "inflation risk" should be addressed by adopting an alternative and better approach to forecasting inflation and for setting the allowed return on equity. For example, the ERA in Western Australia has adopted a market-based approach that produces more reasonable estimates of expected inflation than does ESCOSA's approach. IPART has also indicated that it intends to reconsider whether a market-based approach should replace its existing approach, which resembles the approach used by ESCOSA.

Key recommended improvements to ESCOSA's methodology

- In order to address the problems identified in this report, we recommend that ESCOSA:
  - Adopt a market-based approach to estimating inflation expectations, which we show has produced estimates that match actual inflation outcomes much more closely than ESCOSA's approach—especially over the last few years;
  - When adopting a market-based approach, ESCOSA should estimate inflation expectations over the length of the regulatory period rather than a 10-year horizon;
  - Adopt an approach to estimating the required return on equity that pairs the risk-free rate consistently with the MRP; and

- Set a nominal rather than real cost of debt allowance for SAW.

1.3 Structure of this report

The remainder of this report is structured as follows:

- Section 2 provides a summary of ESCOSA's approach for setting the return on equity allowance and forecasting inflation;
- Section 3 demonstrates, using illustrative examples, how a mismatch between ESCOSA's estimate of expected inflation and the market's expectation of inflation would result in SAW earning a real return on equity that is below the real return on equity required by equity investors;
- Section 4 examines the likelihood of this problem arising in the next regulatory period (SAWRD20) by considering whether ESCOSA's approach to forecasting inflation is likely to produce a forecast that is consistent with the market's true expectation of inflation;
- Section 5 explains why ESCOSA's WACC framework is likely under-estimating the nominal return on equity under current market conditions, and thereby exacerbating the problem set out in preceding sections; and
- Section 6 provides possible solutions to the problems identified above.

2 ESCOSA'S PROPOSED APPROACH TO INFLATION

Key points

- ESCOSA allows regulated business such as SAW to earn a real cash return on capital within each regulatory period.
- This real cash return is determined by first estimating an overall nominal WACC allowance, and then deducting an estimate of expected inflation.
- ESCOSA's proposed methodology for estimating expected inflation will always produce a figure very close to 2.5%, irrespective of economic conditions.
- Market expectations of inflation vary as market conditions change. This means that in some periods ESCOSA's approach will over-estimate expected inflation, and in other periods under-estimate expected inflation—depending on prevailing market conditions.
- ESCOSA's current approach, when applied to current market data, produces an historically low real allowed return on equity. This is because the nominal base risk-free rate is currently near its historical low and the essentially constant inflation estimate close to 2.5% is deducted from it.

2.1 Overview

For SAWRD20, ESCOSA is proposing to use a cost based (building block) approach to set the maximum allowed revenue for SAW. The *Essential Services Commission Act 2002* (ESC Act) specifies a range of factors that ESCOSA must consider when performing its price determination function.[2] This includes, amongst other things, the return on assets in the regulated industry.

ESCOSA's approach to the allowed return on assets effectively involves the following steps:

- Estimate the required return on equity and the required return on debt in nominal terms and combine to produce a nominal weighted-average cost of capital (WACC);
- Deduct from the nominal WACC an estimate of expected inflation to produce an estimate of the real WACC;
- Set the allowed return on assets based on the real WACC. This is the **cash return** that is available to investors and is paid by **current customers**;
- Increase the regulated asset base (RAB) each year according to observed inflation. This is a **non-cash return** that is paid by **future customers**. The increase in the RAB represents the NPV of higher future payments to be paid by future generations of customers.

In this section, we set out the current ESCOSA framework and in the subsequent section we identify the circumstances in which that framework leads to over- or under-recovery for regulated businesses and consumers.

[2] ESC Act, section 25.

2.2 Overarching framework for the allowed return on assets

In all regulatory frameworks in Australia, the return on assets is calculated by multiplying an allowed rate of return by the Regulatory Asset Base (RAB).

The rate of return that investors require in order to invest in a regulated business must cover the cost of capital. The cost of capital reflects the market's forward-looking expectations of the risks and opportunity costs associated with the investment. Most regulators, including ESCOSA, set the allowed rate of return equal to the WACC.

The WACC has two basic components: the cost of equity capital, and the cost of debt capital.

The cost of debt measures the expected cost of borrowing to the business. If the business raises nominal debt (as SA Water does), then its debt service obligations will be specified in nominal terms. As such, the allowed return on debt delivered by the regulatory framework must be sufficient to cover the nominal cost of debt.

The cost of equity is the expected rate of return required by investors in equity that compensates them for the risk they bear and the opportunities they forgo by committing funds to the business. The cost of equity cannot be observed directly (i.e., it exists only in the minds of equity investors). As such, it is not clear whether equity investors target a real return on equity or a nominal return on equity. However, it is plausible that when equity investors consider whether to commit capital to a project, they seek to earn a real return. If that is the case, then the regulatory regime should deliver a return on equity allowance that is sufficient to cover the real required rate of return, plus sufficient compensation for inflation to preserve equity investors' real returns (i.e., to prevent the real equity returns delivered by the regulatory regime being eroded away by inflation).

The ESC Act does not prescribe how the allowed rate of return should be determined.[3] For SAWRD20, ESCOSA proposes to determine SAW's annual allowed return on capital by multiplying a real allowed rate of return by SAW's RAB, which is indexed for inflation.

The real allowed rate of return is determined by first estimating a nominal allowed rate of return, and then deflating that number by an estimate of forecast inflation. ESCOSA then rolls forward the RAB from one period to the next using actual inflation. Under this approach, SAW's overall return on capital will flow from two sources:

- a cash return (i.e., real allowed rate of return multiplied by the RAB) in each period; plus
- growth in the value of the RAB (i.e., indexation of the RAB for actual inflation where such indexation represents the present value of the extent to which future cash flows to equity holders will exceed what they would have been in the absence of such RAB indexation).

We note this is the same approach that ESCOSA used for the current regulatory period, SAWRD16.

In the following subsections, we provide a summary of the approach that ESCOSA has proposed using to determine the nominal return on equity allowance and to forecast inflation for SAWRD20.

2.3 Setting the return on equity allowance

ESCOSA has stated that it will determine the return on equity using the Capital Asset Pricing Model (CAPM). This derives from the National Water Initiative (NWI) Pricing Principles, which requires the use of the CAPM for any new capital expenditure. The CAPM has three parameters – the risk free rate, the

[3] As discussed in section 3.1, the ESC Act does require ESCOSA to have regard to the need to (amongst other things) "facilitate maintenance of the financial viability of regulated industries and the incentive for long term investment."

market risk premium (MRP) and the equity beta. ESCOSA's approach to estimating each parameter is set out below:

- **Risk-free rate** – this is the expected return on a riskless asset. ESCOSA will calculate the risk-free rate as the average yield on 10-year Commonwealth Government Bonds (CGB) over a period of 20 business days.
- **MRP** – this is the return over and above the risk-free rate that an investor in a fully-diversified asset can expect to earn. ESCOSA proposes using a 'long term' MRP of 6%. It notes that a long term MRP is used based on the expectation that MRP's cannot be forecast but revert to the mean over time, despite short term volatility. We note that an estimate of 6% is broadly consistent with estimates of the long-run MRP for Australia, derived from averaging 130+ years of excess returns data for the Australian stock market.[4]
- **Equity beta** – this is a measure of the systematic (non-diversifiable) risk associated with the asset in question. ESCOSA reviewed the equity beta adopted by other regulators in Australia and overseas and noted that a beta between 0.6 and 0.7 would appear to be appropriate based on SAW's likely exposure to systematic risk compared with other companies.

The merits of ESCOSA's approaches to estimating each of these parameters, relative to alternative estimation approaches, is beyond the scope of this report. However, it *is* relevant that ESCOSA's current approach produces an historically low allowed return on equity. The implications of a very low allowed return on equity being paired with a relatively high estimate of expected inflation is addressed in Sections 3 and 4 of this report.

In practice, ESCOSA's approach to determining the return on equity allowance involves adding a fixed MRP of 6% to the prevailing yield on 10-year government bonds. This means that ESCOSA's return on equity allowance moves in lock-step with changes in government bond yields.

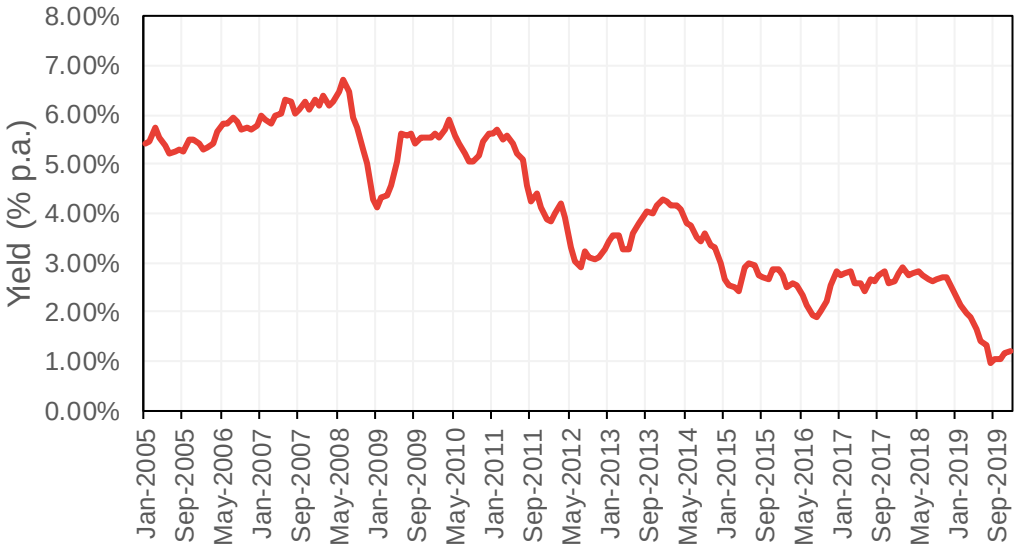
As **Figure 1** below shows, there has been a pronounced and persistent decline in the yields on Australian government and corporate bonds since the peak of the Global Financial Crisis (GFC) in 2008-09.

Since Commonwealth Government Security (CGS) yields are currently very low (approximately 1.20% as at December 2019), the nominal return on equity determined using ESCOSA's approach would also be very low (5.40% = 1.20% + 0.7 x 6%). By comparison, IPART's latest WACC estimates for water businesses, which were published in August 2019, determined a nominal return on equity of 7.4% to 8.3%.[5] As another point of comparison, SAW was allowed a nominal return on equity of 6.73% p.a. for the 2016-20 period.

[4] The precise estimate of the historical MRP depends on the specific historical period that is used and on the assumed value of dividend imputation tax credits. Six per cent lies at the lower end of the range of long-run historical MRPs.

[5] IPART, https://www.ipart.nsw.gov.au/Home/Industries/Special-Reviews/Regulatory-policy/WACC/Market-Update/Spreadsheet-WACC-model-August-2019.

Figure 1: Yields on 10-year Commonwealth Government Bonds over time



Source: RBA data.

2.4 Method for forecasting inflation

The ESC Act does not provide guidance on what measure of inflation ESCOSA should use. In the absence of any guidance, ESCOSA has developed its own forecasting approach.

ESCOSA currently estimates expected inflation as a 10-year average of annual inflation forecasts over the next decade. The forecast for the first year is obtained by taking the RBA's one-year ahead forecast of inflation. From year 2 onwards, ESCOSA assumes that inflation will revert to the midpoint of the RBA's inflation target range – i.e., 2.5%. The ESC then calculates an annual long-term inflation forecast by taking a geometric average of the 10 years of inflation expectations.

Box 1: ESCOSA's approach to calculating expected inflation

ESCOSA proposes to calculate expected inflation using the formula below:

$$Expected\ inflation = \sqrt[10]{(1 + RBA\ forecast) \times (1 + midpoint\ of\ target\ 1) \times \ldots \times (1 + midpoint\ of\ target\ 9)} - 1$$

where:

$RBA\ forecast$ is the RBA forecast for year-ended CPI inflation, one year ahead

$midpoint\ of\ target\ 1, \ldots, midpoint\ of\ target\ 9$ are the mid points of the RBA target inflation band of 2 to 3 per cent, each year from two to ten years ahead.

Source: ESCOSA, Guidance Paper: Treatment of inflation in the regulatory rate of return, June 2019.

This approach guarantees that ESCOSA's estimate of expected inflation is always close to 2.5%. The same approach was used for SAWRD16, and produced an inflation estimate of 2.45%, per year.

ESCOSA has noted that the rationale behind this approach is that the RBA has policy levers to keep inflation within its target band in the longer term but short-term economic factors will cause inflation to be outside of this band in the near term, which are modelled in the RBA's inflation forecasts.

ESCOSA also notes that a 10-year inflation forecast is used as this is consistent with the average period used to determine other components of the WACC:[6]

> *Ten years of inflation expectations are incorporated, as that matches the expectations inherent in the price of a 10-year bond. The 10-year bond is used within the WACC model to estimate the Risk Free Rate, and the MRP is estimated as a premium over that Risk Free Rate, it is for consistency that the 10 years of inflationary expectations are incorporated, rather than for the four years of the determination.*

As a result of ESCOSA's approach to forecasting inflation, a figure very close to 2.5% is deducted from the nominal WACC allowance to obtain a real WACC allowance.

The current approach, when applied to current market data, produces an historically low real allowed return on equity. This is because the nominal base risk-free rate is currently near its historical low and the essentially constant inflation estimate close to 2.5% is deducted from it.

[6] ESCOSA, *Guidance Paper: Treatment of inflation in the regulatory rate of return*, June 2019, p.8. In Section 4.5 of this report, we consider the merits of this argument about matching the tenor of other WACC parameters.

3 POTENTIAL FOR UNDER- OR OVER-RECOVERY DUE TO TREATMENT OF INFLATION

Key points

- The propensity for ESCOSA's proposed approach to guarantee an estimate of expected inflation very close to 2.5%, regardless of market circumstances means that in some regulatory periods (i.e., when the estimate of expected inflation is too high) SAW will be under-compensated and consumers will underpay relative to the efficient cost. Symmetrically, if the estimate of expected inflation is too low, SAW will be over-compensated and consumers will overpay.
- The scale of under-compensation or over-compensation to SAW (and, equivalently, underpayment or overpayment by consumers) can be very material. Given plausible forecasts of SAW's asset base, the allowed nominal WACC and true inflation expectations, the extent of over-compensation or under-compensation over a single period could easily exceed $500 million.[7]
- ESCOSA's objective should be to ensure that *every* generation of consumers pays the efficient cost, rather than for some generations of consumers to be cross-subsidising others. That requires the best estimate of expected inflation for *every* regulatory control period. It is not enough to simply hope that the periods of overpayment and underpayment by consumers average out over the long-run. That is, the debt holders will always receive their contracted nominal return in full (so long as SAW does not default) in which case any undercompensation is borne by the equity holder.
- Equity investors will earn less than the real return on equity they require if ESCOSA's estimate of inflation expectations exceeds the market's true expectations of inflation and actual inflation.
- During periods of under-compensation to SAW (as is currently the case), the losses suffered by equity investors are exacerbated by the fact that ESCOSA provides SAW with only a real return on debt. SAW, like most other businesses in Australia, issues nominal debt. This means SAW must make nominal interest payments to service its debt while receiving only a real cash return to cover those debt service obligations. If SAW is to avoid defaulting on its debt, its equity investor must step to make up the cash shortfall by accepting lower returns. These already-compressed cash equity returns are squeezed even further when ESCOSA misestimates inflation expectations. Any resulting under-recovery is borne entirely by the shareholder, rather than being shared between equity and debt investors.
- Under ESCOSA's current approach, and in the current financial market conditions, there is a *negative* cash return to equity which manifests via ESCOSA's regulatory model producing negative net profit after tax (NPAT) for each year of the regulatory period.

[7] See, for example, **Table 1** below.

3.1 Overview

3.2 Cycles of under- and over-compensation

In the previous section, we noted that ESCOSA's approach to the allowed return on assets is to begin by estimating the required nominal return and to then deduct an estimate of expected inflation. If that estimate of expected inflation is too high, the deduction will be too high and the regulated firm will be under-compensated and consumers will underpay relative to the efficient cost. Symmetrically, if the estimate of expected inflation is too low, the regulated firm will be over-compensated and consumers will overpay.

We show in this section that ESCOSA's approach to estimating expected inflation essentially guarantees an estimate very close to 2.5%. Thus, to the extent that true expected inflation is sometimes below 2.5% and sometimes above, there will be a cycle of under-recovery in some regulatory periods and over-recovery in others. Some generations of consumers will pay too little and some will pay too much – relative to the efficient cost. It is for this reason that the primary objective for a regulator ought to be to seek to ensure that *every* generation of consumers pays the efficient cost, rather than for some generations of consumers to be cross-subsidising others. That requires the best estimate of expected inflation for *every* regulatory control period – it is not enough that the regulatory estimate of inflation averages out over the long-run such that consumers pay fair prices on average over some future horizon (via overpayment by some generations of consumers averaging out underpayment by others).

In the current financial market conditions, it is highly likely that ESCOSA's current approach over-estimates inflation, leading to under-recovery for SAW. At present, inflation and interest rates in Australia are both very low. Inflation has been below the RBA's target inflation band for a number of years. As discussed in Section 4 of this report, there is credible evidence indicating that this situation is expected to continue for (at least) the near term. Under these prevailing market conditions, ESCOSA's current approach to setting the real allowed return on equity and estimating expected inflation is likely to result in SAW under-recovering its efficient real rate of return.

3.3 Impact on revenues within a regulatory period

As explained in the previous section, ESCOSA first determines the nominal required return on debt and equity and then deducts its estimate of expected inflation, such that the remainder (i.e., the estimated real return) is provided as a cash return to investors. Any error in ESCOSA's estimate of inflation expectations can have a very material impact on SAW's allowed revenues and cash flows within a regulatory period. By way of illustrative example:

- Suppose ESCOSA estimates that the nominal return on equity required by SAW is 5.24% and that the nominal return on debt required by SAW in every year of the regulatory period is 4.51%.[8] Suppose also that ESCOSA adopts a benchmark gearing of 60%.
- This implies a nominal vanilla WACC allowance of 4.80%.[9]
- Suppose also that ESCOSA's estimate of expected inflation is 2.50%, but the market's true expectation of inflation is 1.50% (i.e., ESCOSA has overestimated inflation expectations by 1.00%).

[8] These were SAW's estimates of the return on equity and return on debt implied by ESCOSA's proposed WACC approach, as at the end of October 2019.

[9] 5.24% x (1 – 60%) + 4.51% x 60%.

Table 1 shows that SAW's revenue allowance can be highly sensitive to ESCOSA's estimate of inflation expectations. The first row of the Table presents SAW's forecast opening RAB for each year of 2020-24 regulatory period. The second row presents the return on capital allowance (i.e., the real cash return to SAW, computed as the product of the real WACC allowance and the opening RAB) for each year of the regulatory period, assuming ESCOSA's estimate of expected inflation (i.e., 2.50%). The third row presents the return on capital allowance assuming the market's expectation of inflation (i.e., 1.50%). The final row presents the difference in the return on capital allowances under the two inflation scenarios.

Table 1: Sensitivity of allowed revenues ($2018, million) to estimate of inflation expectations

	2020/21	2021/22	2022/23	2023/24
SAW opening RAB	$13,237.50	$13,481.60	$13,565.90	$13,683.10
Return on capital - Inflation = 2.5%	$297.29	$302.78	$304.67	$307.30
Return on capital - Inflation = 1.5%	$430.64	$438.58	$441.33	$445.14
Difference	$133.35	$135.81	$136.66	$137.84

Source: SAW data; Frontier Economics analysis.

Note: The total forecast RAB presented in this Table reflects water and sewerage assets.

In this example, which uses plausible values for SAW's RAB, estimates of the nominal WACC, and the market's expectation of inflation, the regulated revenues that SAW is permitted to receive, varies very substantially depending on whether an inflation estimate of 2.50% or 1.50% is adopted by ESCOSA. The total difference in revenues between the two scenarios, over the regulated regulatory period, is approximately $543.65 million (not accounting for the time value of money).

The illustrative example shows that SAW would receive a materially lower cash return within the regulatory period than it ought to receive if true inflation expectations are lower than ESCOSA's estimate. This means that consumers served by SAW within the regulatory period in question will pay less than they ought to. However, this issue is symmetric. That is, if true inflation expectations exceed ESCOSA's estimate, then SAW would be provided with too high a revenue allowance, and consumers served by SAW over the regulatory period in question would be paying more than they ought to.

3.4 Impact on cash return to equity

ESCOSA's current approach to inflation exacerbates issues relating to the cash return available to equity holders. As noted in the previous section, ESCOSA's framework allows SAW a *real* cash return on capital within each regulatory period. However, nearly all debt raised by corporates in Australia (including regulated businesses such as SAW) is *nominal* debt. In this case, the entire return on debt must be paid in cash (that being a contractual obligation of the regulated firm to its lenders). Because ESCOSA's approach provides only the real return in the form of cash, there will be a cash flow shortfall

in relation to the return on debt. Any such cash flow shortfall must be covered from the cash return available to equity holders, as illustrated in **Table 2** below.

Table 2 shows that debt holders require a total cash payment of $3.60, but that the ESCOSA approach provides a cash return of only $2.10. The shortfall of $1.50 must be paid out of the cash return provided to equity holders. The debt holders then receive their required return in the form of cash (which is a contractual requirement of standard nominal debt). In the example above, the equity holders receive a small cash return and benefit from indexation of the entire RAB. As noted above, this RAB indexation represents the present value of future cash flows to be received over the remaining life of the assets.

In the context of **Table 2**, there are two potential problems that are exacerbated in the prevailing market conditions.

Table 2: Illustration of impact of ESCOSA approach on the cash return to equity

NOTATION	ITEM	DEBT	EQUITY	COMMENTS
A	Value	$60	$40	60% gearing.
B	Nominal return	6.0%	8.0%	
C=A×B	Total required return	$3.60	$3.20	
D	Expected inflation	2.5%	2.5%	
E=B-D	Real return	3.5%	5.5%	Nominal return less inflation.
F=A×E	Allowed cash return	$2.10	$2.20	Real return is allowed in cash.
G=F-C	Cash flow shortfall	-$1.50		Insufficient cash to pay total return on debt.
H	Cash transfer	$1.50	-$1.50	Transfer of cash from equity holders to ensure that debt holders are paid.
I=F+H	Cash paid to investors	$3.60	$0.70	
J=100×D	RAB indexation		$2.50	Debt holders have been paid in full in cash, so equity holders receive entire benefit of RAB indexation.
K=I+J=C	Total return to investors	$3.60	$3.20	Debt holders receive entire return in cash; equity holders receive majority of return via RAB indexation.

Source: Frontier Economics calculations.

The first potential problem relates to the case where ESCOSA has over-estimated expected inflation. In this case, ESCOSA's deduction for expected inflation (Row D) will be too high and the allowed real return (Rows E and F) will be too low. The effect of this mis-estimation will be borne entirely by the equity holders, since the debt holders must receive their cash return of $3.60 or the firm will be in default. For example, suppose that the market was expecting inflation of 2.0% and that inflation actually did turn

out to be 2.0%. In that case, the equity holders would receive only $2.00 of value from RAB indexation (Row J) and would be under-compensated by $0.50 due to the mis-estimate of expected inflation.

The second potential problem arises when there is an inconsistency between the estimates of the nominal required return on equity and inflation (Rows B and D). In particular, ESCOSA's estimate of the nominal required return on equity varies one-for-one with changes in the nominal government bond yield. In the current market conditions, nominal government bond yields are very low. One reason for that is very low inflation expectations. Maintaining a high inflation estimate (e.g., close to 2.5%) would be inconsistent with the very low nominal government bond yields that can be currently observed. This can have the effect of producing a *negative* cash return to equity, which manifests via the regulatory model producing negative net profit after tax (NPAT) for each year of the regulatory period, as illustrated in **Table 3** below.

Table 3: Illustration of impact of ESCOSA approach on the cash return to equity: Prevailing market conditions

NOTATION	ITEM	DEBT	EQUITY	COMMENTS
A	Value	60	40	60% gearing.
B	Nominal return	4.5%	5.5%	
C=A×B	Total required return	2.70	2.20	
D	Expected inflation	2.5%	2.5%	
E=B-D	Real return	2.0%	3.0%	Nominal return less inflation.
F=A×E	Allowed cash return	1.20	1.20	Real return is allowed in cash.
G=F-C	Cash flow shortfall	-1.50		Insufficient cash to pay total return on debt.
H	Cash transfer	1.50	-1.50	Transfer of cash from equity holders to ensure that debt holders are paid.
I=F+H	Cash paid to investors	2.70	-0.30	
J=100×D	RAB indexation		2.50	Debt holders have been paid in full in cash, so equity holders receive entire benefit of RAB indexation.
K=I+J=C	Total return to investors	2.70	2.20	Debt holders receive entire return in cash; equity holders receive majority of return via RAB indexation.

Source: Frontier Economics calculations.

Table 3 shows that a low allowed return on equity paired with a relatively high estimate of expected inflation results in a negative cash return to equity. Thus, not only is there no cash available to pay dividends, but rather equity holders would be required to *pay in* additional equity capital to benefit from the assumed RAB indexation. Of course, if the market is expecting inflation of only 2.0%, and that is

what occurs, the actual benefit of RAB indexation will be lower. In this case, equity holders will have had to contribute additional equity capital in return for a future benefit that does not fully materialize. It would be unreasonable to expect a firm in this situation to invest appropriately in the delivery of regulated services.

The ESC Act requires that in performing its regulatory functions, ESCOSA:[10]

> *must—*
>
> *have as its primary objective protection of the long term interests of South Australian consumers with respect to the price, quality and reliability of essential services*

That is, ESCOSA is required to protect the long term interests of South Australian consumers with respect to "quality" and "reliability of essential services" as well as price. The ESC Act does not direct ESCOSA to focus on minimising prices to consumers at the expense of service quality and reliability.

The provision of high quality and reliable services requires long term investment by regulated businesses such as SAW. Such long term investment can only occur if regulated businesses are allowed to earn a reasonable rate of return on those investments. Regulated businesses that are forced to earn a return lower than is required to cover their cost of funds, or which threatens the financial viability of the business, cannot invest adequately. Indeed, this is recognised in the ESC Act, which requires ESCOSA to have regard to the need to (amongst other things):[11]

> *facilitate maintenance of the financial viability of regulated industries and the incentive for long term investment*

In our view, a regulatory regime that results in negative regulated cash returns to equity is incompatible with facilitating "maintenance of the financial viability of regulated industries and the incentive for long term investment."

3.5 Modelling the sources of potential under-recovery in the prevailing market conditions

In the remainder of this section, we present the results from a simple stylised model to demonstrate the problem of potential under-recovery in the prevailing market conditions. We use scenario analysis to provide insights on the source of the under-recovery, and offer some observations on the implications for the financial viability of a business regulated under ESCOSA's current regulatory framework.

[10] ESC Act, section 6(a).

[11] ESC Act, section 6(a)(vi).

3.5.1 Assumptions

Consider a business that has a RAB of $100 million. For simplicity, assume that that the RAB is not subject to any depreciation, and that the business's allowances for opex, capex and tax will be zero over the regulatory control period.[12] Further, assume that:

- The regulator estimates the nominal return on equity perfectly (i.e., without error) to be 5.5% p.a.;[13]
- The regulator estimates the nominal return on debt perfectly to be 4.5% p.a.[14] This nominal cost of debt, along with a nominal cost of equity of 5.5%, implies a nominal vanilla WACC of 4.9% p.a.;[15]
- ESCOSA derives an estimate of inflation over the regulatory control period to be 2.5% p.a.;
- The benchmark gearing assumption (which matches the actual gearing of the business) is 60%; and
- The business raises only nominal debt, so it is obliged to make nominal interest payments on debt.

Under these assumptions:

- ESCOSA's estimate of the real return on equity would be 3.0% p.a.;[16] and
- ESCOSA's estimate of the real return on debt would be 2.0% p.a.

3.5.2 Scenario 1: ESCOSA sets a *real* cost of debt allowance

Under this scenario, we assume that the market's expectation of inflation matches ESCOSA's estimate of inflation, 2.5% p.a., and that actual inflation turns out as expected by the market and as estimated by ESCOSA. Furthermore, we assume that ESCOSA sets a real cost of debt allowance and a real cost of equity allowance, in line with ESCOSA's existing regulatory framework. Finally, we assume that the business's RAB is indexed forward at actual inflation.[17]

Under this scenario:

- The real allowed return on equity would be $1.2 million (i.e., 3.0% x 40% x $100 million);
- The real allowed return on debt would be $1.2 million (i.e., 2.0% x 60% x $100 million);
- The total allowed real return on capital would be $2.40 million; and
- The RAB indexation benefit received by the business would be $2.50 million (i.e., 2.5% x $100 million). It is important to note that this is not a cash return, but rather an increase in the value of the RAB. This increase represents the NPV of future cash returns received over the remaining economic

[12] The worked examples in the Appendix to this report allow the regulated assets to be depreciated (using the straight line method) over 10 years.

[13] SAW has advised us that its estimate of the return on equity (as at end of October 2019) under ESCOSA's proposed approach for the next regulatory control period is 5.24%. For simplicity, the return on equity figure we use in this simple example is chosen to approximate that estimate.

[14] SAW has advised us that its current estimate of the return on debt (as at end of October 2019) under ESCOSA's proposed approach for the next regulatory control period is approximately 4.51%. For simplicity, the return on debt figure we use in this simple example is chosen to approximate that estimate.

[15] 0.4×5.5% + 0.6×4.5%.

[16] For simplicity, we calculate the real return as the simple difference between the nominal return and the estimate of inflation as an approximation to the Fisher relationship: $Real\ return = \frac{1+Nominal\ return}{1+Inflation\ rate} - 1$. The point being made here is not contingent on our use of this simplifying approximation.

[17] Under ESCOSA's framework, the RAB is not indexed forward for inflation within a regulatory period. Rather, the RAB is rolled forward from one regulatory period to the next using actual inflation. However, the business's prices are indexed to actual inflation within the regulatory period. Hence, our assumption that the RAB is indexed using actual inflation is a rough approximation to ESCOSA's methodology.

life of the assets, assuming that ESCOSA has accurately estimated the return on equity that investors require.

- The total allowed nominal return would be $4.90 million ($2.40 million + $2.50 million), which is consistent with the product of the WACC (4.9%) and RAB ($100).

Note, however, that since the business faces nominal debt obligations, its *required* return on debt (i.e., the revenue requirement to cover exactly its nominal interest payments) is $2.70 million (i.e., 4.5% x 60% x $100 million). That is, the firm is contractually obligated to pay $2.70 million in cash to service its debt. This required cash payment is clearly larger than the allowed cash return on debt of $1.2 million. This shortfall of $1.5 million must be met by the business if it is to avoid defaulting on its debt obligations. Ultimately, this shortfall must be covered using the cash returns available to equity investors—in this instance, $1.2 million. However, even this sum would be insufficient to meet the full nominal debt obligations of the business. Consequently, shareholders would need to contribute a further $0.3 million of equity capital to cover the debt cash shortfall. Hence, the cash return to equity in this scenario would be -$0.3 million. This is the scenario set out in **Table 3** above.

In this case, the RAB indexation benefit received by the business would be $2.50 million. This means, that the total return on equity received by equity investors would be $2.2 million (i.e., $2.50 million via growth in the RAB *plus* a cash return on equity of -$0.3 million). This matches exactly the return on equity required by equity investors, which comprises:

- A real return on equity of $1.2 million (i.e., 3.0% x 40% x $100 million); plus
- Expected growth in the RAB of $1.0 million to account for the market's expectation of inflation (i.e., 2.5% x 40% x $100 million).

Hence, under the assumptions underpinning this scenario, equity investors in this business will receive the returns they require. However, as shown above, they will need to *contribute* equity capital to the business in order to meet the business's nominal debt obligations. In doing so, they will have to forego dividends. It is unlikely that such an outcome would be financially sustainable if it were to persist over the medium to long term.

3.5.3 Scenario 2: ESCOSA sets a *nominal* cost of debt allowance

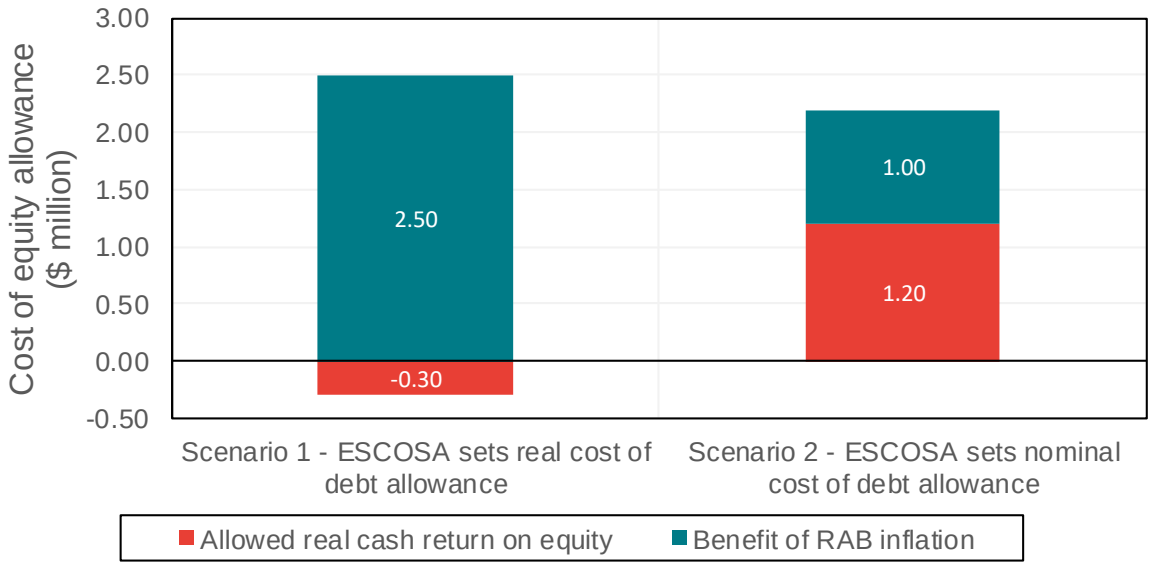
The assumptions under this scenario are identical to those in Scenario 1, with one exception: we assume that ESCOSA sets a nominal cost of debt allowance for the business, rather than a real cost of debt allowance. Under this scenario:

- The real allowed return on equity would be $1.2 million (i.e., 3.0% x 40% x $100 million), as before;
- The nominal (cash) allowed return on debt would be $2.7 million (i.e., 4.5% x 60% x $100 million);
- The total cash return on capital would be $3.9 million; and
- The RAB indexation benefit received by the business would be $1.00 million (i.e., 2.5% x 40% x $100 million).

That is, the business would receive a return on debt cash allowance that matches exactly its nominal cost of debt obligations, so there would be no cash shortfall for equity investors to cover. Hence, equity investors would receive precisely the real cash return on equity they require (i.e., $1.2 million) and the RAB growth they require to meet their inflation expectations (i.e., $1.0 million). The total compensation to equity investors of $2.2 million therefore matches the total return required by the equity investors.

The total equity returns under this scenario are also identical to those under Scenario 1 above. However, the split between real cash returns to equity and RAB growth differs markedly, as shown in **Figure 2** below.

Figure 2: Decomposition of equity returns when either real or nominal cost of debt allowances are set



Source: Frontier Economics analysis.

The Figure above illustrates that ESCOSA's current approach of setting a real cost of debt allowance skews the returns to equity away from cash returns and in favour of growth in the RAB. In our view, this has a number of unfavourable features:

- Firstly, access to low (and potentially negative) cash returns to equity over a sustained period of time could create perverse investment incentives;
- Secondly, equity investors may have to wait extended periods of time in order to recover their returns (i.e., via future regulatory depreciation of the RAB). If the business exists into perpetuity, then investors will never fully recover the required return on equity, as those returns will be continually capitalised into the RAB, with recovery of those returns pushed perpetually into the future; and
- Finally, any regulatory framework that defers recovery of costs will favour consumers today, but at the expense of consumers in the future. Consumers today will pay relatively low prices (as implied by the low (negative) cash returns to equity under Scenario 1). However, consumers in the future will pay relatively higher prices via a greater return *of* capital to the business in future years. In our view, this raises concerns about intergenerational equity.

3.5.4 Scenario 3: Actual inflation turns out to be *lower* than ESCOSA's estimate

The assumptions under this scenario are identical to those in Scenario 2, with one exception: we assume that actual inflation turns out to be 1.0% rather than 2.5% (as estimated by ESCOSA, and as expected by the market).

Under this scenario the total return received by equity investors would be $1.6 million, which would comprise:

- An allowed real cash return on equity of $1.2 million, as above;
- RAB indexation benefit to the business of $0.40 million (i.e., 1.0% x 40% x $100 million).

However, equity investors require a total return on equity of $2.2 million, as above. This means that there will be a shortfall in the nominal returns received by equity investors (relative to the returns they

require) of $0.6 million. However, equity investors would receive a real return on equity of $1.2 million (i.e., a real rate of return of 3.0%), which matches the real return that the equity investors require, given their expectation of inflation of 2.5%.

This is because, whilst equity investors received a RAB indexation benefit ($0.4 million) that was lower than the amount they expected ($1.0 million), the growth in the RAB they actually received was sufficient to preserve their required real return on equity.

3.5.5 Scenario 4: Actual inflation and the market's expectation of inflation both sit *below* ESCOSA's estimate

The assumptions under this scenario are identical to those in Scenario 3, with one exception: we assume that the market's expectation of inflation is in line with actual inflation of 1.0%. Under this scenario, the total return received by equity investors would be $1.6 million, and the total nominal return required by equity investors would be $2.2 million. This means that, once again, the actual nominal return received would be $0.6 million lower than was expected by equity investors.

However, crucially, under this scenario, equity investors would have received a lower real return on equity than they actually required. Specifically, equity investors:

- Would have received a real cash return on equity of $1.2 million (as above); but
- Would have required a real cash return on equity of $1.8 million (i.e., 4.5% x 40% x $100 million).[18]

That is, the equity investors required a real rate of return of 4.5% but would have realised a rate of return of just 3.0%. That is, investors would have suffered an under-recovery of their required *real* return on equity of 1.50%. This is because by over-estimating the market's expectation of inflation, ESCOSA would have deducted too much from the nominal return on equity estimate to obtain the real return on equity allowance.

The key insight from this scenario is that the regulated business will under-recover its required return on equity if ESCOSA over-estimates the market's expectation of inflation (all else remaining equal). The opposite will also be true. That is, if ESCOSA under-estimates the market's expectation of inflation, the regulated business will recover more than its real required return on equity (all else remaining equal).

3.5.6 Scenario 5: Actual inflation and the market's expectation of inflation both sit *below* ESCOSA's estimate and ESCOSA sets a real cost of debt allowance

The assumptions under this scenario are identical to those in Scenario 4, with one exception: we assume that ESCOSA sets a real cost of debt allowance for the business, rather than a nominal cost of debt allowance (per Scenario 1). Under this scenario, equity investors require a total return on equity of $2.2 million (as above). However, they would actually receive a nominal return on equity of just $0.7 million, which would comprise:

- A real cash return on equity of -$0.3 million (as in Scenario 1); and
- RAB indexation benefit of $1.0 million (i.e., 1.0% x $100 million).

This implies a shortfall in the total nominal return on equity of $1.5 million.

[18] Given their inflation expectation of 1.0%, equity investors would have required RAB growth of $0.4 million (i.e., 1.0% x 40% x $100 million).

Moreover, equity investors would suffer under-recovery of the real return on equity. This can be seen by recognising that:

- The realised nominal return on equity would be $0.7 million (as above);
- The realised indexation of the RAB would be $0.4 million (i.e., 1.0% x 40% x $100 million); and
- The real return on equity is therefore $0.3 million.

Given that the equity value in the RAB is $40 million, the realised real rate of return on equity would be 0.75% (i.e., $0.3 million ÷ $40 million). However, as in Scenario 4 above, the required real return on equity would be 4.50%, given that the market's expectation of inflation is 1.0% p.a. This implies that equity investors would face under-recovery of their required rate of return of 3.75%.

This scenario shows that the under-recovery of real returns experienced by equity investors (when inflation expectations sit below ESCOSA's estimate) are amplified when equity investors must also cover any shortfall required in order for the firm to meet its debt obligations. Scenario 1 showed that such shortfalls would arise when the business faces nominal debt obligations but is only permitted a real cost of debt allowance.

In our view, Scenario 5 mirrors the circumstances faced by SAW at the present time. Specifically:

- Actual inflation is significantly lower at the present time than ESCOSA's estimate of inflation;
- For the reasons discussed in section 4, it is very likely that the market's expectation of inflation is much closer to actual inflation that ESCOSA's estimate of inflation; and
- ESCOSA permits SAW to earn a real (rather than nominal) cost of debt allowance.

3.6 Summary of findings

Table 4 summaries the key insights from the scenario analysis presented above. The Table shows that the scenario that most closely matches SAW's current circumstances (i.e., Scenario 5) results in equity investors under-recovering the real returns they require for two reasons:

- ESCOSA's estimate of inflation exceeds both actual inflation and the market's expectation of inflation; and
- Equity investors must cover any shortfall between the real cost of debt allowance and nominal cost of debt requirement.

Of the alternative scenarios modelled (i.e., Scenarios 1 to 4), the only scenario in which equity investors earn the real equity return they require is one where (i.e., Scenario 2):

- ESCOSA's estimate of inflation is in line with both actual inflation and the market's expectation of inflation; and
- ESCOSA sets a nominal cost of debt allowance, thereby preventing any shortfall between the real cost of debt allowance and business's nominal cost of debt requirement.

Table 4: Summary of scenario analysis findings

SCENARIO	IMPLICATION
1. ESCOSA sets a real cost of debt allowance. Actual inflation is equivalent to the market's expectation of inflation and ESCOSA's estimate of inflation.	Equity investors' real cash return on equity is eroded to cover the shortfall between the business's real cost of debt allowance and nominal cost of debt obligations. However, equity investors are compensated through higher growth the RAB. Hence, equity investors will earn the overall nominal return required.
2. ESCOSA sets a nominal cost of debt allowance. Actual inflation is equivalent to the market's expectation of inflation and ESCOSA's estimate of inflation.	Equity investors earn the real cash return on equity they require and receive the RAB indexation benefit they require.
3. ESCOSA sets a nominal cost of debt allowance. Actual inflation turns out to be lower than ESCOSA's estimate.	Equity investors earn a lower nominal return than they expect, but earn the real equity return they require.
4. ESCOSA sets a nominal cost of debt allowance. Actual inflation and the market's expectation of inflation both sit below ESCOSA's estimate	Equity investors under-recover they real equity return they require.
5. **Current scenario**: ESCOSA sets a real cost of debt allowance. Actual inflation and the market's expectation of inflation both sit below ESCOSA's estimate and ESCOSA sets a real cost of debt allowance	Under-recovery of real equity returns is amplified because equity investors must cover any shortfall between the real cost of debt allowance and nominal cost of debt requirement.

Source: Frontier Economics.

3.7 SACES

In its recent submission on regulatory inflation, SACES (2019) observes that:[19]

> *…the revenue model for SA Water provides near-full insurance against inflation risk.*

It is important to understand the limits of this statement – in the context of the framework and examples set out above. The premise of the SACES statement is that equity investors require a particular real return on their investment in order to provide equity capital. ESCOSA's revenue model does indeed 'lock in' a particular real return on equity. It does this by starting with an estimate of the required nominal return and then deducting an estimate of expected inflation. The resulting real return is then 'locked in' in the sense that the RAB is adjusted to reflect actual inflation expectations. The model is designed to

[19] SACES (2019), *Estimating inflation expectations for regulatory decisions*, p. i.

provide equity investors with that fixed real return (via distributions) plus compensation for whatever actual inflation turns out to occur (via RAB indexation).

However, as illustrated above, it is also important to consider that debtholders will generally require a particular nominal rate of return as debt is generally issued in nominal terms. In this case, the firm is contractually required to make (a) fixed nominal coupon payments whereas the regulatory model provides (b) a fixed real return plus RAB indexation according to actual inflation outcomes. Of course, it is only by chance that (a) will equal (b) and any difference will be borne by the equity holders. Thus, equity holders are exposed to inflation risk flowing from the fact that the revenue model does not accurately compensate for the (nominal) cost of debt.

It is also important to recognise the risk and consequences of ESCOSA locking in the 'wrong' estimate of expected inflation. For example, if ESCOSA over-estimates expected inflation by 1% (e.g., an ESCOSA estimate of 2.5% relative to a true market estimate of 1.5%), the real rate of return on equity that be 'locked in' under the revenue model will be 1% below the return that investors require.

In summary, it is important to note that the "near full insurance against inflation risk" is limited to the following special circumstances:

- ESCOSA's estimate of expected inflation equals the true market expectation in the prevailing market conditions; and
- Actual inflation turns out to equal expected inflation such that correct compensation is provided in relation to the (nominal) required return on debt.

Outside of this special case, equity holders are not immunized from inflation risk. We have shown above that, in the current market conditions, the combination of ESCOSA's implausibly high estimate of expected inflation and SAW's contractual requirement to pay nominal returns to its debtholders results in the revenue model locking in losses (negative NPAT) for every year of the forthcoming regulatory period.

4 ASSESSMENT OF ESCOSA'S APPROACH TO ESTIMATING EXPECTED INFLATION

Key points

- There is overwhelming evidence from a variety of sources that current market expectations of inflation are well below 2.5% — i.e., between 1.0% and 2.0%. ESCOSA's inflation approach assumes that inflation will revert to the midpoint of the RBA's inflation target range (i.e., 2.5%) within two years. There is no credible support from any source for that assumption.
- ESCOSA notes that the AER conducted a major review of its inflation methodology in 2017 and decided to retain an approach that resembles ESCOSA's approach closely. However, we note that market circumstances have changed very materially since 2017. In view of this, the AER is presently considering whether it should open a fresh review into its inflation methodology.
- ESCOSA has suggested that the problem of "inflation risk" could be addressed via regulatory mechanisms (e.g., pass throughs) or financial products (presumably inflation swaps). Neither of these proposed solutions would address the underlying problem effectively:
  - Cost pass throughs (a) would not deal with cash flow shortfalls as revenues would be adjusted only in future periods; (b) may only be permitted by ESCOSA within narrow circumstances; and (c) would fail to address the problem of ESCOSA mis-estimating the required WACC allowance.
  - Inflation swaps (a) involve a financial cost—which would ultimately be borne by consumers and/or shareholders. Consumers and shareholders should not need to shoulder costs imposed by a flawed regulatory approach; (b) cannot feasibly hedge the under-recovery or over-recovery of revenues created by ESCOSA's present inflation approach; and (c) may be available to some regulated businesses but are not available to consumers. ESCOSA's inflation approach imposes symmetric inflation risk on consumers as well as SAW.
- The problem of "inflation risk" should be addressed by adopting alternative and better approach to forecasting inflation and for setting the allowed return on equity. The ERA in Western Australia has adopted a market-based (i.e., the 'break-even inflation') approach that produces more reasonable estimates of expected inflation than does ESCOSA's approach. IPART has also indicated that it intends to consider whether it should move to the break-even inflation method at its next WACC methodology review.
- ESCOSA considers that it should estimate inflation expectations over a 10-year horizon because it uses 10-year yields to estimate the WACC allowance. This view has created a deep inconsistency in the way SAW is actually compensated under ESCOSA's framework. Whilst ESCOSA uses an estimate of expected inflation over a 10-year horizon to set SAW's allowed real cash return within a regulatory period, the remainder of SAW's total return (i.e., growth in the RAB) is determined using year-on-year inflation over a four-year horizon (i.e., the regulatory period). This inconsistency contributes to the inflation mismatch problem, which in turn results in SAW being under-compensated in some periods and over-compensated in others. In our view ESCOSA should set SAW's allowed real cash return within a regulatory period using an estimate of expected inflation over that regulatory period. IPART adopted this

approach in 2018.

4.1 Overview

In the preceding section we used illustrative examples to demonstrate the issues that may arise when ESCOSA's estimate of inflation does not match the market's true expectation of inflation and/or outturn inflation. We showed that under ESCOSA's current approach to estimating the return on equity, using an inflation forecast that is greater than the market's true expectation of inflation would cause SAW to under-recover its efficient rate of return.

In this section, we examine the likelihood of this problem arising in SAWRD20. In particular, we examine relevant data and evidence to assess whether ESCOSA's approach to forecasting inflation is likely to produce a forecast that is consistent with the market's true expectation of inflation.

As noted in section 2, ESCOSA currently estimates expected inflation as a 10-year average of annual inflation forecasts over the next decade. The forecast for the first year is obtained by taking the RBA's one-year ahead forecast of inflation. From year 2 onwards, ESCOSA assumes that inflation will revert to the midpoint of the RBA's inflation target range – i.e., 2.5%. ESCOSA then calculates an annual long-term inflation forecast by taking a geometric average of the 10 years of inflation expectations. This approach will always produce a forecast that is very close to 2.5%.

In this section, we show that:

- Current inflation is materially below 2.5% and has been for some time. Indeed, the current excursion below the RBA target band (now for 20 consecutive quarters) is the longest on record since the RBA began targeting inflation in the mid-1990s;
- Since 2014, the RBA has consistently over-estimated expected inflation;
- There is a large body of evidence, including from the RBA itself, that the market expects a much slower return to the mid-point of the RBA's target inflation band than what ESCOSA has assumed. This evidence includes:
  - Market data from government bonds and inflation swaps. In this regard, AMP Capital has recently concluded that "Worryingly for the RBA, the market now expects inflation to average around 1.5% over the next 10 years and to stay below 2% for around 25 years";[20]
  - Surveys of market participants;
  - Detailed commentary from the RBA itself; and
  - Market participants questioning the credibility of RBA inflation forecasts.

The combination of these factors suggests that ESCOSA is using a forecast of inflation that is too high under current market conditions, leading to a real risk that SAW will under-recover its efficient rate of return in SAWRD20.

In its Guidance Paper 6, ESCOSA refers to the similarities between its approach to forecasting inflation and the approach adopted by the AER. We note that the AER conducted a comprehensive review of its inflation forecasting methodology in 2017 and concluded that it was fit for purpose. However, and as we set out below, market conditions have changed substantially since the AER's 2017 review. There is now a large and growing body of evidence that indicates that the assumption that inflation will return to 2.5% after one (or even two) years is implausible in the prevailing market conditions. As a result of this, a

[20] ANZ Research, *Inflation Expectations: Anchoring at the wrong point*, August 2019.

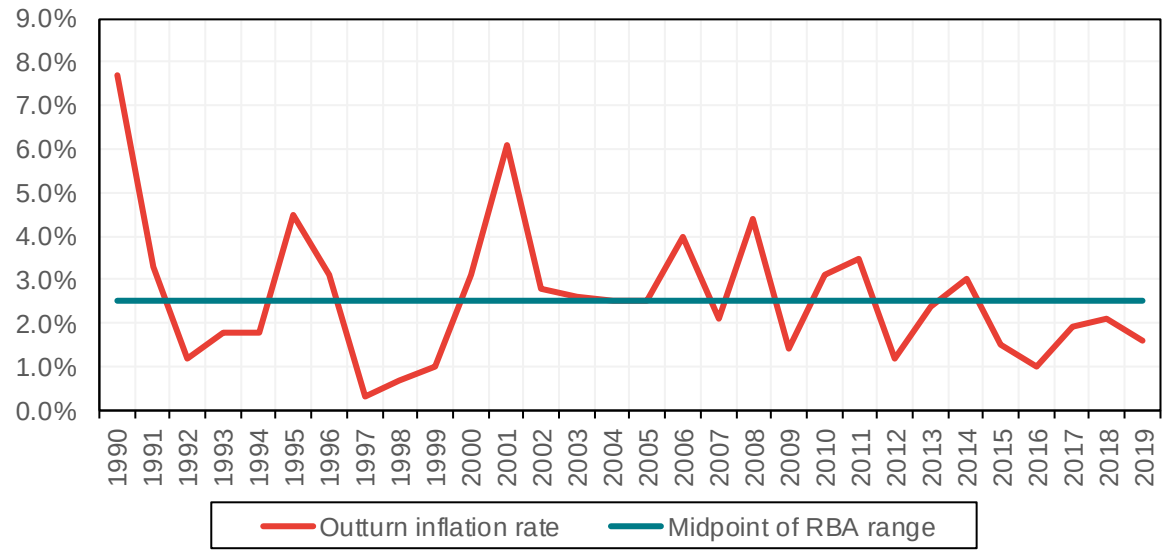
number of electricity networks (e.g., SA Power Networks, Ergon Energy and Energex) have requested that the AER conduct another review of its inflation forecasting methodology in the current market conditions. We understand that in response to these submissions, the AER is hosting a series of workshops with stakeholders to address concerns regarding its inflation forecasts.

4.2 Outturn inflation has been below RBA forecasts

Since the RBA began targeting an inflation range of 2% to 3% in the early 1990s,[21] the *average* rate of inflation has been very close to 2.5%. However, as **Figure 3** below shows, in any given year, the actual rate of inflation can depart materially from this midpoint target.

At present, actual inflation in Australia remains very low by historical standards. The RBA data presented in **Figure 3** shows that outturn inflation over the 12 months to June 2018 was 2.1%, and over the 12 months to June 2019 was 1.6%. Indeed, for a number of years now actual inflation has been well below both the RBA's midpoint target and ESCOSA's inflation forecasts. Of course, we are ultimately concerned with the reasonableness of ESCOSA's assumption that inflation will return to 2.5% immediately after one year in the future, in which case we consider forward-looking estimates of inflation below. What we demonstrate in the figure below is that the assumption about an immediate return to 2.5% after one year has been materially violated for the last several years.

Figure 3: Actual CPI inflation (June-to-June) vs. RBA midpoint target



Source: Frontier analysis of ABS data.

The RBA noted in its August 2016 Statement on Monetary Policy that actual inflation in Australia has been low for some time, and explained that this had been driven by macroeconomic factors such as spare capacity in domestic labour and product markets and heightened retail competition (including by new overseas entrants) in recent years:[22]

[21] RBA, Six years of inflation targeting, Address by Assistant Governor Glenn Stevens, May 1999.

[22] RBA, Statement on monetary policy, August 2016, pp.57-58.

> *Inflation has been low. A confluence of factors is contributing to weakness in domestic cost pressures. This includes spare capacity in labour and a number of product markets, which has been associated with low wage growth and pressures on costs and margins. Some of the weakness in domestic cost pressures also reflects the adjustment to the decline in the terms of trade and mining investment over recent years, while the depreciation of the Australian dollar over the past few years has put upward pressure on the costs of tradable items. …*
>
> *The final prices of tradable items depend on the world market price and exchange rate movements, although there is still a significant domestic cost component. The substantial heightened retail competition over recent years, including from new foreign entrants, has placed downward pressure on retail prices.*

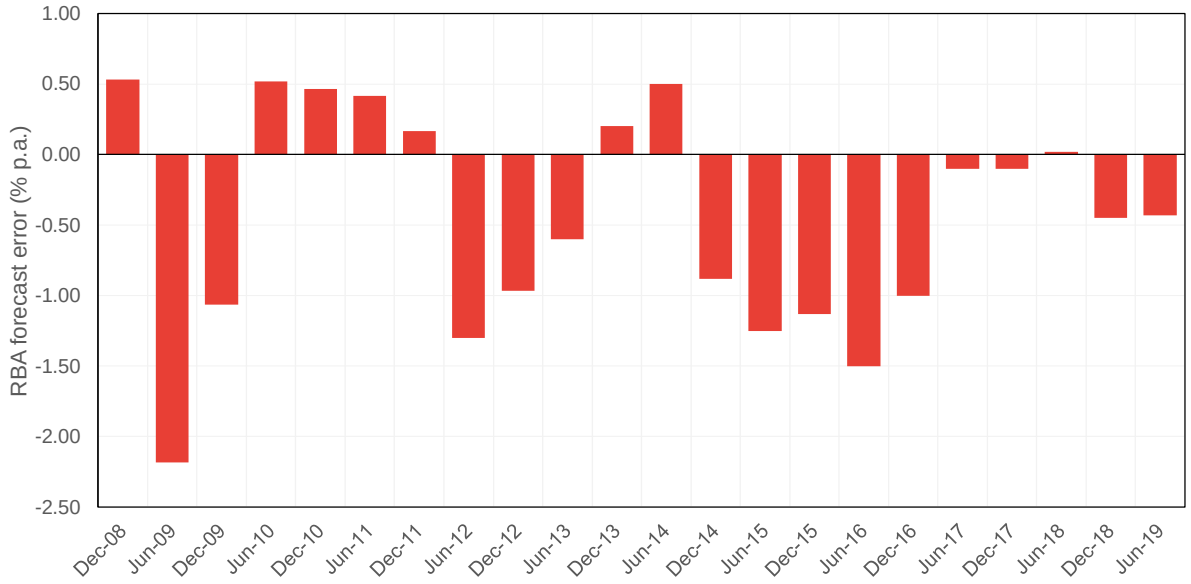
The RBA noted in the same Statement on Monetary Policy that inflation remains low globally, and monetary policy pursued by central banks around the world reflects expectations of low inflation looking forward over "an extended period":[23]

> *Inflation remains below most central banks' targets. Globally, monetary policy continues to be remarkably accommodative and, for most jurisdictions, market participants generally expect it to remain so for an extended period or to become even more stimulatory. In an environment of low inflation and low inflation expectations, the Bank of Japan announced some additional stimulus measures at its July meeting. Market participants anticipate further easing by the European Central Bank and while the Bank of England left its policy rate unchanged at its July meeting, it signalled that it expects to ease policy in August. Market expectations for the US federal funds rate have declined over the past few months such that the next rate rise in the United States is not priced in until late 2017, although members of the Federal Open Market Committee have signalled that there is a reasonable likelihood of an increase before the end of 2016.*

As shown in **Figure 4**, since about 2012, outturn inflation in Australia has been persistently below the RBA's 1-year and 2-year ahead forecasts.

[23] RBA, Statement on monetary policy, August 2016, p.1.

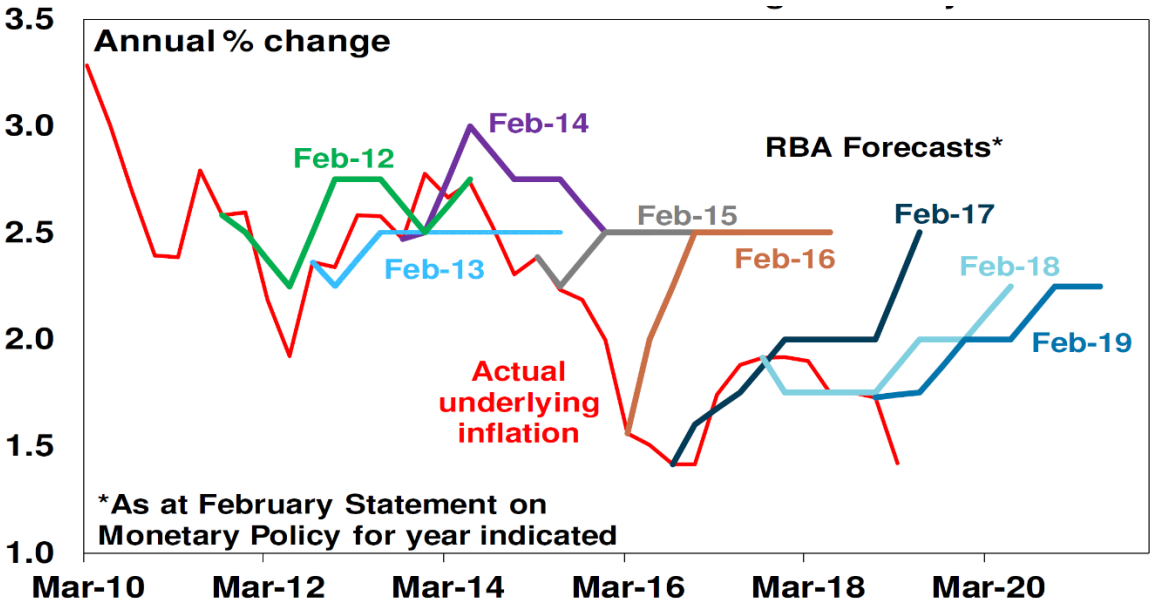
Figure 4: Size of forecasting error for RBA's 1-year ahead inflation forecasts



Source: Frontier analysis of ABS and RBA data.

This has also been recognised by market participants such as AMP Capital. **Figure 5** shows that, since 2014, the RBA has repeatedly forecast a return to the midpoint of its inflation band which has not materialised. As a result, the RBA has uniformly over-estimated future inflation, in most cases by a material amount. This had led to market participants questioning the credibility of RBA forecasts, particularly the suggestion that inflation is likely to quickly return to 2.5%.

Figure 5: Comparison of RBA inflation forecasts and outturn inflation



Source: AMP Capital, Inflation undershoots in Australia – why it's a concern, is the RBA running out of ammo & what it means for investors?, 29 April 2019.

We have analysed out of target band excursions post 1995. We examine each instance where inflation falls outside the 2-3% target zone and then measure the number of quarters before inflation returns to 2.5%. Prior to the current excursion (beginning in 2014-15), the longest period taken for inflation to return to 2.5% was 13 quarters (i.e., the RBA always had inflation back to 2.5% within about 3 years). The current excursion is 20 quarters in a row. As shown in the following section, this is expected (including by the RBA itself) to continue for some time.

4.3 RBA target midpoint does not align with market expectations

As noted above, ESCOSA's current approach to forecasting inflation always produces an estimate that is very close to the midpoint of the RBA's target inflation band (i.e., very close to 2.5%).

ESCOSA has noted that "if long-term inflation expectations were to 'de-anchor' (i.e., shift materially for a sustained period), it would not be valid to use 2.5 per cent as a proxy target." However, ESCOSA goes on to state that uncertainty around long term inflation expectations means that it is inappropriate to adopt an inflation forecast that is 'well below' the RBA's target band.[24]

> *The historically low level of interest rates has prompted some concern about structurally weak aggregate demand in the economy and persistent deflationary pressures, and therefore the likelihood for low inflation in future years (which would be within the SAW RD20 regulatory period). While this risk cannot be dismissed, there are also reasons to think aggregate demand could pick-up and become relatively strong. This uncertainty suggests that in the regulatory determination it is not currently appropriate to use an assumption about long-term inflation expectations which is well below the target band. Furthermore, an assumption of persistent, low inflation has not recently been used by SA Water's owner, the SA Government, for the purposes of the State budget.*

In making this proposition, ESCOSA cites data published by the RBA in 2019 and a paper by Professor Vahey that was prepared in 2017.[25]

It is not clear exactly which RBA publication ESCOSA is referring to. However, we note that the RBA's most recent Statement on Monetary Policy, published in November 2019, forecast inflation for 2020 and 2021 to be between 1.8% and 1.9%, substantially below the midpoint of their target band.

Table 5: RBA inflation forecasts

	JUNE 2020	DECEMBER 2020	JUNE 2021	DECEMBER 2021
CPI	1.9	1.8	1.9	1.9

Source: https://www.rba.gov.au/publications/smp/2019/nov/forecasts.html.

Professor Vahey's paper was prepared in the context of the AER's 2017 review of the roll-forward model (RFM) and the method for estimating expected inflation. The AER's approach to forecasting inflation is

[24] ESCOSA, *Guidance Paper: Treatment of inflation in the regulatory rate of return*, June 2019, p.8.

[25] Vahey, S., *Report to the AER on estimating expected inflation,* September 2017.

similar to that adopted by ESCOSA in that it provides an estimate of inflation that is generally quite close to 2.5%. Specifically, the AER uses forecasts of inflation published by the RBA for the next two years, and combines these with the midpoint of the RBA's target band for inflation (i.e., 2.5 per cent) to extend the series out to ten years. The estimate of expected annual inflation is then the average of these 10 yearly figures. In his report, Professor Vahey found that the AER's approach to forecasting inflation provided the best estimate.

We have not undertaken a review of Professor Vahey's report. However, we note that:

- there is now a substantial body of evidence to suggest that market expectations are that inflation will remain below the midpoint of the RBA's inflation band for several years; and
- on the basis of submissions received from stakeholders, the AER is in the process of conducting a series of workshops with stakeholders to consider its approach to forecasting inflation.

We consider each of these below.

4.3.1 Market evidence on forecast inflation

In our view, there is a substantial body of evidence to suggest that market expectations are that inflation is likely to remain below the midpoint of the RBA's inflation band for several years.

4.3.2 Statements from the RBA

In July 2019, the RBA noted that it would be some time before inflation is back within the target range:[26]

> *"Whether or not further monetary easing is needed, it is reasonable to expect an extended period of low interest rates. On current projections, it will be* ***some time before inflation is comfortably back within the target range****. The Board is strongly committed to making sure we get there and continuing to deliver an average rate of inflation of between 2 and 3 per cent. It is highly unlikely that we will be contemplating higher interest rates until we are confident that inflation will return to around the midpoint of the target range.*
>
> ***Low inflation has become the norm in most economies****. This is evident in this next graph, which shows the share of advanced economies with a core inflation rate below 2 per cent and below 1 per cent (Graph 3). Currently, three-quarters of advanced economies have an inflation rate below 2 per cent, and one-third have an inflation rate below 1 per cent.*
>
> *But countries that are operating nearer to full capacity are more likely to have inflation close to target.* ***It also appears that if you have an extended period of very low inflation –as did Japan and the euro area –it is harder to get back to target as a deflationary mindset takes hold.***

The RBA has continually pushed out the time at which inflation is expected to return to the 2-3% range. In August 2019, it noted as follows:[27]

[26] Statement by Philip Lowe, Governor, Address to Anika Foundation Luncheon, Sydney, 25 July 2019 (emphasis added).

[27] RBA, Opening Statement to Economics Committee, 9 August 2019.

> *Over the year to June, inflation was 1.6 per cent, in both headline and underlying terms, extending the period over which inflation has been below the 2–3 per cent medium-term target range. The Reserve Bank Board remains committed to having inflation return to this range, but* ***it is taking longer than earlier expected.*** *…*
>
> *Looking ahead, inflation is still expected to pick up, but* ***the date at which it is expected to be back at 2 per cent has been pushed out again. Over 2020, inflation is forecast to be a little under 2 per cent and over 2021 it is expected to be a little above 2 per cent****.*

Similar statements were made in November 2019 when the RBA commented that:[28]

> *The central scenario remains for inflation to pick up, but to do so only gradually. In both headline and underlying terms,* ***inflation is expected to be close to 2 per cent in 2020 and 2021.*** *…*
>
> *Given global developments and the evidence of the spare capacity in the Australian economy****, it is reasonable to expect that an extended period of low interest rates will be required in Australia*** *to reach full employment and achieve the inflation target.*

More generally, the RBA has noted that it does not target a mechanical return to the target inflation rate, but rather determines interest rates by taking into account broader welfare maximising outcomes.[29]

> *Our target is to achieve an average rate of inflation, over time, of between 2 and 3 per cent. This means that there is an acceptable degree of variation in inflation from year to year, and we have been prepared to use this flexibility.* ***Our focus is very much on the medium term – hence 'on average' and 'over time'****. …*
>
> *Importantly, we have always seen the inflation target as nested within the broader objective of welfare maximisation. This means that the question the Reserve Bank Board asks itself when making interest rate decisions is how those decisions can best contribute to the welfare of the Australian people. In particular, we are seeking to achieve the maximum sustainable rate of employment consistent with inflation being at target. And we are seeking to do this in a way that limits the build-up of financial imbalances that can be the source of instability down the track. In doing this, we can make a material contribution to the welfare of the society we serve.*

[28] Statement by Philip Lowe, Governor, Monetary Policy Decision, 5 November 2019 (emphasis added).

[29] Philip Lowe, RBA Governor, Sir Leslie Melville Lecture, 29 October 2019.

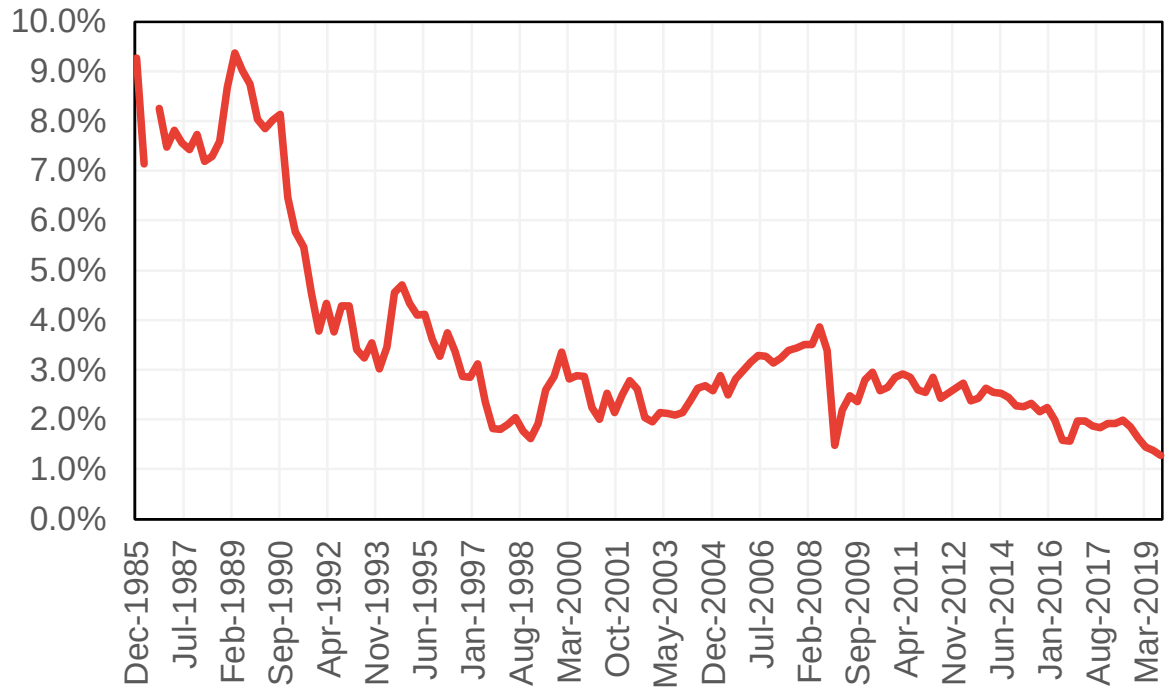
> *I acknowledge there is an element of judgement and discretion in this approach. Certainly, there is more judgement involved than in an approach to monetary policy that* ***mechanically sets interest rates so that forecast inflation is at the target in two years' time.***

In summary, the suggestion that inflation is expected to return to 2.5% after one year (which is the current ESCOSA approach) is inconsistent with the current evidence from the RBA itself.

4.3.3 Market data

The RBA also publishes quarterly data on what it refers to as "inflation expectations." These data, include those presented in **Figure 6** below—namely, breakeven inflation, which is the inflation rate implied by the difference between 10-year nominal bond yield and 10-year inflation indexed bond yield. **Figure 6** indicates that the market's expectation of inflation (according to the breakeven method used by the RBA to estimate market expectations) is approximately 1.3% at the present time.

Figure 6: RBA's estimates of market expectations of inflation



Source: RBA Statistical Table G3. Note: Average annual inflation rate implied by the difference between 10-year nominal bond yield and 10-year inflation indexed bond yield.

4.3.4 Evidence from market surveys

The RBA publishes periodic inflation forecasts based on surveys of key market segments, specifically consumers, businesses, union officials, and market economists. As shown in **Table 6**, the most recent publication of market-based inflation forecasts are generally less than 2.5%, in many cases substantially so.

While the current consumer forecast is higher than the RBA's target inflation band, we note that it is very close to its historical low. Specifically, the RBA publishes a quarterly series of survey inflation expectations extending back to 1989 for business expectations and for shorter periods for other survey groups. **Table 6** below shows the percentile rank of the current forecast, relative to all previous forecasts from the same series. For example, the current consumer forecast is lower than all but 6% of all previous consumer forecasts on record. By contrast, the consumer forecast was higher than 73% of all prior consumer forecasts in 2017 (when, for instance, the AER last reviewed its approach to forecasting inflation).

Indeed, all of the current survey estimates published by the RBA in **Table 6** below are at or close to their historical lows (e.g., a percentile rank of 0% indicates that the current estimate is the lowest ever on reported – it is lower than 0% of all prior estimates). All are materially below their levels in December 2017, indicating a deterioration in inflation expectations over the last two years.

Table 6: RBA market based inflation expectations

TITLE	FORECAST INFLATION (%)	CURRENT ESTIMATE PERCENTILE RANK	DECEMBER 2017 PERCENTILE RANK
Consumer inflation expectations – 1-year ahead	3.1	6%	73%
Business inflation expectations – 3-months ahead	1.0	11%	21%
Union officials' inflation expectations – 1-year ahead	1.8	4%	7%
Union officials' inflation expectations – 2-year ahead	2.0	1%	6%
Market economists' inflation expectations – 1-year ahead	1.9	1%	15%
Market economists' inflation expectations – 2-year ahead	2.0	0%	8%
Break-even 10-year inflation rate	1.3	0%	8%

Source: RBA Statistical Table G3. Note. The breakeven rate is based on the average annual inflation rate implied by the difference between 10-year nominal bond yield and 10-year inflation indexed bond yield. All other rates are based on relevant surveys of the respective groups.

ESCOSA indicates in its Guidance Paper 6 that surveys of economists' expectations of inflation—such as those produced by Consensus Economics—could be a potential alternative to ESCOSA's existing method for estimating inflation expectations.[30] The most recent Consensus Economics long-term inflation forecasts are lower than 2.5% as shown in **Table 7** below. We note that the long-term

[30] ESCOSA, Guidance Paper: Treatment of inflation in the regulatory rate of return, June 2019, p. 14.

Consensus Economics forecasts have been highly persistent at 2.5% and have consistently over-estimated outturn inflation over the last five years.

Table 7: Consensus Economics long-term inflation forecasts

	2021	2022	2023 TO 2029
Consensus Economics inflation forecasts	2.0	2.3	2.4

Source: Consensus Economics, Asia Pacific Consensus Forecasts, 14 October 2019.

4.3.5 Evidence from financial institutions

A number of financial institutions have also stated that long run estimates of inflation are generally below the midpoint of the RBA's target inflation band. For instance, a recent research note by ANZ concludes that 2.5% is no longer an appropriate long-run estimate.[31]

> *Worryingly for the RBA,* ***the market now expects inflation to average around 1.5% over the next 10 years and to stay below 2% for around 25 years****.*
>
> *Most measures of inflation expectations have been moving in the same direction – down. Less than a year ago, the market in the short term expected inflation to average less than 2%, but it still expected inflation to rise and average 2% within 10 years. Now the market does not see the RBA making much progress on getting inflation to pick up.*
>
> *This suggests that the market is seeing this new low-interest-rate environment continuing for a long time, in part due to structurally lower inflation outcomes. What's more,* ***current implied forward rates indicate that the market is not expecting inflation to return to the target band for another 25 years****.*

In addition, as we set out in the preceding section, AMP Capital has noted that the RBA has consistently forecast inflation returning quickly towards the mid-point of its target band, even as actual inflation has consistently moved in the opposite direction over recent years.

4.3.6 Other regulatory views about inflation

In its 2018 Rate of Return Guideline Explanatory Statement, the ERA explained the reasons for rejecting the approach of assuming that inflation will return immediately and permanently to 2.5% in the near term:[32]

[31] ANZ Research, *Inflation Expectations: Anchoring at the wrong point*, August 2019 (emphasis added).

[32] ERA, 2018 Rate of Return Guidelines Explanatory Statement, paragraphs 1580-1581.

> *…given the weight placed on the mid-point of the RBA's target inflation, the inflation forecast remains relatively constant over time and will not reflect changing inflation expectations. The mid-point of the RBA's inflation band is therefore not as dynamic as a market based measure.*
>
> *There is evidence that the RBA inflation forecast and target band method has not responded to the changing inflation environment and* ***leads to an overestimate of expected inflation****.*

As set out above, the RBA has more recently conceded that it considers it to be unlikely that inflation would return to 2.5% after two years in the current financial market conditions.

The ERA went on to note the serious implications of setting allowed returns in a way that embeds an implied negative real risk-free rate:[33]

> *Given the lag in the RBA inflation forecast method, it can result in a negative real risk free rate when the Fisher equation is used. An expected negative real risk free rate is likely to have adverse regulatory implications, since investors would be unwilling to lend funds with an expected negative real rate of return, when withholding investment offers a zero per cent rate of return.*
>
> *Negative expected real rates of return may occur when the RBA overestimates the expected inflation rate. Applying the nominal risk free rate observed from the market, in conjunction with the inflation forecast from the RBA, to the Fisher equation will return a negative real risk free rate under these circumstances.*

This analysis led the ERA to adopt a 'breakeven' estimate of inflation, derived from the yields on real and nominal government bonds. The ERA concluded that:[34]

> *In this approach, estimates of both the nominal and real risk free rates of return are directly observed from the financial markets, so reflect the market expectation for inflation.*

The Independent Panel endorsed that approach:[35]

[33] ERA, 2018 Rate of Return Guidelines Explanatory Statement, paragraphs 1582-1583.

[34] ERA, 2018 Rate of Return Guidelines Explanatory Statement, paragraph 1591.

[35] ERA, 2018 Rate of Return Guidelines Explanatory Statement, paragraph 1585.

The Independent Panel considered that the ERA's Treasury bond implied inflation approach was well-explained, based on sound reasoning and, given its use of appropriate market information, likely to be the best means of forecasting inflation.

As part of its most recent WACC methodology review (concluded in early 2018), IPART noted that:[36]

In theory, the BEI method is superior to a geometric average approach, because it is the expected inflation rate that would make an investor indifferent between an inflation-linked bond and a nominal bond of the same maturity.

There is less reason to expect that the geometric average of RBA's 1-year ahead inflation forecast, and the midpoint of its inflation target, would be the best inflation forecast.

IPART ultimately determined to retain a geometric averaging method for estimating expected inflation (similar to the approach used by ESCOSA—with some differences).[37] However, IPART concluded that it would:[38]

Reconsider whether we should move to a break-even inflation method to calculate the average expected inflation rate at the next review of our WACC method.

4.3.7 Analysis of inflation swaps

Figure 7 below shows the inflation swap curve in 2017 and 2019. As can be seen, in 2017, the swap curve was within the target band by Year 3 and had reached the 2.5% mid-point by Year 25. By contrast, the current inflation swap curve does not reach even the minimum point of the target band any time within the next 30 years. Similarly, **Figure 8** below shows that spot and forward 10-year inflation swap rates are also markedly lower now than they were in 2017, only just reaching the lower end of the target band over the next 20 years.

These Figures suggest that financial market conditions have changed materially in recent years.

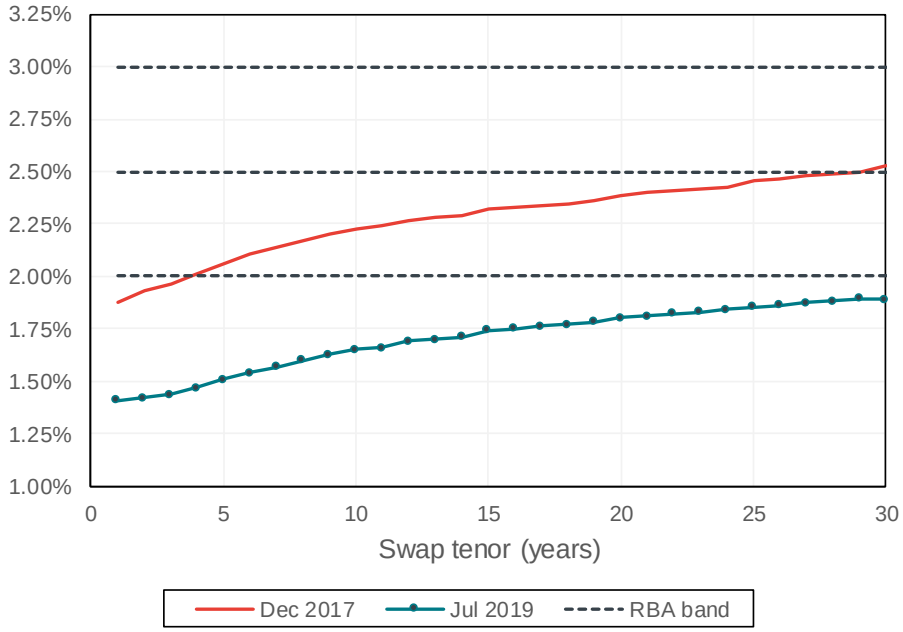
Ultimately, in our view, the current market evidence indicates that it is untenable to assume that inflation will immediately return to 2.5% after one year.

[36] IPART, Review of our WACC method – Draft Report, October 2017, p. 75.

[37] As explained in Section 4.5, IPART determined that it would assess inflation expectations over a period equivalent to the length of the regulatory period in question, rather than 10 years (per its previous approach).

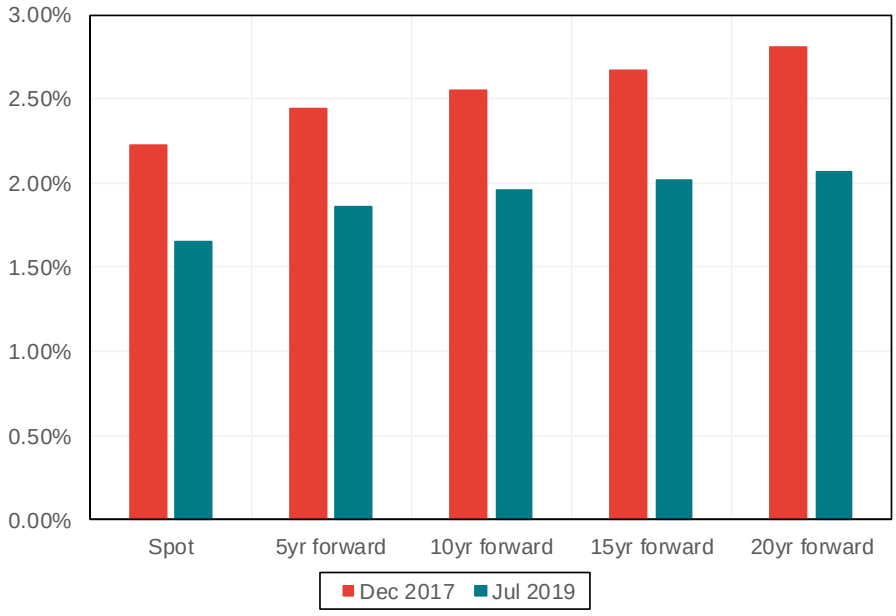
[38] IPART, Review of our WACC method – Final Report, February 2018, p. 80.

Figure 7: Inflation swap curves for 2017 and 2019



Source: Bloomberg

Figure 8: Forward and spot inflation swap rates for 2017 and 2019



Source: Bloomberg.

4.3.8 AER is workshopping its inflation forecasting methodology

In 2017, the AER conducted a comprehensive review of its approach to calculating expected inflation. It evaluated different approaches to forecasting inflation and ultimately concluded that it would retain its current approach. As noted above, this is based on a 10-year average of annual inflation costs, which

is comprised of RBA one- and two-year ahead forecasts for the first two years, and the midpoint of the RBA's target inflation (i.e., 2.5%) thereafter. Similar to ESCOSA's approach, this produces a forecast for inflation that is always close to 2.5%.[39]

> *Our final position is to continue using the current approach to estimate inflation expectations (the current estimate of expected inflation is a combination of the available RBA forecasts with the RBA's target band). The current method is preferred due to it being relatively congruent with long term inflation expectations (as compared to other methods considered), robust, simple to employ, transparent and easy to replicate…*
>
> *We agree with stakeholders' submissions that the RBA method is predicated on the use of the RBA's target band as an anchor for long term inflation expectations. The evidence before us does not indicate long term inflation expectations have deanchored from the RBA's target band at present. We propose to add one additional monitoring process, which is to regularly review survey evidence on long term inflation expectations. If these deviate substantially from the mid-point of the RBA target band (used in the RBA method) we would seek advice from the RBA.*

However, as discussed in above, there have been material changes in market outcomes since the AER's decision and mounting evidence contrary to the proposition that inflation is expected to immediately return to 2.5% after two years. Specifically, inflation has remained low and is expected to remain well below the midpoint of the RBA's inflation target for some time, and interest rates have also dropped further since 2017. This has led a number of electricity distribution businesses to request that the AER undertake a further formal review of its approach to inflation under current market conditions. For instance, SAPN noted as follows:[40]

> *SA Power Networks considers that the AER's approach to forecasting future inflation is not producing reasonable forecasts of future inflation over the forthcoming RCP. In this regard SA Power Networks considers that there is strong evidence indicating that there is* ***little or no chance of inflation averaging 2.36% over the 2020-25 RCP****. SA Power Networks notes that, to the extent that actual inflation turns out to be less than 2.36%,* ***SA Power Networks will not have an opportunity to recover its efficient costs and equity investors will be under-compensated relative to the AER's allowed return on equity****.*

Similar views were put forward by Ergon Energy and Energex in Queensland.[41] We understand that in response to these submissions, the AER is hosting a series of workshops with stakeholders to consider concerns regarding its inflation forecasts. The AER is yet to make a decision about whether to begin a formal review of its inflation methodology.

[39] AER, Final position paper – Regulatory treatment of inflation, December 2017, p.45.

[40] SAPN, 2020-25 Revised Regulatory Proposal – Attachment 3: Rate of Return, 10 December 2019, p.10.

[41] Ergon Energy, *Revised Regulatory Proposal 2020-25*, December 2019, p.41-46; Energex, *Revised Regulatory Proposal 2020-25*, December 2019, p.39-44.

4.4 ESCOSA's proposed solutions would not address the key problems identified

ESCOSA has suggested that there are ways in which SA Water could mitigate inflation risk:[42]

> *SA Water has access to various mechanisms within the broader regulatory framework that can help to mitigate inflation risk, such as a cost-pass through mechanism, and there are available financial products that can help companies to hedge inflation risk.*

4.4.1 Cost pass through mechanism

The cost pass through mechanism allows SAW to apply for adjustments to its maximum revenues at any time to account for any unforeseen, exogenous events that lead to a material change in the cost of providing regulated services. ESCOSA may approve a cost pass through amount that adjusts SAW's maximum revenues to ensure that it recovers the efficient costs associated with that event.

It is unclear how ESCOSA envisages that the cost pass through mechanism it refers to could be used in practice by SAW to address the problems identified in section 3. In section 3, we demonstrate that under ESCOSA's existing framework, equity investors will fail to recovery their required real return on equity when actual inflation and market expectations of inflation are lower than ESCOSA's estimate of inflation. It is unclear whether ESCOSA is suggesting that it would be willing to use the pass through mechanism to allow recovery of any such shortfall.

In our view, there are three reasons why the cost pass through mechanism will not address the inflation mismatch problem. That is:

- cost pass throughs only adjust revenues in the subsequent regulatory period, and therefore will not address any cash flow problems that arise in the current period as a result of misestimation of the required rate of return;
- cost pass throughs are subject to a materiality threshold, and therefore will not apply to mitigate any revenue under-recovery if this is below the threshold; and
- SAW may fail to earn the real required return on equity, even if its estimate of inflation matches actual inflation and market expectations of inflation exactly. This could occur if ESCOSA mis-estimates the required nominal return on equity. As we explain in section 5, in our view ESCOSA's proposed WACC methodology under-estimates materially the required *nominal* return on equity in the current market circumstances. This is contributing materially to SAW's under-recovery of the required real return on equity at the present time. The pass through mechanism cannot be used to address this problem.

4.4.2 Financial instruments to hedge inflation risk

We note that ESCOSA does not specify what financial products SA Water could use to mitigate inflation risk. However, we presume that ESCOSA is referring to inflation swaps.

In our view, inflation swaps would be an inadequate way to address the problem identified above for several reasons:

[42] ESCOSA, *Guidance Paper: Treatment of inflation in the regulatory rate of return*, June 2019, p.6.

- First, using inflation swaps involves a financial cost for the business. These additional costs are likely to be passed through to consumers in the form of higher prices and/or borne by shareholders in the form of lower returns. In our view, consumers and shareholders should not be required to incur the costs of hedging cash flow risk which is created as result of a flawed regulatory approach. As we discuss in Section 6, the problem of 'inflation risk' can be addressed by adopting alternative and better approach to forecasting inflation and for setting the allowed return on equity.
- Secondly, the use of inflation swaps will not eliminate the problem. This is because inflation swaps pay the difference between the swap rate and actual inflation. Hence, inflation swaps could only mitigate the inflation mismatch problem if ESCOSA is using the swap rate as its estimate of the market's expectation of inflation. As shown in **Figure 7** above, there is currently a large difference between ESCOSA's estimate of inflation (which is always close to 2.5%) and current swap rates that can be locked in by regulated businesses.
- Finally, we note that inflation risks are symmetric – regulated businesses and consumers are on opposite sides of the risk. Whereas instruments such as inflation swaps are potentially available to businesses it is not feasible for consumers to make any use of them.

4.5 Market expectation of inflation assessed over wrong period

As noted above, ESCOSA derives an annualised estimate of expected inflation by taking a geometric average of estimates of expected inflation over a 10-year time horizon. ESCOSA states that it uses a 10-year time horizon since it is also using a 10-year forecasting period for the purpose of estimating the risk free rate and debt risk premium.[43]

> *The approach is based on estimating long-term (ten years) inflation expectations. As noted earlier, this reflects that the borrowing and investment decisions are for long horizons and have inflation expectations embedded within them. The Commission uses a ten-year term to be consistent with the term of the market instruments used to arrive at the nominal WACC — that is, ten-year Commonwealth Government Securities (CGS) and ten-year BBB corporate bonds.*

In our view, there is no fundamental economic reason why the time horizon over which expected inflation is calculated should be match the tenor of the risk free rate and debt risk premium assumed by ESCOSA.

Further, we believe that the use of a 10-year time horizon to estimate expected inflation is inconsistent with the way in which returns are compensated in ESCOSA's regulatory framework.

As noted in section 2.2, SAW's overall return on capital will flow from two sources:

- a cash return (i.e., real allowed rate of return multiplied by the RAB) in each period; plus
- growth in the value of the RAB (i.e., indexation of the RAB for actual inflation).

Under ESCOSA's current approach, SAW's total return on capital is based on assessments of inflation over two different time horizons. In particular, the first component of this return (i.e., the cash return) is calculated using inflation forecasts over a 10-year time horizon. However, the second component of this return (i.e., the growth in the value of the RAB) is calculated by escalating the RAB using actual year-on-year inflation over the four-year regulatory period.

[43] ESCOSA, *Guidance Paper: Treatment of inflation in the regulatory rate of return*, June 2019, p.8.

This inconsistency contributes to the inflation mismatch problem, which in turn results in SAW being under-compensated in some periods and over-compensated in others. In our view ESCOSA should set SAW's allowed real cash return within a regulatory period using an estimate of expected inflation over that regulatory period.

We note that in 2018 IPART moved away from estimating inflation expectations over a 10-year future horizon. Under its current approach, IPART estimates inflation expectations using an averaging period equal to the length of the regulatory period. Specifically, in its Final Decision on its 2018 WACC methodology review, IPART stated that its new approach to estimation inflation expectations would be to:[44]

> *Calculate the average expected inflation rate as the geometric average of:*
>
> *– the RBA's 1-year ahead inflation forecast in its most recently issued Statement of Monetary Policy for the first year of the regulatory period, and*
>
> *– the midpoint of the RBA's target inflation band (2.5%), for the remaining years in the regulatory period.*

4.6 Summary of findings

The RBA has consistently over-estimated inflation since 2014. In addition, there is a large body of evidence, including from the RBA itself, that the market expects a much slower return to the midpoint of the RBA's target inflation band than is assumed by ESCOSA's inflation approach. The combination of these factors suggest that ESCOSA is using a forecast of inflation that is too high under current market conditions, leading to a real risk that SAW will under-recover its efficient rate of return in SAWRD20.

ESCOSA has suggested that "inflation risk" imposed by its approach on regulated businesses could be managed through regulatory mechanisms (e.g., pass throughs) or financial products (presumable inflation swaps). Neither of these proposed solutions would address the under-recovery or over-recovery problem created by ESCOSA's proposed inflation methodology. In our view, a more effective way to address "inflation risk" would be for ESCOSA to adopt alternative and better approaches to forecasting inflation and for setting the allowed return on equity.

ESCOSA's inflation approach is premised on a view that inflation expectations should be estimated over a 10-year horizon, since ESCOSA uses 10-year yields to set the WACC allowance. However, this ignores the fact that part of the regulatory return (in the form of indexation of the RAB) is set using actual year-on-year inflation over a four year horizon (i.e., the regulatory period). This reveals a deep inconsistency in ESCOSA's approach to setting the overall return, which is contributing to the under-recovery or over-recovery problem identified in this report. In our view, ESCOSA should set the real WACC allowance using an estimate of inflation expectations over the regulatory period, rather than a 10-year horizon.

[44] IPART, Review of our WACC method – Final Report, February 2018, p. 80.

5 ASSESSMENT OF ESCOSA'S RETURN ON EQUITY APPROACH

Key points

- ESCOSA sets the return on equity allowance by pairing a:
  - 'prevailing' estimate of the risk-free rate, which is typically very volatile over time; with
  - Long-run historical estimate of the market risk premium (MRP), which is for all intents and purposes fixed at 6.0%.
- As a result, ESCOSA's approach produces estimates of the return on equity that move in lock-step with government bond yields. Such an approach can produce outcomes that are clearly economically implausible—as revealed during the peak of the Global Financial Crisis (GFC). During the GFC, government bond yield dropped sharply as demand for safehaven assets (such as highly-rated government bonds) increased. ESCOSA's approach would have implied that return demanded by equity investors fell during the GFC, when clearly it rose.
- Government bond yields are currently near their all-time-low. Consequently, ESCOSA's estimate of the required nominal return on equity is extremely low. When ESCOSA's very high estimate of expected inflation is deducted from this very low estimate of the required nominal return, the resulting real return on equity allowance for SAW is implausibly low.
- An approach that pairs the risk-free rate consistently with the MRP would be more theoretically sound, and produce more reasonable estimates of the required return on equity, than ESCOSA's approach. The approach adopted by IPART is the best such regulatory example we are aware of. We recommend that ESCOSA follow IPART's approach of achieving consistency between the risk-free rate and the MRP.

5.1 Overview

As noted above, ESCOSA appears to be pairing a short-run estimate of the risk-free rate with a fixed long-run estimate of the MRP. Such an approach means that the allowed return on equity moves one-for-one with changes in CGS yields. We showed in section 2.3 that CGS yields are currently very low. As a result of these market conditions, ESCOSA's approach results in a low estimate for the nominal return on equity.

In our view, whilst it is likely that SAW's true required return on equity has declined over recent years, it is very unlikely that it has declined as much as suggested by ESCOSA's method. That is, ESCOSA's method is very likely to be under-estimating SAW's required return on equity at the present time. The reasons for this conclusion are set out in the remainder of this section.

5.2 Inconsistent pairing of risk-free rate and market risk premium

It is well accepted in finance theory that the overall cost of capital remains reasonably stable over time. The WACC is the market clearing price for capital and it reflects investors' opportunity costs of capital and the risk associated with investment opportunities. Since neither the opportunity costs of investors, nor the risk characteristics of individual investments (relative to the market), change rapidly over time,

the overall return required by investors to compensate them for investing capital should also remain relatively stable over time. Further, there is evidence that the risk-free rate and the MRP tend to move in opposite directions. This means that as the risk-free rate falls, the MRP will tend to increase (although not necessarily in a one-for-one fashion) such that the overall return on equity remains fairly stable.

With this in mind, and noting that the regulatory task is to derive a return on equity allowance that best matches the return needed by equity investors in the regulated business, our view is that a good estimate of the return on equity will be one that remains more stable over time (relative to the volatility that might be observed in the individual risk-free rate and MRP parameters).

In practice, this means that the risk-free rate and the MRP should be estimated and combined together in a consistent way. For example:

- If the MRP is estimated using only forward-looking, prevailing market evidence (for example, using the Dividend Growth Model), then the risk-free rate (for the purpose of computing the return on equity allowance) should be estimated consistently using forward-looking, prevailing market evidence (i.e., using an 'on-the-day' rate).
- However, if the MRP is estimated using only historical market return data, then the risk-free rate (for the purpose of calculating the return on equity allowance) should be estimated consistently using a relatively long historical average of returns data.

Both of these approaches will tend to produce relatively similar, stable and reasonable return on equity estimates. For example:

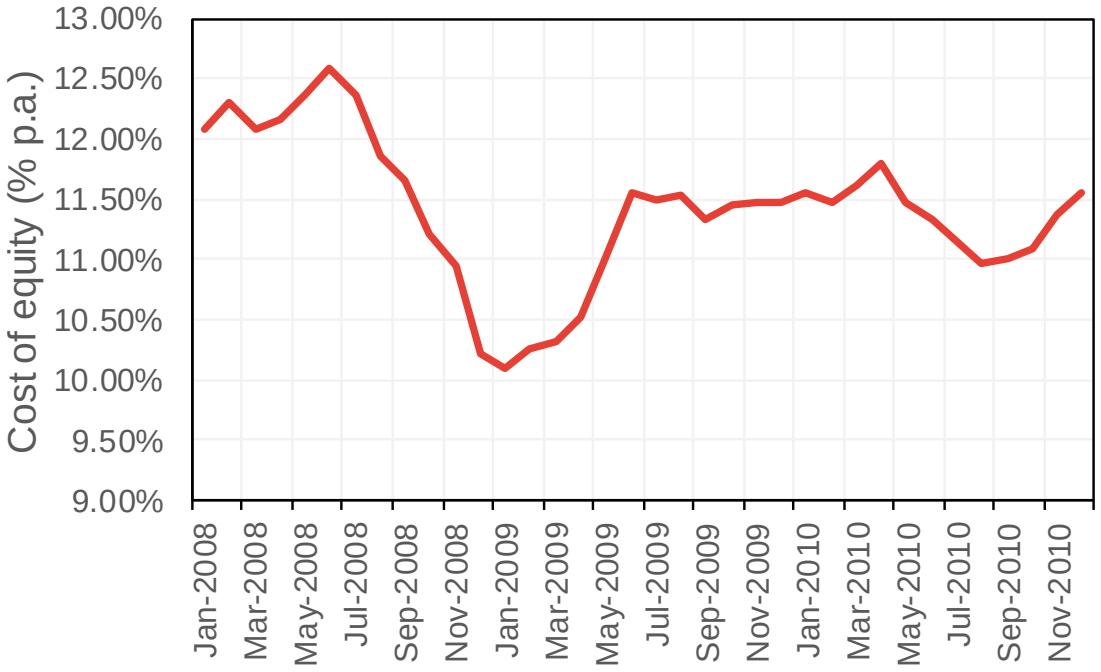
- A return on equity estimate derived using an 'on-the-day' risk-free rate and a forward-looking MRP will tend to be stable because both of these parameter estimates will reflect prevailing market conditions. As the risk-free rate falls, the MRP estimate tends to rise (and vice versa), so the overall return on equity estimate remains relatively stable over time.
- A return on equity estimate derived using a long term historical average of risk-free rates and a MRP estimated using a long historical average of market returns will also remain fairly stable over time. This is because using long historical averages to estimate both these parameters means that each will change only slowly over time, and the resulting return on equity will, consequently, change slowly over time as well.

Mixing and matching risk-free rate and MRP estimates derived using current and historical data can result in implausible regulatory outcomes. For instance, combining an on-the-day risk-free rate estimate with a MRP derived using only long historical averages of market returns (which is the approach adopted by ESCOSA) would result in a return on equity allowance that moves perfectly in line with fluctuations in government bond yields. This is because the MRP estimate (typically derived using more than 130 years of returns data) will remain effectively constant from one year to the next. However, the on-the-day risk-free rate will fluctuate significantly from year to year as the prevailing government bond yield varies. A largely fixed MRP, combined with a very volatile risk-free rate, will result in the overall return on equity changing in line with government bond yields.

A well-known instance of such an approach producing implausible outcomes occurred during the peak of the Global Financial Crisis (GFC), in late 2009. During that time, when the market risk rose to unprecedented levels, Australian government bond yields fell to historic lows as capital flooded away from risky assets into safe government bonds, driving down the yields on those securities. ESCOSA's proposed approach to estimating the required return on equity—combining the on-the-day risk-free rate with an effectively fixed MRP (derived using a very long history of market returns)—would imply that the rate of return demanded by equity investors *fell* sharply (in line with government bond yields) during the peak of the worst financial crisis since the 1930s—as shown in **Figure 9**. This is clearly an implausible

outcome since it was evident that equity investors were demanding *higher*, not *lower*, returns during the peak of the GFC.

Figure 9: Estimates of the cost of equity during the GFC



Source: Frontier Economics analysis using RBA data. Note: The cost of equity in this figure is based by pairing the prevailing risk-free rate with a fixed MRP estimate of 6%

In summary, the approach of pairing the prevailing risk-free rate with a long-run historical MRP ought to be set aside by ESCOSA as it implies that financial crises have the effect of *reducing* the required return on equity. Such an outcome is clearly economically illogical.

For clarity, we do not suggest that financial markets remain in a 'GFC' state today. Rather, we use this period to show the shortcomings of an approach that adds a fixed MRP to the prevailing government bond yield. This approach produced clearly implausible outcomes during the GFC period. This episode, and the prolonged period of falling interest rates that followed, has prompted a number of practitioners to re-examine their approaches to estimating the cost of capital.

5.3 Market evidence on changes in the return on equity

As noted above, ESCOSA appears to be pairing a short-run estimate of the risk-free rate with a fixed long-run estimate of the MRP. Such an approach would suggest that the cost of equity has declined very materially from pre-GFC levels.

Our view is that while the headline required return on equity has reduced as CGB yields have fallen, the fall has not been one-for-one. We consider that there is evidence that the total required return on equity has been slower to decline than would be implied by simply adding a fixed premium to the observed CGB yields.

We note that the Governor of the RBA has recently stated the same view:[45]

> *In this context, it is worth noting that despite the marked decline in global interest rates (and some decline in the cost of equity), average hurdle rates of return for new investments in many countries have not changed much...It seems that there is a global norm for hurdle rates somewhere around the 13 to 14 per cent mark and it is hard to shift this norm, even at record low interest rates.*
>
> *There are a couple of possible explanations for this.*
>
> *The first is that the reduction in the cost of borrowing has been offset by a rise in the required risk premium due to the uncertainties that I spoke about. If this were so, the hurdle rate would be unchanged, with lower interest rates just compensating for the riskier environment.*
>
> *The second possibility is that some firms have been slow to adjust to the new reality of low interest rates. We hear reports that a hurdle rate of return of 13 to 14 per cent has been hardwired into the corporate culture in some companies. Changing this hard-wiring is difficult and time consuming. However, from our liaison with Australian companies, we do know that some companies have lowered their hurdle rates and this is opening up new opportunities for them. It would be good to hear more such reports.*
>
> *My view is that there is an element of truth to both explanations: risk premiums have gone up and, in some cases, hurdle rates of return are too sticky.*

The theory is supported by a range of empirical evidence. Indeed, a number of informed experts, have argued that the overall cost of capital has not fallen in line with government bond yields. For example, in a speech in New York on 21 April 2015, the former Governor of the Reserve Bank of Australia, Glenn Stevens, stated that the equity risk premium appears to have risen to offset the recent falls in the risk-free rate such that the overall required return on equity has not fallen:[46]

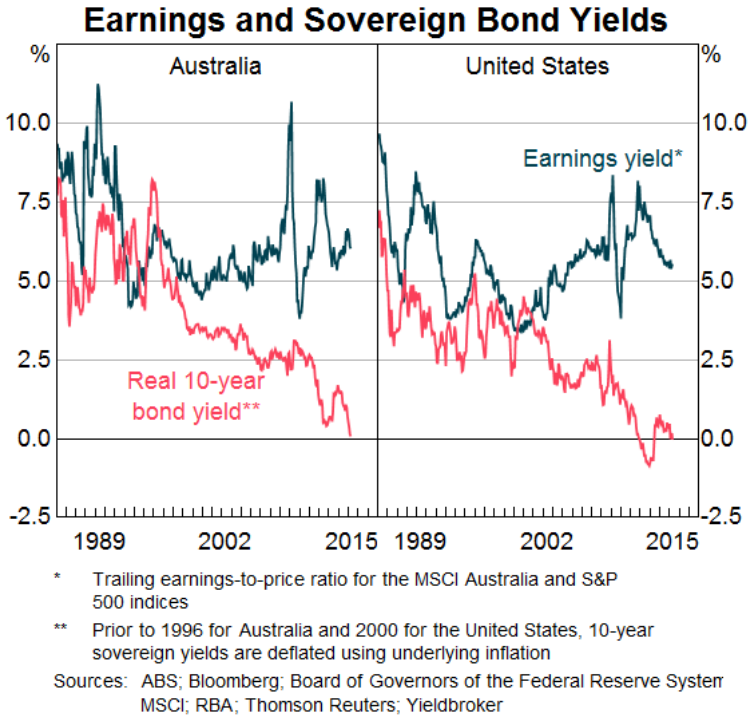
> *…post-crisis, the earnings yield on listed companies seems to have remained where it has historically been for a long time, even as the return on safe assets has collapsed to be close to zero (Graph 2).*[47] ***This seems to imply that the equity risk premium observed ex post has risen even as the risk-free rate has fallen and by about an offsetting amount.***

[45] Lowe, P., October 2019, "Some echoes of Melville," Sir Leslie Melville Lecture, Canberra, pp. 11-12.

[46] Glenn Stevens, Speech to the Australian American Association, New York, 21 April 2015. Emphasis added.

[47] Graph 2 in the quote above is reproduced as Figure 10 below.

Figure 10: Earnings and sovereign bond yields (Graph 2)



Source: Reserve Bank of Australia.

Some recent research undertaken by the RBA confirms that the hurdle rates used by Australian firms to make investment decisions are changed very infrequently and are typically well above prevailing estimates of the cost of capital (where those estimates are based on the approach of adding a constant risk premium to the prevailing government bond yield). That is, the expected rate of return that Australian firms require in order to commit capital to investment opportunities appears to remain relatively stable, even in the face of short-term changes in interest rates. The RBA's research observes that:[48]

> *…in many instances it appears that firms are using hurdle rates that have not changed in a long time, set at a time when nominal long-term interest rates were far higher than they are today. Whether explicit or not, such behaviour is consistent with a reduced appetite for risk or the possibility that risks have increased.*

The notion that the required return on equity has not fallen one-for-one in line with the decline in CGB yields has been recognised over some time and across different markets. For example, Zenner and Junac from JP Morgan note that following the GFC, US government bond yields fell well below historical levels, but they conclude that the cost of equity did not fall in line with government bond yields:[49]

[48] Lane, K., Roswell, T., Firms' investment decisions and interest rates, RBA Bulletin, June 2015, p. 4.

[49] Zenner, M. and E. Junek, 2012, "Musings on low cost of debt and high risk premia," JP Morgan Corporate Finance Advisory, p. 3.

> *So even with a relatively low Treasury rate, the currently high equity risk premium leads to a cost of equity higher than it has been historically. The cost of equity has been lower almost 68% of the time, primarily driven by a market risk premium that has been lower 97% of the time.*

That is, they conclude that the MRP rose to historically high levels, offsetting the decline in government bond yields after the GFC.

Zenner and Junac reach this conclusion by comparing, over time, a number of relatively simple methods for estimating the prevailing cost of equity and the prevailing equity risk premium. They do not suggest that these methods produce accurate or definitive point estimates of either. Rather, they compare prevailing values with historical values to determine whether the current cost of equity and the current equity risk premium are likely to be high or low relative to historical levels. Their conclusion is that:[50]

> *…the equity risk premia, however estimated, have rarely been this high.*

In summary, a number of market participants have concluded that, since the GFC, the market risk premium has increased to offset at least some of the decline in government bond yields and that this has resulted in a cost of equity that is relatively more stable over time.

While there is no reason to think the cost of capital remains completely fixed over time, there is even less reason to think that the cost of capital moves in perfect lock-step up and down with changes in the government bond yield. In order for the overall cost of capital to remain relatively stable as the risk-free rate varies, it must be the case that risk premiums move in the opposite direction to (at least partially) offset any changes in the risk-free rate.

5.4 The problem has been recognised by other regulators

In December 2012, IPART (the NSW economic regulator) initiated a fundamental review of its rate of return methodology. The impetus for that review was a concern from IPART that its WACC methodology at that time (which shares some features of ESCOSA's prevailing approach) was, in the wake of the GFC, no longer fit for purpose. At the conclusion of that review, in December 2013, IPART published the details of its new WACC methodology.[51]

The new methodology included a number of major improvements on IPART's previous approach. One of the main changes was a recognition by IPART that its previous approach to estimating the cost of equity involved an inconsistency that had been exposed by the GFC. Specifically, under the previous approach, IPART estimated the return on equity using the CAPM by coupling:

- An estimate of the prevailing risk-free rate (calculated by taking a 20-day average of yields on Commonwealth Government Securities as close as practicable to the commencement of the regulatory period); with

[50] Zenner, M. and E. Junek, 2012, "Musings on low cost of debt and high risk premia," JP Morgan Corporate Finance Advisory, p. 3.

[51] IPART, Review of WACC methodology, final report, December 2013 (IPART 2013 WACC methodology).

- A fixed MRP estimate (6%) in all determinations.

Adding a fixed MRP to the short-run average of the government bond yield is similar to Origin Energy's current approach, albeit by adopting a short-term historical average of the AUD government bond yield, Origin Energy has sought to limit this impact. IPART was concerned that this approach was leading to implausible estimates of the cost of equity because, essentially, these estimates would move in lock-step with changes in the risk-free rate. IPART was particularly concerned about the fact that its 'constant MRP' approach implies (nonsensically) that the required return on equity *fell* dramatically during the peak of the GFC as government bond yields declined.

For example, IPART noted that:[52]

> *In relatively stable market conditions, there may be a little difference between long-term historic and current market implied estimates of the expected MRP. Since the GFC, market conditions have become significantly more volatile. Estimates of the market implied expected MRP are currently above the historic long-term average of 6%.*
>
> *The application of the CAPM using a stable historic MRP (of 6%) and a prevailing market rate for the risk free rate means that the cost of equity will move in synchronicity with the risk free rate for a given level of equity beta. If the risk free rate fluctuates significantly so will the cost of equity.*
>
> *In late 2008/early 2009, and then again from late 2011, the risk free rate fell to a 50-year low. The overall effect is that the regulatory cost of equity has fallen and may underestimate the cost of equity for regulated businesses when the risk free rate is low. Conversely, it may overestimate the cost of equity when the risk free rate is high.*

IPART went on to explain that:[53]

> *…estimated risk premiums are not stable through time. Risk premiums tend to move in the opposite direction to the risk free rate. As investors may respond to recent losses on riskier assets by shifting to safer assets, prices of those assets are likely to fall, increasing the expected rate of return for a given flow of future dividends. In periods of high risk aversion there is a flight from risky assets to safe assets (such as the risk free rate). This tends to push up the price of safe assets, thereby pushing down their yields. Thus, in these circumstances, a falling risk free rate tends to be associated with rising equity risk premiums (and vice versa).*
>
> *To the extent there is a negative relationship between the risk free rate and the risk premiums on listed equities, the required return of the equity market (being the sum of risk free rate and the market risk premium) is relatively more stable than its individual components.*

[52] IPART, Review of method for determining the WACC: Dealing with uncertainty and changing market conditions, December 2012 (IPART discussion paper) p. 55.

[53] IPART discussion paper, pp. 57-58.

Following this realisation, and after extensive consultation with stakeholders, IPART introduced a new approach, which involved:

- Deriving an estimate of the cost of equity using only current market data, whereby a contemporaneous estimate of the risk-free rate (computed by taking a 40-day average of prevailing government bond yields) would be coupled with a contemporaneous estimate of the MRP (computed using a range of techniques, several of which are versions of the dividend growth model (DGM) that is considered in more detail later in this report). IPART refers to this estimate as the 'current' cost of equity, or alternatively, the 'short-short' approach.
- Deriving an estimate of the cost of equity using only long-term historical averages, whereby a long-term risk-free rate (computed by taking a 10-year historical average of government bond yields) is coupled with an MRP reflecting long-term historical excess returns (typically 6%). IPART refers to this estimate as the 'long-term' or 'historic' cost of equity, or alternatively, the 'long-long' approach.
- As a default position, determining the allowed cost of equity by giving equal weighting to the current and long-term estimates.

In July 2017, IPART commenced another review of its rate of return methodology. IPART's final methodology decision was published in February 2018. IPART determined that it would retain the key elements of the MRP approach it developed in the 2013 review. Namely, IPART decided that it would:

- Continue to estimate a 'current' cost of equity by pairing a current estimate of the risk-free rate with a current estimate of the MRP (determined largely by examining the outputs of five DGMs);[54]
- Continue to estimate a 'long-term' cost of equity by pairing a 10-year average of the government bond yields with a fixed estimate of the long-term MRP of 6%; and
- Determine the default MRP allowance by giving equal weighting to the current and long-term estimates—effectively giving 50/50 weighting to Ibbotson-type estimates and Cornell-type estimates.

In arriving at this conclusion, IPART reiterated that the approach that it followed prior to the 2013 review produces invalid estimates of the required return on equity:[55]

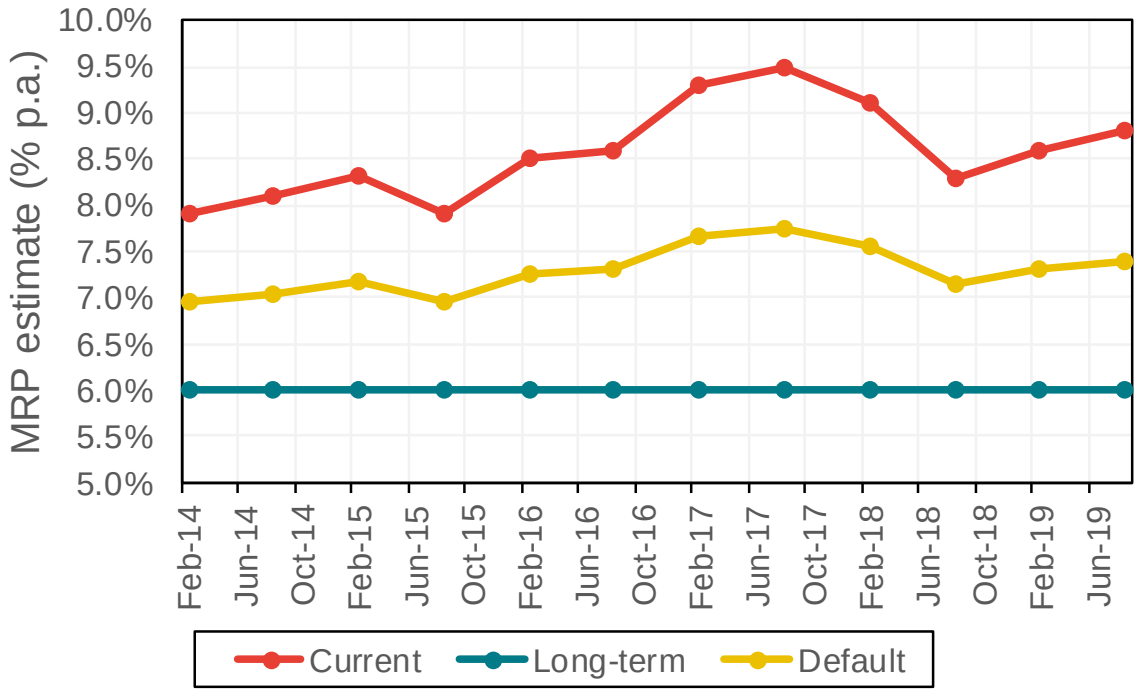
> *We consider it would be invalid to combine a current risk-free rate with a historic MRP, because the result of that calculation would not represent the state of the equity market at any point of time. By combining a current estimate of the risk-free rate with a current MRP estimate, we can approximate the current market price of equity. Likewise, by combining a historic estimate of the risk-free rate with a historic MRP estimate, we can approximate the historic average market price of equity. Either of these benchmarks would be a valid point of reference. When we combine the risk-free rates and MRP estimates in this time-consistent way, the current cost of equity is closer to the historic average cost of equity than either of them is to the time-inconsistent sum.*

IPART publishes an update of its WACC estimates every six months (i.e., in February and August of each year). **Figure 11** below plots IPART's MRP estimates since February 2014, following the introduction of its revised rate of return methodology in December 2013.

[54] IPART decided that it would make some minor refinements to one of the techniques it uses to derive its current MRP estimate, and the way in which it weights estimates from different methods. See IPART 2018 WACC methodology, p. 47.

[55] IPART 2018 WACC methodology, pp. 51-52.

Figure 11: IPART's MRP estimates since February 2014



Source: IPART biannual WACC updates.

There are two striking features of IPART's MRP estimates above:

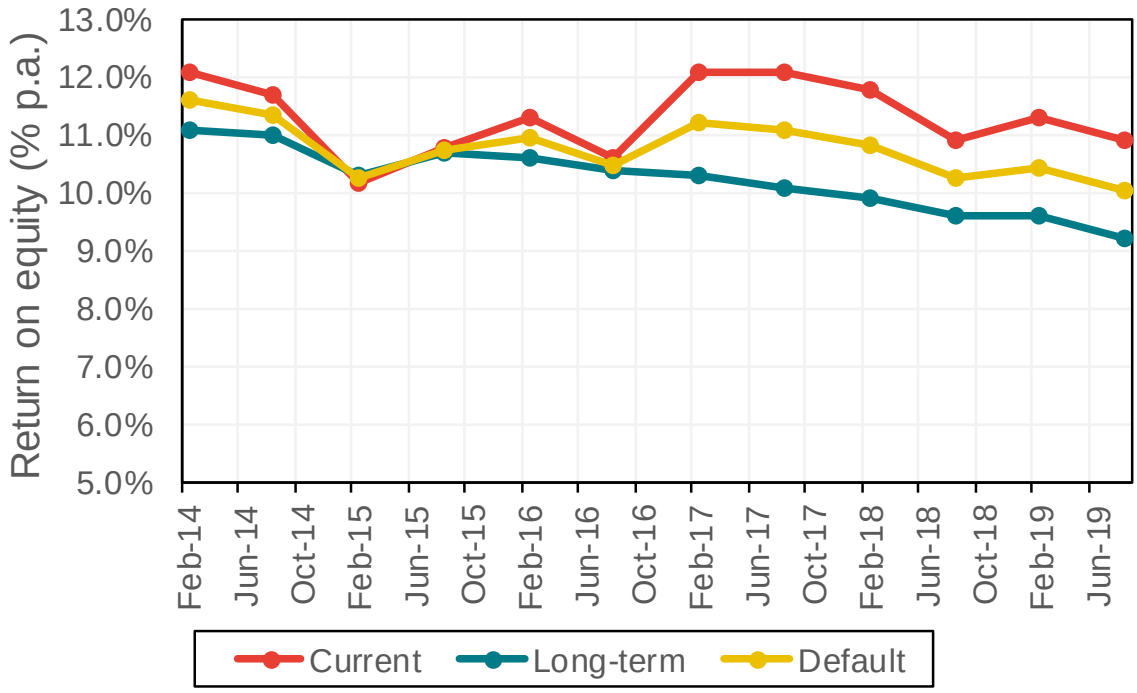
- IPART's estimates have evolved over time to reflect changes in market conditions. This is due to the fact that IPART gives explicit and equal weight to current estimates of the MRP, which reflect prevailing market conditions; and
- IPART's MRP estimates (expressed relative to a 10-year risk-free rate) were materially higher than the long-run MRP estimate of 6%.

As a result, IPART's overall return on equity estimates have remained relatively stable (though not constant) over time. This is demonstrated in **Figure 12**, which plots IPART's biannual total cost of equity estimates (for a notional firm with an equity beta of 1) since February 2014.

If a similar chart were produced over the same time period reflecting ESCOSA's current approach of pairing a shorter-term average of the risk-free rate with a stable long-term average market risk premium of 6%, the result would be a cost of equity that followed the government bond yield down to its current historical lows. Declining government bond yields would have the effect of reducing ESCOSA's estimates of the cost of equity (on a one-for-one basis) whereas the effect on IPART's estimates of the cost of equity are much more muted.

We note that not all regulators adopt the same approach as IPART. For example, the Australian Energy Regulator (AER) currently adopts a mechanistic CAPM approach whereby a fixed constant MRP of 6.1% is added to the prevailing 10-year government bond yield. For the reasons set out above, our view is that such an approach does not currently produce reasonable estimates of the required return on equity. However, for completeness, we note that the approach of pairing a prevailing risk-free rate with an historical average MRP is still adopted by some practitioners.

Figure 12: IPART's cost of equity estimates since February 2014



Source: IPART biannual WACC updates.

5.5 Summary of findings

ESCOSA's approach of pairing a short term (prevailing) estimating of the risk-free rate with a long term estimate of the MRP is inconsistent with finance theory and liable to give rise to implausible outcomes (as occurred during the GFC). It means that the nominal return on equity moves on a one-for-one basis with CGB yields. As a consequence, the substantial drop in CGB yields since the GFC has substantially reduced the nominal return on equity.

In our view, whilst it is likely that SAW's true required return on equity has declined over recent years, it is very unlikely that it has declined as much as suggested by ESCOSA's method. That is, ESCOSA's method is very likely to be under-estimating SAW's required return on equity at the present time

6 OPTIONS TO ADDRESS CONCERNS

Key points

- In order to address the problems identified in this report, we recommend that ESCOSA:
  - Adopt a market-based approach to estimating inflation expectations (Option 3 below), which we show has produced estimates that match actual inflation outcomes much more closely than ESCOSA's approach—especially over the last few years;
  - When adopting a market-based approach, ESCOSA should estimate inflation expectations over the length of the regulatory period rather than a 10-year horizon;
  - Adopt an approach to estimating the required return on equity that pairs the risk-free rate consistently with the MRP (Option 3 below); and
  - Set a nominal rather than real cost of debt allowance for SAW (Option 5).

6.1 Overview

This section sets out, and analyses, a number of potential changes to ESCOSA's methodologies that might be considered as means of addressing the concerns identified above.

We begin by noting that Section 3 of this report identifies two key problems with ESCOSA's current approach to estimating expected inflation:

- Problem 1: ESCOSA's current approach estimates expected inflation to be very close to 2.5% for every regulatory period, whereas expected inflation for a particular regulatory period may be materially different from 2.5%. That is, there may be a discrepancy between ESCOSA's estimate of expected inflation and the true market inflation expectation. Any such discrepancy results in regulated businesses being improperly compensated and consumers paying inefficient prices. This is because the regulatory model has the effect of delivering a real return on capital computed by estimating the required nominal return and deducting the regulator's estimate of expected inflation. If the regulator's estimate of expected inflation is wrong (in the sense that it does not match the true market expectation) the target real return will also be wrong. In the current market conditions, it seems highly likely that the true market expectation of inflation over the forthcoming regulatory period is materially lower than the ESCOSA estimate, in which case the target real return will be lower than the efficient level.
- Problem 2: There is also a mismatch if actual inflation turns out to differ from ESCOSA's estimate of expected inflation. The problem that arises in this case is that regulated businesses generally raise debt finance on nominal terms such that interest payments are fixed in nominal terms. The regulatory model then reduces the allowed return on capital according to ESCOSA's estimate of expected inflation and then inflates the asset base according to actual observed inflation outcomes. Thus, if actual inflation turns out to be lower than ESCOSA's estimate (which seems to be highly likely in the current market conditions) the regulatory allowance will be insufficient to pay the fixed interest payments that the regulated business is contractually required to make.

These problems are best illustrated in Scenario 5 in Section 3.

In summary, under ESCOSA's current approach, the regulatory allowance will differ from the efficient allowance unless there is equality between ESCOSA's estimate of expected inflation over the regulatory period, the true market expectation of inflation, and actual inflation outcomes. This equivalence is illustrated in Scenario 1 in Section 3.

We also note in Section 3 of this report that the problems that flow from any differences between ESCOSA's estimate of expected inflation and market expectations and/or actual outcomes are exacerbated in the prevailing market conditions. This is because the allowed return on equity is at such an extreme historical low that the interplay between the allowed return and inflation estimation is such that SA Water would be locked into a loss-making position – net profit after tax would be negative for every year in the forthcoming regulatory control period.

Thus, there are presently two reasons for ESCOSA to review its approach to estimating expected inflation:

- Since ESCOSA last considered its approach to expected inflation, a substantial body of market evidence has accumulated. This evidence strongly indicates that expected inflation over the forthcoming regulatory control period is materially below the 2.5% figure that the current ESCOSA approach always produces. Thus, in the prevailing market conditions, it is implausible to suggest that inflation is expected to average close to 2.5% over the next regulatory period.
- In the prevailing market conditions, the interplay between ESCOSA's approach to expected inflation and the return on equity is such that SA Water would be locked into a loss-making position whereby net profit after tax would be negative for every year in the forthcoming regulatory control period. Such an outcome would seem to warrant a review of the process that produced it.

In the remainder of this section, we consider a number of approaches that ESCOSA might consider in response to the problems that have been identified above. A brief summary of the potential approaches, and our analysis of them, is as follows:

- **No change to ESCOSA's current approach**

  In our view, neither basis for maintaining the current approach has any merit:

  - The argument that regulatory errors in relation to inflation estimation might tend to cancel out over time is speculative and fails to recognise that this would involve some generations of consumers underpaying at the expense of other generations (symmetrically) overpaying.
  - The argument that regulated businesses can hedge inflation risk using derivative instruments such as inflation swaps fails to recognise that:
    - No instruments are available for hedging any discrepancy between the ESCOSA estimate of expected inflation and the true market expectation.
    - It is infeasible for consumers to use such derivatives to hedge inflation risk.
- **Annual update**

  The usefulness of an annual update depends on how that update would be implemented:

  - Simply repeating the current ESCOSA approach to inflation every year would have no benefit as the estimate of expected inflation would remain very close to 2.5% every year, with all of the consequent problems set out above.
  - The approach of annually updating the regulatory estimate of expected inflation to accord with observed inflation during the previous year would mitigate, but not eliminate, the problems that have been identified in relation to ESCOSA's treatment of inflation.
  - Annual updating would introduce some intra-period price volatility, which some consumers may wish to avoid.
- **Improved estimation approaches for expected inflation and return on equity**

Implied inflation forecasts can be extracted from the prices of traded instruments such as nominal and real government bonds and inflation swaps. These market-based estimates of inflation are currently materially lower than the ESCOSA estimate and they have been materially more closely aligned with actual inflation outcomes in the post-GFC market conditions. Giving at least some weight to the market evidence would tend to mitigate the mismatch between the current ESCOSA forecast and the true market expectation.

We note that the interplay between the allowed return and inflation estimation is such that SA Water would be locked into a loss-making position – net profit after tax would be negative for every year in the forthcoming regulatory control period. Whereas this problem could be mitigated to some extent by adopting an estimate of expected inflation that better reflects the prevailing market conditions, it can also be mitigated by adopting an estimate of the required return on equity that better reflects the prevailing market conditions.

- **Glide path approach**

  The current ESCOSA approach takes the RBA forecast for Year 1 of the regulatory period and then assumes that inflation will return immediately to 2.5% thereafter. The glide path approach simply extends the period over which inflation is assumed to revert to 2.5%. This will have the effect of reducing the regulatory estimate when inflation is low and increasing it when inflation is high, which is likely to mitigate the mismatch between the regulatory estimate and true market expectations. In practice, the glide path approach will typically produce inflation estimates that are not materially dissimilar to those produced by ESCOSA's current approach. This means that this approach may not be effective in addressing the problems that underlie the inflation approach proposed by ESCOSA.

- **Nominal return for return on debt**

  As noted above, Problem 2 arises due to differences between the inflation expectations that are embedded in the fixed nominal interest rates that the regulated firm is contractually bound to pay and outturn inflation during the regulatory period. This problem can be eliminated by simply applying a nominal allowed return on debt – such that the regulatory allowance is set equal to the contractual obligations to debt holders in the benchmark firm.

6.2 Option 1: No change to ESCOSA's current approach

6.2.1 Rationale 1: Regulatory errors cancel out over time

One potential response to the problems identified above is to maintain the current approach on the basis that the errors will tend to cancel out over time. That is, whereas the current ESCOSA approach materially over-estimates inflation in the current market conditions, there may be other market conditions in the future when the reverse is true. In this case, over time there will be some periods where business are under-compensated and other periods where they are over-compensated. Symmetrically, there will be some periods where consumer prices are too high and some where they are too low, relative to efficient levels.

In our view, there are several problems with the hypothesis that such regulatory errors will tend to cancel out over time. The first is that the proposition is speculative and not based on any evidence or modelling. For example, we are unaware of any evidence to support the proposition that episodes of below-average inflation have the same average length as episodes of above-average inflation. By contrast, since the RBA began targeting inflation in the mid-1990s, there has never been a period of above-average inflation as long as the current period of below-average inflation.

In any event, our view is that the regulatory task is best performed by setting efficient prices in every regulatory period, rather than by relying on errors to cancel out over the long run. In order to produce the appropriate incentives for investment and to support allocative efficiency, prices should be set to the

efficient level in every regulatory period, such that investors are appropriately compensated in every regulatory period.

The benefits of setting prices correctly in every regulatory period, rather than relying on errors to cancel out over time, is best illustrated in the context of intergenerational equity. It should not be the case, for example, that current customers should pay prices below the efficient level on the basis that future generations will be (symmetrically) over-charged.

6.2.2 Rationale 2: Regulated businesses can hedge

It might also be argued that no change is required to the current approach on the basis that regulated businesses are able to hedge inflation risk using derivative instruments such as inflation swaps. However, there are two fundamental problems with such an argument:

- Whereas the difference between actual inflation outcomes and the market's expectation of inflation can be hedged with inflation swaps, there is no instrument available to hedge the difference between ESCOSA's estimate of expected inflation and the true market expectation. Any such difference flows through in the form of permanent mis-compensation for the regulated business; and
- It is infeasible to expect consumers to hedge any component of inflation risk. Consequently, some generations of consumers will underpay at the expense of other generations overpaying.

6.3 Option 2: Annual updating of expected inflation and real WACC using previous year's observed inflation outcome

ESCOSA's June 2019 Guidance Paper on inflation suggested that one possible approach to "address inflation risk" would be to update the real WACC allowance annually for inflation.

ESCOSA clarified subsequently in a December 2019 Guidance Paper that it envisages that it would simply re-estimate expected inflation annually, using its current approach.[56] This would be a largely meaningless exercise because each fresh estimate of expected inflation would also be very close to 2.5%. As a result, it would do nothing to address either of the problems set out above, which arise when market expectations of inflation and actual inflation outcomes differ from 2.5%. We note that SACES (2019) has reached the same conclusion on this point:[57]

> *The Commission does not suggest that annual updating will protect against measurement error. But it is worth being clear that it will not address the main potential source of error in the measurement of WACC. This is because the Commission proposes to confine revisions to parameters that can be "objectively estimated" [p. 9], and these are not the source of errors.*

Moving to an annual update of some or all WACC-related parameters would have an effect on the time series of consumer prices. To the extent that parameters are updated annually, prices would have to change annually, resulting in more frequent smaller changes in prices than the current approach of re-setting prices at the time of each regulatory review. Some customers may not wish to bear such year-to-year price volatility. In our view, the important point here is that the type of annual update proposed

[56] ESCOSA, Guidance Paper: Annual updates of the regulatory rate of return, December 2019, p. 9.

[57] SACES (2019), *Estimating inflation expectations for regulatory decisions*, p. 6.

in the Guidance Paper will do nothing to address the current problem in relation to regulatory inflation. The effect on the smoothness of prices, and how that might be perceived by consumers, is therefore not relevant to the current issue, and should not be conflated with the question of how to improve ESCOSA's estimates of expected inflation.

An alternative way of implementing annual updating would be to re-estimate the real WACC each year using outturn inflation from the previous year (i.e., with a one-year lag). The economic rationale for this approach would be that actual inflation in the most recent year would provide a reasonable expectation of inflation in the following year, given the persistence in observed inflation. Such an approach would be technically and administratively feasible, given that ESCOSA already updates SAW's regulated prices within a regulatory period, for actual inflation, in a similar manner.

This approach would address Problem 1 above as it would likely provide a superior estimate of expected inflation to the current approach which effectively always sets expected inflation to something very close to 2.5%. However, this approach would not address Problem 2, which arises due to differences between the inflation expectations that are embedded in the fixed nominal interest rates that the regulated firm is contractually bound to pay and outturn inflation during the regulatory period.

In summary, the approach of annually updating the regulatory estimate of expected inflation to accord with observed inflation during the previous year would mitigate, but not eliminate, the problems that have been identified in relation to ESCOSA's treatment of inflation.

6.4 Option 3: Improved estimation approaches for expected inflation and return on equity

6.4.1 Improved approach to estimating expected inflation

As set out above, problems arise when the ESCOSA estimate of expected inflation differs from the true market expectation of inflation over the relevant regulatory period (Problem 1). This problem can be mitigated by adopting an approach that produces estimates of expected inflation that more closely align with the true market expectation.

Of course, the ideal regulatory approach would be one where the regulatory estimate of expected inflation used for a particular regulatory period exactly matched the true market expectation of average inflation over that same regulatory period. However, it is impossible to directly observe market expectations – indeed, if the market expectation could be observed, regulators would simply use that figure. This is a common issue in financial economics where it is impossible to directly observe market expectations about inflation, returns, interest rates, and so on. The standard approach in such circumstances is based on the rational expectations framework, whereby it is assumed that there is no consistent systematic bias in market expectations. In this case, observed outcomes can be treated as reflecting the market expectation plus random forecast error. Thus, when testing different approaches for estimating expected inflation, the standard method would be to compare the various approaches with observed outcomes.

When testing inflation forecasts against observed outcomes, two aspects of the test are important:

- The goal is to identify the approach that provides the best estimate in the *prevailing* market conditions. Whereas a constant estimate of 2.5% might appear to perform adequately over 100 years (e.g., if actual inflation is above 2.5% in some market conditions and below it in other market conditions), what is required is the best estimate given the relevant information about the *prevailing* market conditions.

- The relevant time horizon is the length of the regulatory period. This is because the regulatory model sets an expected inflation figure for the duration of each regulatory control period.

We have noted above that ESCOSA's current approach always produces an estimate very close to 2.5%. This would only be appropriate if the true market expectation of inflation was very close to 2.5% for every regulatory period in all market conditions, which is highly unlikely. The alternative approaches that are available use observed market prices to derive the implied market expectation for future inflation. Two such market-based approaches are available:

- The breakeven inflation method derives the market's expectation of future inflation from a comparison of nominal and indexed Commonwealth Government Securities. A comparison of the nominal rate on one bond with the real rate on the other bond produces an estimate of implied inflation.
- The inflation swaps method produces a direct estimate of the market's expectation of future inflation, being the market inflation rate for the fixed side of the swap. For the reason that it produces a direct estimate, the use of inflation swaps is the preferred approach of SACES (2019).[58]

We note that previous regulatory reviews of methods for determining expected inflation have identified that the market-based methods are potentially affected by various biases or premiums. For example, the AER's 2017 Inflation Review identified that the bond breakeven and swap approaches to estimating expected inflation are potentially affected by inflation and liquidity risk premiums.[59] The nature of those risk premiums, and their potential effect on estimates of expected inflation, is summarised in **Table 8** below.

Table 8: AER analysis of premiums associated with market estimates of expected inflation

METHOD	INFLATION RISK PREMIUM	LIQUIDITY PREMIUM
Bond breakeven	Nominal bond holders are exposed to inflation risk, so require higher compensation. **Over-estimates** expected inflation.	Nominal bonds more liquid than inflation protected bonds, narrowing differential. **Under-estimates** expected inflation.
Inflation swaps	Payer of floating side bears risk, so requires higher rate on fixed side. **Over-estimates** expected inflation.	More demand to receive floating and pay fixed, so higher rate on fixed side. **Over-estimates** expected inflation.

Source: Frontier Economics, AER (2017) Final Position Paper on Regulatory Treatment of Inflation, Tables 5 and 6.

The AER did not quantify the extent of these premiums or make any adjustments in relation to them. Rather, in 2017 the AER rejected these market data approaches because they are potentially affected by these premiums. A number of submissions to the AER's 2017 Review indicated that the premiums are likely to be small, average out over time, and result in (if anything) and overestimate of expected inflation. For example, the AER acknowledged that:[60]

[58] South Australian Centre for Economic Studies, December 2019, *Estimating inflation expectations for regulatory decisions*.

[59] AER, December 2017, *Final Position Paper on Regulatory Treatment of Inflation*.

[60] AER, December 2017, *Final Position Paper on Regulatory Treatment of Inflation, p. 32*.

CEPA submitted the AER's current approach is not the best estimate of expected inflation and does not necessarily reflect the macroeconomic conditions that market based approaches take into account. CEPA preferred a breakeven inflation approach, without adjustment. It note that while the breakeven approach is subject to some distortions from bias and risk premium, evidence suggests these tend to 'average out' over time and on balance overestimate (rather than underestimate) inflation.

The AER also acknowledged that:[61]

The 2016 CEG Report, Best Estimate of Expected Inflation compares the breakeven method with the AER's current approach and attempts to illustrate that the AER's method performed poorly. CEG stated that the breakeven method has advantages over the AER's current method, including it is a direct measure of inflation expectations in the same bond market that the AER uses to set the nominal rate of return on equity.

In the prevailing market conditions, the market-based estimates of expected inflation are materially lower than ESCOSA's constant estimate close to 2.5%. It would, of course, be disingenuous to observe a market-based estimate of (say) 1.7%, to reject giving any weight at all to that estimate because of concerns that it may be upwardly biased by some risk premium, and to then adopt a figure of 2.5% instead.

In its 2017 WACC methodology review, IPART noted that it had received previous concerns about the breakeven inflation approach, due to illiquidity in the market for indexed-linked bonds, were no longer as acute because:[62]

The depth and liquidity of inflation-linked bond markets have improved significantly in recent years, with investor demand, bond issuance and turnover data increasing significantly in recent years. In addition, the Australian Office of Financial Management (AOFM) – which is responsible for issuing inflation-linked bonds – has committed to maintaining an inflation-linked bond market.

Inflation and liquidity premia are likely to have fallen in line with the increase in the size of the inflation-linked bond market.

IPART conducted its own empirical analysis and concluded the following:[63]

[61] AER, December 2017, *Final Position Paper on Regulatory Treatment of Inflation, p. 32*.

[62] IPART 2018 WACC methodology, p. 79.

[63] IPART 2018 WACC methodology, p. 104.

Our analysis for this review suggests that inflation-linked bond liquidity is currently lower than liquidity in the nominal bond market. However, we consider that bond market liquidity is currently:

- *sufficient, if judgement is applied, to produce an estimate of inflation using the BEI method for 3-5 year regulatory period, and*
- *not appropriate for shorter regulatory windows.*

That is, IPART concluded that one of the main objections expressed by some regulators for the breakeven inflation approach is no longer a material problem if applied to a 3-5 year regulatory period.

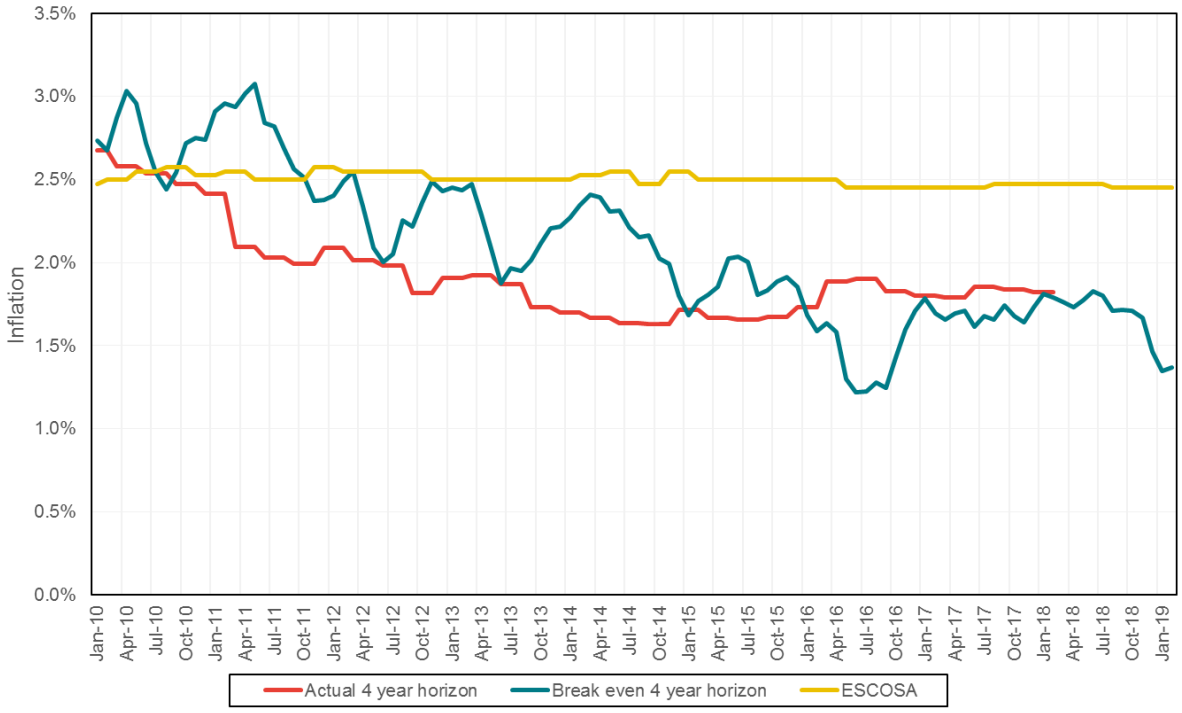
In the context of the current market conditions, we note that:

- If anything, the premiums set out above are likely to result in an overestimate of expected inflation; and
- The market data approaches already generate estimates of expected inflation that are materially lower than ESCOSA's constant 2.5% estimate. Any adjustment to account for any such premium would only serve to reduce the estimate of expected inflation.

Consequently, our view is that, in the current market conditions, the market data approaches produce a conservative estimate of expected inflation in the sense that any bias that may be present acts to reduce allowed revenues.

Of course, the key question is whether, *in the current market conditions*, the market data approaches are likely to produce a superior estimate of expected inflation than ESCOSA's effectively constant 2.5% estimate. In that regard, we have compared the ESCOSA approach to estimating expected inflation with the breakeven method in terms of their relationship with future observed inflation outcomes. **Figure 13** below shows that, since the global financial crisis, the market-based breakeven method of deriving inflation expectations has been materially more closely aligned with the subsequent observed inflation outcomes than the ESCOSA approach of setting expected inflation to essentially a constant of 2.5%.

Figure 13: Inflation estimate forecast performance



Source: RBA data; Frontier Economics calculations.

Taken together, the results set out in **Figure 13** and Section 4 establish that:

- Current market-based estimates indicate that expected inflation in the prevailing market conditions is materially lower than the ESCOSA estimate of approximately 2.5%; and
- The market-based breakeven estimate has been materially more closely aligned with actual inflation outcomes in the post-GFC market conditions.

Consequently, our view is that the approach of giving at least some weight to the market evidence would tend to mitigate the mismatch between the current ESCOSA forecast and the true market expectation.

We note that SACES (2019) has proposed that, rather than having regard to the contemporaneous market-based estimates, one could instead perform a regression analysis to identify the average relationship between the nominal government bond yield and the market-based estimates. Thus, if the nominal government bond yield at a point in time was say 3%, the regression model could be used to estimate the market expectation of inflation at that time. We do not favour this approach for the reason that what is required is the best estimate of expected inflation in the prevailing market conditions. Whereas the current ESCOSA approach always produces an estimate close to the unconditional long-run average of 2.5%, the SACES approach has the advantage of producing an estimate conditional on government bond yields being at 3%. However, nominal government bond yields are not the only determinant of inflation expectations, in which case the SACES approach disregards relevant information about inflation expectations in the prevailing market conditions.

Finally, we note that even a perfect estimate of market inflation expectations does not address Problem 2, which arises due to differences between the inflation expectations that are embedded in the fixed nominal interest rates that the regulated firm is contractually bound to pay and outturn inflation during the regulatory period.

6.4.2 Improved approach to estimating the required return on equity

We have noted above that the allowed return on equity is at such an extreme historical low that the interplay between the allowed return and inflation estimation is such that SA Water would be locked into a loss-making position – net profit after tax would be negative for every year in the forthcoming regulatory control period. Whereas this problem could be mitigated to some extent by adopting an estimate of expected inflation that better reflects the prevailing market conditions, it can also be mitigated by adopting an estimate of the required return on equity that better reflects the prevailing market conditions.

As we have noted in Section 5 ESCOSA's current approach implies that equity capital is currently cheaper than at any time in recorded history. Using approaches such as those outlined in Section 5 may produce more reasonable estimates of the required return on equity in the prevailing market conditions, which in turn would mitigate Problem 2 that we have identified above.

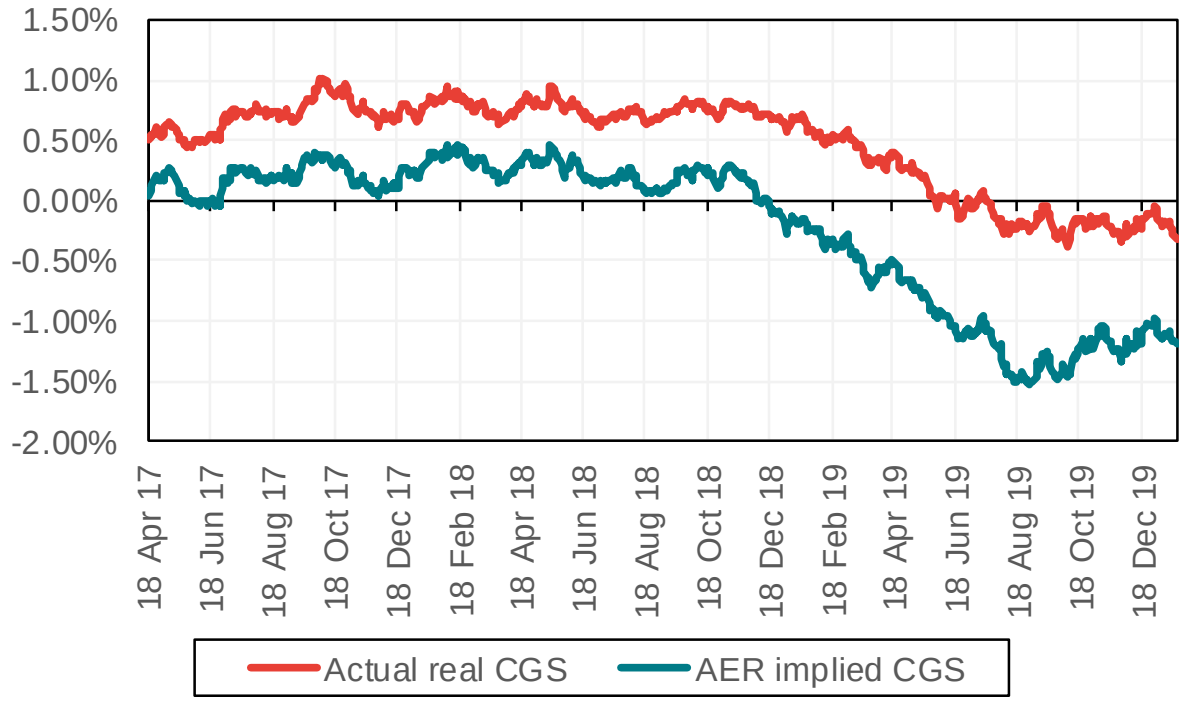
The same issue has arisen in the context of the AER's approach to estimating inflation. The AER approach takes the RBA inflation forecasts for two years and then assumes immediate reversion to 2.5%. Thus, the AER approach also consistently produces an expected inflation estimate very close to 2.5%, albeit with slightly more variation than the ESCOSA approach. In that setting, stakeholders have noted the material difference between:

- The implied real risk-free rate, extracted from the regulatory allowed real return on equity; and
- The observed real risk-free rate derived from the prices of traded inflation-indexed Commonwealth Government Securities (CGS).

For example, **Figure 14** below shows that the gap between the observed real risk-free rate and the real risk-free rate implied by the AER's regulatory approach has widened significantly over the last two years.

In our view, the discrepancy between the real risk-free rate that is implicit in the regulatory allowance, and the corresponding figure that can be observed in capital markets, adds to the reasons for a re-examination of the approach to setting the allowed return on equity that are set out in Section 5 above.

Figure 14: Actual and AER-implied real CGS yields



Source: RBA and Bloomberg data; AER decisions; Frontier Economics analysis.

6.5 Option 4: A glide path for expected inflation

The current ESCOSA approach takes the RBA forecast for Year 1 of the regulatory period and then assumes that inflation will return immediately to 2.5% thereafter. The assumption that inflation will immediately return to 2.5% after one year is implausible in the current market conditions and also inconsistent with the RBA's own forecast for inflation in year 2 of the forthcoming regulatory period.

An alternative approach would be a glide path approach, which simply extends the period over which inflation is assumed to revert to 2.5%. This would have the effect of reducing the regulatory estimate when inflation is low and increasing it when inflation is high, which is likely to mitigate the mismatch between the regulatory estimate and true market expectations.

For example, it could be assumed that inflation transitions gradually to 2.5% over 10 years. The assumed length of the transition would be no more ad hoc than ESCOSA's current assumption of, effectively, a 1-year transition to the midpoint of the RBA's inflation target range. We note that the shorter the glidepath, the more closely the glidepath estimate would resemble estimates produced by ESCOSA's existing approach. Hence application of a short glidepath would be an ineffective way of addressing the problems associated with ESCOSA's existing inflation approach.

During the stakeholder workshop to discuss the AER's Preliminary Position, held on 31 October 2017, five alternative approaches for determining the length of the glide path were discussed:

1. Adopt a fixed glide path length in all decisions. This would be akin to the approach adopted by the New Zealand Commerce Commission, which adopts a three-year glide path.
2. Use the trend between the RBA's one-year ahead forecast and two-year ahead forecast to extrapolate out to the midpoint of the RBA inflation target range. For example, suppose the one year-ahead forecast was 1.0% and the two-year ahead forecast was 1.5%, the increment between these

two forecasts is an annual change of 0.5%. The glide path could then be formed by extrapolating the two-year ahead forecast out to 2.5% at a rate of 0.5% p.a.

3. Specify some bounds around the mid-point of the inflation target range, and then apply a glide path only if the two-year ahead RBA forecast lies outside these bounds.
4. Undertake statistical analysis to estimate how quickly actual inflation reverts to the mid-point of the RBA inflation target range, and then use this estimate of the rate of mean reversion to determine the length of the glide path. This empirical analysis could be updated periodically to ensure that the length of the glide path is informed by recent evidence.
5. Use the bond breakeven approach to estimate expected inflation over the next one year, two years, three years, and so on. These estimates could then be used to infer expected inflation for years one, two, three, and so on. This process would provide an estimated term structure of expected inflation. This term structure could then be used to estimate how quickly the market expects inflation to revert to the mid-point of the RBA's inflation range. This would then form the basis of the glide path from the RBA two-year ahead forecast to 2.5%. It is important to recognise that under this approach, estimates of breakeven inflation would be used only to determine the length of the glide path—not the direct point estimate of expected inflation.

Whereas the implementation of the glide path approach requires a degree of judgment in setting the length of the period over which inflation is expected to revert, it would likely have the effect of reducing the regulatory estimate when inflation is low and increasing it when inflation is high, which is likely to mitigate the mismatch between the regulatory estimate and true market expectations.

This is illustrated in **Table 9**, which compares the outcome of three different approaches:

- a 10-year glide path approach, where the RBA's one-year ahead forecast is used in Year 1, and a linear glide path is applied from Year 2 onwards to a value of 2.5% (the midpoint of the RBA's inflation target range) by Year 10;
- a 10-year glide path approach, where the RBA's one-year ahead forecast is used in Year 1, the RBA's two-year ahead forecast is used in Year 2, and a linear glide path is applied from Year 3 onwards to a value of 2.5% by Year 10; and
- ESCOSA's existing inflation approach.

This numerical example is constructed using the RBA forecasts from the November 2019 Statement on Monetary Policy.

The Table shows that, in the present market conditions, a 10-year glide path approach improves slightly on the ESCOSA approach—in the sense that it produces an estimate of expected inflation that is somewhat more plausible (lower, in the current market circumstances) than the estimate generated using ESCOSA's approach. However, the estimate produced by the glide path approach remains materially higher than:

- Current outturn inflation and the RBA's one-year ahead forecast of inflation (i.e., 1.75%);[64] and
- Current market-based estimates of inflation expectations (i.e., approximately 1.3% as at December 2019 using the breakeven approach).[65]

Hence, it is unlikely that the glide path approach would address substantively the problems identified in Section 3.

[64] RBA Statement on Monetary Policy, November 2019, Table 5.1, p. 70.

[65] See **Figure 13**.

Table 9: Comparison of 10-year glide path and ESCOSA approaches

	10-YEAR GLIDE PATH USING 1-YEAR AHEAD RBA FORECAST	10-YEAR GLIDE PATH USING 1-YEAR AND 2-YEAR AHEAD RBA FORECASTS	ESCOSA APPROACH
Year 1	1.75%*	1.75%*	1.75%*
Year 2	1.83%	2.00%*	2.50%
Year 3	1.92%	2.06%	2.50%
Year 4	2.00%	2.13%	2.50%
Year 5	2.08%	2.19%	2.50%
Year 6	2.17%	2.25%	2.50%
Year 7	2.25%	2.31%	2.50%
Year 8	2.33%	2.38%	2.50%
Year 9	2.42%	2.44%	2.50%
Year 10	2.50%	2.50%	2.50%
Geometric average	**2.11%**	**2.19%**	**2.41%**

*Source: Year 1 rate taken to be RBA forecast for FY2020 as presented in the November 2019 Statement on Monetary Policy; Frontier Economics analysis. Note: * indicates RBA forecasts.*

6.6 Option 5: Use a nominal allowance for the return on debt

As noted above, Problem 2 arises due to differences between the inflation expectations that are embedded in the fixed nominal interest rates that the regulated firm is contractually bound to pay and outturn inflation during the regulatory period. This problem can be eliminated by simply applying a nominal allowed return on debt – such that the regulatory allowance is set equal to the contractual obligations to debt holders in the benchmark firm.

That is, rather than beginning with the nominal required return on debt, and reducing that according to the regulator's estimate of expected inflation, and then increasing it via RAB indexation in relation to actual observed inflation, the regulatory allowance would simply match the nominal required return on debt.

This would require one additional line in the regulatory model. The return on equity would remain as it is – equity investors would receive a real return plus some benefit from RAB indexation. The return on debt would be delivered as a nominal return, with no RAB indexation. There would be no need to maintain separate RABs and no need for any complication other than separate lines in the model for the return on equity and the return on debt.

Such an approach would eliminate Problem 2 as the allowed return on debt would reconcile precisely with the regulator's estimate of the contractual obligations of the benchmark firm.

6.7 Summary of findings

In order to address the problems identified in this report, we recommend that ESCOSA:

- Adopt a market-based approach to estimating inflation expectations (Option 3), which we show has produced estimates that match actual inflation outcomes much more closely than ESCOSA's approach—especially over the last few years;
- When adopting a market-based approach, ESCOSA should estimate inflation expectations over the length of the regulatory period rather than a 10-year horizon;
- Adopt an approach to estimating the required return on equity that pairs the risk-free rate consistently with the MRP (Option 3); and
- Set a nominal rather than real cost of debt allowance for SAW (Option 5).

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