29 July 2020

Mr. Warwick Anderson
General Manager, Networks Finance and Reporting
Australian Energy Regulator

By email: InflationReview2020@aer.gov.au.

Dear Mr. Anderson

Re: 2020 Inflation Review – Discussion Paper

Spark Infrastructure is pleased to have the opportunity to contribute to the AER's Inflation Review (**2020 Review**). We believe we are uniquely positioned to provide comment on this matter as long-term Australian investors in regulated network infrastructure for whom inflation is a key component of the overall investment return under the existing regulatory framework and revenue models.

Spark Infrastructure has equity interests in over $18 billion of electricity infrastructure assets, delivering energy to more than 5 million customers across the National Electricity Market (**NEM**). Our equity interests include a 15% interest in TransGrid in NSW; a 49% interest in SA Power Networks in South Australia; a 49% interest in CitiPower and Powercor in Victoria; and 100% ownership of the Bomen Solar Farm in NSW.

Against a backdrop of increased uncertainty and risk for investors, now is the time to ensure that Australian regulation is best designed to facilitate efficient investment and innovation in our energy network. We consider that the regulatory treatment of inflation needs to change for this to occur.

Summary of position

- This review is an important opportunity for the AER to consider whether the regulatory treatment of inflation remains appropriate given recent changes to the legislative framework. For network service providers (**NSPs**) to be given a reasonable opportunity to recover their efficient costs, the treatment of inflation must be consistent with, and follow, the methodologies established in the rate of return instrument (**RORI**).
- In our opinion, the current treatment of inflation needs to change for this to occur. The current revenue methodologies do not align properly to provide revenue consistent with efficient costs. Instead, the return on equity is the residual after the return on debt and the forecast error is provided for.
- These errors have been exacerbated because the forecast methodology for inflation adopted by the AER does not cater for significant changes in market expectations even in unprecedented global market conditions.
- Together, these errors are responsible for reducing the equity returns of NSPs by hundreds of millions of dollars below that provided for in the RORI, which is an unacceptable result and, ultimately, not in the best long-term interests of consumers.
- The AER's regulatory treatment of inflation and the operation of the post-tax revenue model (**PTRM**) and the roll-forward model (**RFM**) should work together to deliver the returns as specified in the RORI. This can be achieved by improving the method for forecasting inflation, applying the right forecast of inflation in the right place, and matching the forecast of inflation removed from the RAB in rolling forward the debt portion of RAB in future regulatory periods.
- The absence of any review mechanism increases the AER's responsibility to demonstrate that it will correct any errors required to give effect to the law. If the current errors are not addressed, investors are not able to rely upon the effective operation of the regulatory framework. This will increase the cost of capital (and hence costs to consumers) and reduce the likelihood of future investment, undermining the important transition underway in the energy industry.

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Why is the 2020 inflation review important?

The energy sector in Australia is undergoing a rapid and transformative transition, driven in part by ageing infrastructure and the shifting costs and mix of generation technologies. To support this transition, there is a broader focus by regulators and government on ensuring that the planning and regulatory settings are right to support the right amount, mix and location of investment in the energy system to maximise savings for customers.

In this context, it is more important than ever for the AER to ensure that its revenue models, including its treatment of inflation, remain fit-for-purpose. These methodologies affect the returns on more than $90 billion in electricity network infrastructure and are a key driver and determinant of future investment over the long term.

It is well-understood that the changing energy network requires sizeable new network infrastructure to enable a move to lower carbon emissions and to deliver savings to customers. For these investments to go ahead, the revenue allowed must be sufficient for NSPs to attract efficient capital commensurate with its associated risks and to maintain the benchmark credit rating assumed in the regulatory framework.

Why does the regulatory treatment of inflation need to change?

In 2018, the RORI was elevated from a non-binding guideline to a subordinate legislative instrument. This represented a fundamental change in the AER's regulatory framework. Instead of being guided by the rules and a set of objectives, the new RORI set out an explicit formula for calculating the return on debt and return on equity that NSPs are to be given a reasonable opportunity to recover. The RORI is binding on the AER and NSPs.

This review is an important pre-requisite for the AER to ensure that the regulatory treatment of inflation remains appropriate given the broader changes in the regulatory framework described above. For NSPs to be given a reasonable opportunity to recover their efficient costs, the treatment of inflation must be consistent with, and follow, the methodologies established in the RORI.

The errors that have been identified have been exacerbated because the AER has adopted a forecast methodology for inflation that does not adjust with changes in market expectations even in these unprecedented global market conditions, and, as a result, the AER's forecast has diverged materially from market expectations and actual inflation. Together, the errors are responsible for reducing equity returns to NSPs by hundreds of millions of dollars below that actually specified in the RORI.

As a case in point, in its recent final regulatory decision for SA Power Networks (**SAPN**) the AER continued with its current method of forecasting inflation and determined a forecast of 2.27% to be used for the 5-year period, based on a 10-year geometric average. The nominal risk-free rate was measured (using market information) at 0.90%, meaning that the real risk-free rate was -1.37%. This is anomalous in the Australian market where negative real rates have never been a feature. Outcomes such as these should be a clear trigger for the AER to re-examine its methodologies in applying the inflation forecast to ensure it was consistent with market expectations, and together with the nominal risk-free rate, produce a realistic and commercial outcome.

Compensation for efficient costs

In its 2017 review of inflation (**2017 Review**), the AER outlined the issue of determining an ex-ante real return as if it was solely one of targeting the overall real weighted average cost of capital (**WACC**).[1] At the time, this position may have been consistent with the concept of allowed rate of return objective (**ARORO**) contained in the National Electricity Law (**NEL**).

[1] Otherwise characterised as the rate of return on capital (aggregate across debt and equity). AER, Final position paper, Regulatory treatment of inflation, December 2017, p. 97

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However, in November 2018, the NEL was amended to remove the ARORO and include a new requirement for the AER to make a binding RORI.[2] The new RORI sets out the precise method to separately calculate the nominal return on debt and the nominal return on equity in regulatory decisions. Within this binding instrument, the WACC is merely a method of presenting the return provided.[3]

Spark Infrastructure considers that the AER must take a similarly differentiated approach to the treatment of inflation within its revenue methodologies as it does within the RORI. The current methods adopt the same forecast of inflation for use in both the debt and equity inputs in the PTRM. This is ultimately less accurate than a differentiated approach to debt and equity, because if, and when, the 10-year inflation expectation is different to the 5-year expectation, the regulatory models do not compensate for the return determined in the RORI, but rather:

- May compensate for the real cost of equity (depending on the accuracy of the PTRM inflation measure), but
- Does not compensate for any economically meaningful conception of the real cost of debt – even if the PTRM inflation measure is perfectly accurate.

This error ultimately results in a permanent loss (or gain) to equity returns for NSPs, as the return on equity is the balancing item in the revenue allowance after the return on debt and the forecast error is provided for. Further, this error is exacerbated by the RFM (i.e. left uncorrected), given the current indexation of the debt portion of the regulatory asset base. The ramifications of this are expanded on in the note from Competition Economists Group (**CEG**) in Attachment B to this letter.

Most importantly, the salient point is that the current revenue models result in a return that is not consistent with the RORI – which is a binding instrument on the AER and NSP's. This inconsistency removes any reasonable opportunity for NSPs to recover their efficient costs which impacts on incentives for investment and is not in the long-term interests of consumers. Current global market conditions affecting inflationary expectations, monetary policy operation and the level of risk-free proxies exacerbate these issues. To address the error, the models and inputs used to calculate allowed revenue should be adjusted to:

- Separately provide for the return on debt and return on equity to be calculated in the PTRM, including removing inflation consistent with the treatment of inflation in the RORI estimate; and
- Adopt the same inflation used to index the debt proportion of the RAB in the PTRM in rolling forward the same in the RFM. This would provide for the efficient nominal cost of debt and ensure that there is no permanent loss or gain in RAB value due to forecast error.

Following changes to the legislative framework, the AER is now the sole arbiter for ensuring that its revenue models remain an effective instrument to give effect to the RORI. If the current errors are not addressed, Spark Infrastructure is concerned that investors are not able to rely upon the effective operation of the regulatory framework. This will increase the cost of capital (and hence costs to consumers) and reduce the likelihood of future investment, jeopardising the current energy transition underway to lower carbon emissions and lower costs to consumers.

It is important that investors and consumers have confidence that the regulator will correct errors once identified regardless of the impact on prices or returns. The integrity of the regulatory framework and independence of the administrator of the framework is critical to support the investment required to

[2] This instrument supplants prior rules and law regarding the rate of return. In making the RORI, the AER must have regard to the National Electricity and Gas Objective and the revenue and pricing principles. *National Electricity (South Australia) Act 1996*, Subdivision 2, 18I (2).

[3] This view is consistent with recent literature produced by the AER, including the 2020 Energy network debt data draft working paper. The paper proposes several options that could not be considered or implemented if the AER did not go about the task of estimating the efficient cost of debt separately to the efficient cost of equity.

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provide sustainable and valuable services to customers and support the energy transition. This risk extends beyond the required private investment in regulated networks to the private investment in new generation capacity that might need to connect to those networks to replace retiring coal fired generation. This investment, which could be upwards of $50 billion, is key for Australia to reinvigorate its economy as it recovers from the impacts of COVID-19.

An appropriate forecast methodology

It is good regulatory practice to regularly monitor and test whether a forecast methodology delivers the best estimate. The AER has recognised that significant movements in market indicators and expectations have occurred in making the decision to review its method of estimating expected inflation.

Since the 2017 Review, RBA forecasts of inflation and market expectations of inflation have fallen significantly, and the effects of the COVID-19 pandemic and global crisis have resulted in shared expectations that inflation will be lower for longer. Nevertheless, the AER's forecast of expected inflation has remained anchored to the mid-point of the RBA's target range as we have seen in their recent decisions for SAPN, Jemena Gas and Energy Queensland. The AER's forecast of expected inflation should be based on a methodology that has regard, and is affected by, market measures and expectations of inflation. It should be the right forecast of the right thing and applied in the right way.

We support the analysis and recommendations contained in Energy Networks Australia's (**ENA**) submission in relation to improvements to the forecast methodology and effective operation of the revenue models and encourage the AER to give weight to the material it has provided.

The AER has a responsibility to ensure best estimates are applied across its regulatory decisions. After many representations to the AER during the SAPN process for the treatment of inflation to be revised for its final decision, the AER announced a further review too late for this to occur despite these issues being known and growing in impact. Accordingly, the errors in the AER's treatment of inflation and the operation of the models embedded in the SAPN determination for the five year period from 1 July 2020 should be corrected as soon as practicable and included in the RFM for the next regulatory period. This should also occur for the other determinations applying the 2018 RORI.

Attachment A to this letter provides a response to the AER's Discussion Paper and questions in the AER's Discussion paper on the regulatory treatment of inflation.

Attachment B provides views from CEG in response to questions put to it by Spark Infrastructure in relation to the issues outlined in this submission.

I would be happy to discuss these matters further and can be contacted on 0421057821.

Yours sincerely,

[redacted]

Sally McMahon
Head of Economic Regulation and Energy Policy
Spark Infrastructure

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Attachment A: Response to the discussion paper on the regulatory treatment of inflation

1. Context for the 2020 Review of the regulatory treatment of inflation

In 2017, the AER conducted a review of the regulatory treatment of inflation (2017 Review) in response to industry requests to address the growing divergence between its forecasts and market expectations of inflation.

The 2017 Review clarified that the task being reviewed was to forecast expectations of inflation over a 10-year period, rather than estimate what inflation was expected to be in each year of the regulatory period. The AER determined that there was no need to change its methodology for forecasting inflation, because any errors were expected to be small and symmetrical and the overall compensation was appropriate. Many of the reasons for the AER to make no change in the 2017 Review are no longer current.

The 2020 Review is very timely given the change to the rate of return framework that occurred during 2018 culminating in the establishment of the RORI as the governing instrument for the efficient cost of capital, and the significant continued divergence between the AER's forecast of expected inflation, market expectations of inflation and out-turn inflation. Together, these act to remove any reasonable opportunity for an NSP to recover at least its efficient cost. Nevertheless, the interconvertibility of the models and the RORI is enough reason for change.

The following sections of this response and the CEG responses to our questions in Attachment B will provide support for our views that:

1. The AER's current method for forecasting expected inflation is not the best estimate for any expectation of inflation.

2. Continuing the current method for forecasting inflation results in a significant cost which should be removed, not allocated.

3. There is an error in the operation and inputs in the PTRM and RFM, that, if left uncorrected, will not give effect to the AER's binding RORI.

4. The correction required is to adopt differentiated forecasts of inflation for the PTRM inputs for return on debt and equity, and adopt the same forecast of inflation deducted from the PTRM input for return on debt in rolling forward the debt portion of the RAB in the RFM.

2. The best estimate of inflation should reflect changes in market expectations

The 2020 Review allows consideration of further information that has become available since the 2017 Review, such as:

- inflation has continued to fall;
- the RBA has continued to revise downwards its estimates of inflation;
- the RBA has sought to review its method for forecasting inflation; and
- market expectations of inflation have significantly reduced.

The COVID-19 pandemic and economic crisis has significantly compounded pre-existing trends in market conditions, reducing bond rates, current inflation and longer-term expectations of inflation. It has further shone a light on the inability of the AER's forecast methodology to flex with significant changes in market conditions as would be expected in a robust forecast methodology. This alone is reason to review the forecast methodology.

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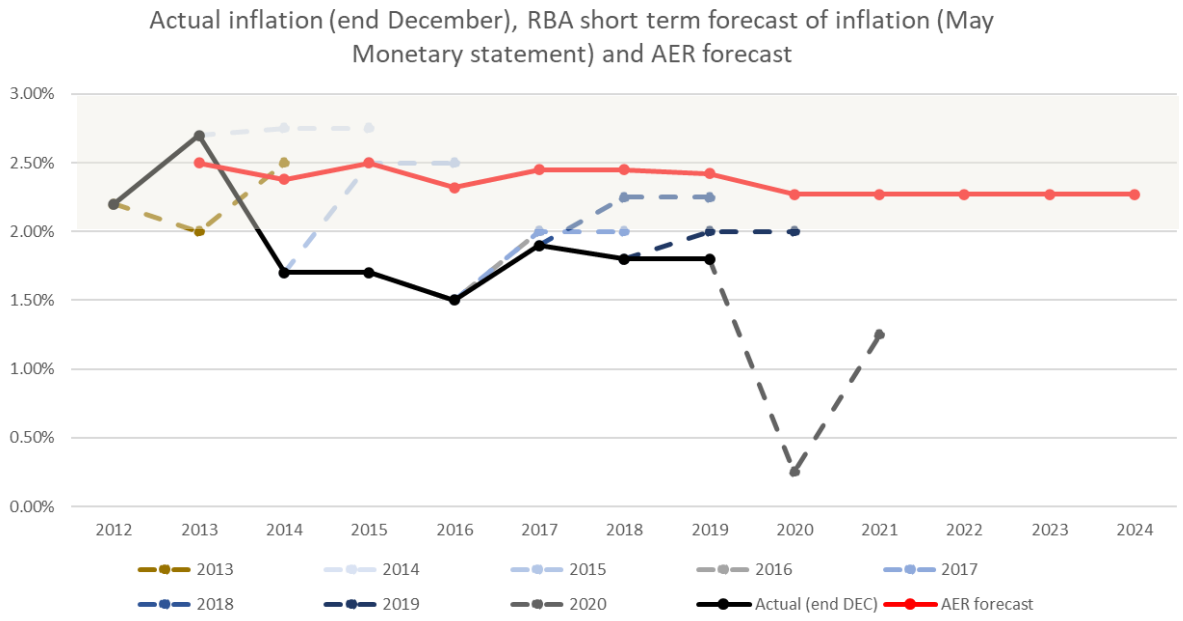
The following chart presents the AER's forecast of inflation compared with the RBA's short term forecast of inflation as made in the relevant year and actual inflation. It shows that the RBA has consistently over estimated inflation and inflation has not been in the RBA's target band since 2013.



Source: RBA May Monetary statements and AER determinations. Where the RBA short term forecast is provided as a range, the mid-point is adopted.

The performance of the AER's forecast of expected inflation compared to RBA's forecasts and out-turn inflation is observable. Nevertheless, the AER is not attempting to forecast out-turn inflation but rather expectations of inflation over a 10-year period at the outset of a regulatory period.

However, the AER's forecast methodology is not a forecast of expectations of inflation either. The method consists of a mathematical calculation of the geometric mean of two years of the RBA's forecast and 8 years of the mid-point of the RBA's target band. The mid-point of the RBA's target band is not a forecast or objective. It may have been a reasonable proxy for longer term expectations of inflation at one time, but it is not anymore because:

- The RBA has consistently over-estimated inflation and sought to review its forecast methodology.[4] This has an effect on market expectations of congruence.

- 2.5% is not an RBA inflation target or a forecast, it is just the mid-point of its target range. In practice, the RBA will be satisfied if inflation increases back up to 2.0%, being the bottom of its range, and will have no reason to act further to increase inflation back to the mid-point once inflation is within the target range. The corollary is also true if inflation is above the top-end of the range at 3.0%. Also note that the RBA's tools for reducing inflation are more effective than for increasing inflation in low inflation times. Therefore, market expectations are likely to be that the RBA will not act to increase inflation to 2.5% and nor will it be effective in increasing inflation to 2% any time soon.

A further concern is that the AER's method results in no meaningful deviation (ever) from the mid-point of the RBA's target range in conditions of unprecedented low inflation, and low expectations of inflation in the future. The current COVID-19 pandemic and economic crisis has led to unprecedented low bond

[4] RBA, Explaining Low Inflation Using Models, June 2019 and Panel participation by Philip Lowe, Governor, at the ANU Crawford Leadership Forum – Global Economy and COVID-19, 22 June 2020.

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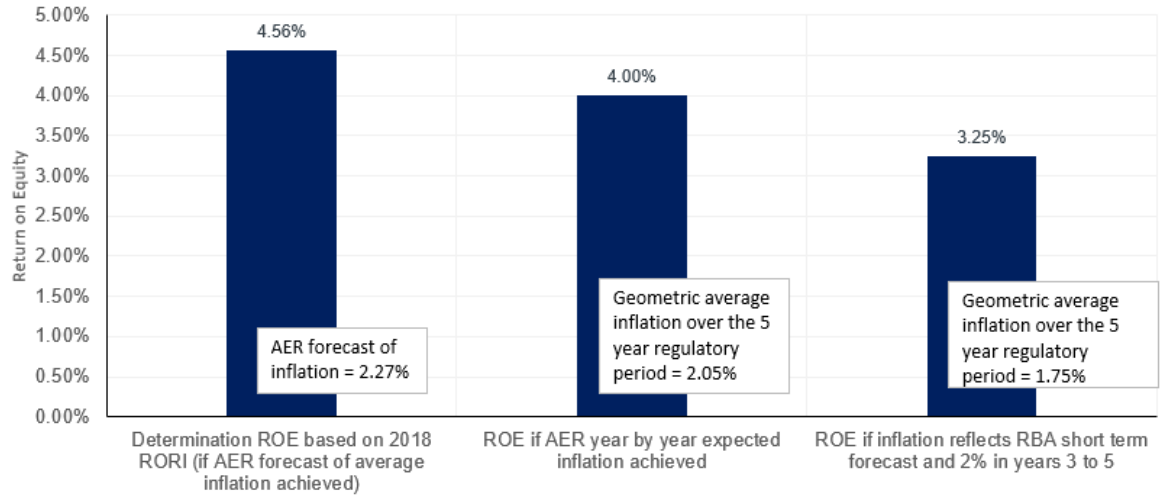
rates, low inflation (and deflation followed by lower for longer inflation) and low expectations of economic growth. A method for forecasting expectations that does not forecast a significant change in the face of significant changes in expectations does not produce the best estimate of those expectations.

The Australian Financial Review article recently stated that:

- Market expectations of inflation are that inflation will not return to the RBA's target band for a decade; and
- Australian break-even rates, a market-based measure of inflation expectation, has five-year break-even rates sitting at 0.774 per cent, while 10-year break-even is at 1.231 per cent. [5]

The difference between this measure and the AER's forecast of 2.27% is not small, it is 84% higher and is a material difference. The divergence between the AER's forecast of expectations of inflation and market measures of expectations of inflation such as break-even rates and CPI swaps is also demonstrated by CEG in Attachment B to this submission and in its report for ENA.

The Figure below presents the impact on the return on equity (**ROE**) of the forecast error in expected inflation in the AER's determination for SAPN in June 2020. Even if a conservative assumption that inflation will return to the lower bound of the RBA's target band by 2022, the forecast error reduces the return to equity holders from the 4.56% determined based on the 2018 RORI to 3.25% simply because of the variation in the AER's forecast of expected inflation.[6] This is a 1.31% difference reflecting 29% under-recovery on the ROE – this is not small, not symmetrical, and materially affects the overall compensation from investing in NSPs.



Another way of looking at the issue is by assessing the cost of hedging the difference between the AER's forecast of expected inflation and market expectations of inflation. If the error was small and symmetrical, the cost would be low. However, in this case the difference is consistently in one direction (i.e. asymmetric) and material, so we would expect that the cost of hedging the difference would be prohibitive and inefficient, if it were available. [redacted][7]
This cost represents the cost that equity holders are being asked to wear. However, if no change is made to the regulatory treatment of inflation, this cost will be deemed efficient and should be included in the costs to be paid for by customers. In our opinion it should not be considered as an efficient cost as it is a

[5] Australian Financial Review, inflation set for worst quarter on recover, 28 Jul 2020, p. 27.

[6] The third column in the chart (equity returns of 3.25%) assumes inflation is 0.25% in 2020 and 1.25% in 2021 consistent with the RBA's short-term forecast and 2% in years 3 to 5.

[7] We approached a major Australian Bank to provide us with an approximate cost for a theoretical hedge adopting the AER's forecast rate and using SAPN's recent June 2020 5-year regulatory determination as an example.

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cost introduced by the AER's methodology which has increased significantly since the 2017 Review and is not a risk that needs to be allocated as it can be avoided.

We also note that the AER use of a geometric average of forecasts in each of 10 years will always ensure that the NSP does not recover its determined return (i.e. it will always be higher or lower) when used for a 5-year regulatory period. In the SA Power Network's final regulatory decision, the 10 year geometric average for inflation produced a forecast of 2.27% to be used in the 5 year regulatory decision, notwithstanding that a geometric average of the first 5 years of the same data points, which would match the regulatory period, actually produces a forecast inflation of 2.05% (illustrated in the middle column in the chart above).

The AER's approach has resulted in a forecast of expected inflation that is materially above market expectations, materially above the RBA's expectations, materially above the mathematical calculation for the five year period and results in an assumption that equity investors require a negative real return on investment. These errors are not small and symmetrical and the result of applying the methodology is non-sensical. This approach, if retained, is not the best estimate of any expectation of inflation.

3. The AER's consultants support a change to the method for forecasting inflation

We consider that the AER's consultant reports support the need to change in the method for forecasting inflation because current circumstances reflect those that have been identified as being cause for change:

- In the 2017 Review, Professor Vahey indicated that the credibility of the RBA underwrites the credibility of the current methodology and this would not be expected to be at risk unless nominal interest rates were effectively zero and the economy faces persistent deflationary pressures.[8]
- In the 2020 Review, Deloitte Access Economics (**DAE**) finds that the AER's approach to forecasting inflation expectations over 10 years remains fit for purpose but should be reviewed if market expectations become de-anchored from the RBA target range[9], and if inflation remained below the RBA target band for an extended period, there may be a degree of de-anchoring of inflation expectations and this would result in the congruence of the AER's method to deteriorate.[10] DAE also supported Professor Vahey's view that central banks would be perceived as being less effective in influencing the economy in times of low inflation.[11]

Despite its findings in the 2020 Review, DAE had previously commented that inflation was below the RBA's target range in 2018, had been there for some time, and expected that inflation would remain below market expectations for some time yet.[12] In July 2020, commentary from DAE was that a lift in inflation was the last thing that needed to be worried about and inflation is 'dead as a door nail'.[13]

We contend that market expectations have: de-anchored from the mid-point of the RBA's target range; the RBA is likely to be perceived as less effective in influencing the economy (and inflation rate); and, the expected forecast errors of maintaining the current approach will be large and asymmetrical. Indeed, the errors reduce equity returns by hundreds of millions of dollars below that specified for in the RORI, and this has been exacerbated by the impact of COVID-19.

[8] Shaun P. Vahey, Response to the Spark Infrastructure submission on the AER's Preliminary position paper, December 2017, p. 7.
[9] DAE, Review of the regulatory treatment of inflation prepared for the Australian Energy Regulator, June 2020, p. 38.
[10] DAE, Review of the regulatory treatment of inflation prepared for the Australian Energy Regulator, June 2020, p. 7.
[11] DAE, Review of the regulatory treatment of inflation prepared for the Australian Energy Regulator, June 2020, p. 22.
[12] DAE, Inflation remains low, despite surging power prices, David Rumbens, July 2018.
[13] DAE Business Outlook: Fast crisis, slow recovery, What comes next for the Australian world economies? Chris Richardson, July 2020.

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4. The regulatory treatment of inflation and the operation of the revenue models must give effect to the RORI

Under the previous framework, there may have been a role for the AER to 'target' a return outside the rate of return guideline. However, the RORI is now the relevant instrument which is binding on the AER and NSPs. This review is about the ability to recover the efficient cost determined by the AER, it is not about changing the returns set out in the RORI or an allocation of risk.

The regulatory treatment of inflation and the operation of the PTRM and RFM are tools to give effect to the AER's determination of efficient costs, including the efficient cost of debt and equity in the RORI. The inputs and operation of the models should do no more than convert the nominal values in the RORI to 'methodological matching' real values as required in the PTRM to model real revenues over the regulatory period and returns over the life of asset. They should not alter the values expected under the RORI. The AER has a responsibility to demonstrate that this is working properly as it is the only arbiter of the effective application of the RORI.

The current treatment of inflation and the operation of the PTRM and RFM adopt the same forecast of inflation for use in both the debt and equity inputs in the PTRM. This has the effect of neither providing for a real or nominal return, or a nominal return on debt or a real return on equity. Instead, the return to equity holders is the residual compensation after the return on debt and forecast error are provided for. This does not deliver a nominal return consistent with the RORI or the real return adopted in the PTRM.

In particular, the current approach does not calculate the efficient amount of return on assets in the regulatory period ('fast money') or the return on assets over the life of assets ('slow money') to be recovered by NSPs: [14]

- Fast money: The PTRM converts the nominal rate of return to a real rate by subtracting forecast inflation (based on a 10-year period forecast). This is not the correct inflation measure to remove, and it results in a return on debt and, therefore, a residual return to equity holders that does not reflect the determined rate as outlined in the RORI.
- Slow money: The RFM adds to the RAB actual inflation. There is no true up for the difference between forecast inflation removed in the PTRM and the actual inflation added to RAB and as a result any difference becomes a permanent difference between the targeted return and the actual return provided.

This outcome is further supported in Attachment B to this submission.

The AER's usual practice in response to a change to the assessment of efficient cost of any 'building block' is to review the PTRM and RFM as it did in relation to the change to the regulatory treatment of tax. Therefore, a review of the inputs and operation of the models to ensure that they are operating effectively to give effect to the RORI is required and overdue.

5. The AER's consultant supports a change to the interaction between the treatment of inflation and the PTRM and RFM to give effect to the RORI

The models and inputs adopted by the AER to calculate revenue that provides for the efficient cost of debt and equity should mirror the methodology established in the RORI. The risk to equity holders where this is not the case, as presented above, was also identified in the 2017 Review and it has continued to grow and materialise.

[14] Fast money being the proportion of allowed revenue that is recovered within the current regulatory period, and slow money being the proportion of allowed revenue that is capitalised within the RAB and recovered over future regulatory periods.

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In the 2020 Review the AER's consultant, Sapere, also identified this problem,

"*Stakeholders therefore correctly identify that the current regulatory approach may result in negative cash returns to equity, and that this may occur with low allowed nominal rate of return on equity and/or high leverage. If, in addition, outturn inflation is low then total return on equity could be negative and thus even realised return on capital would be insufficient in amount to meet the obligation to pay interest.*"[15]

Sapere suggested that a projected negative cash return on equity might indicate an underlying inconsistency in one or more inputs into its estimate of the weighted average cost of capital (**WACC**) and expected inflation.[16]

The Sapere report confirms that there is an error in the interaction between the treatment of inflation, the models and the RORI and suggests that this issue can be addressed by adopting a hybrid rate of return that targets real returns on equity. We contend that this is indeed the expectation set out in the RORI and it should be achieved. The appropriate response given this error, is to address it in the inputs and operation of the PTRM and RFM, not to overlook it until the next RORI is established.

To address the error, the models and inputs used to calculate allowed revenue should be adjusted to:

- Separately provide for the return on debt and return on equity to be calculated in the PTRM, including removing inflation consistent with the treatment of inflation in the methodology adopted in the RORI estimate; and
- Adopt the same inflation used to index the debt proportion of the RAB in the PTRM in rolling forward the same in the RFM. This would provide for the efficient nominal cost of debt and ensure that there is no permanent loss or gain in RAB value due to forecast error.

[15] Sapere, Target return and inflation, Input to the AER Inflation Review 2020, June 2020, p. 21.
[16] Sapere, Target return and inflation, Input to the AER Inflation Review 2020, June 2020, p. 28.

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Response to the AER's questions in the discussion paper on the regulatory treatment of inflation

Question	Spark Infrastructure's response
1. What method should we use to estimate expected inflation?	The method for estimating expected inflation should match the inflation contained in the estimate of the nominal cost of debt and the nominal cost of equity. • **For debt:** the expected inflation is the inflation that might exist in each year of the regulatory period at the time that the next tranche of debt contract is entered in to. This could be a different estimate in each year. Nevertheless, to give effect to a nominal return on debt, the same estimate of inflation used to deflate the nominal return to real should be applied in rolling forward the debt proportion of the RAB. • **For equity:** the forecast of expected inflation should be consistent with the inflation that might be contained in the nominal risk-free rate used to estimate the nominal return on equity. This estimate should have strong congruence to market expectations of inflation, rather than be anchored to the RBA's target range.
2. Does the regulatory framework successfully deliver the expected real rate of return under the current approach?	No. To deliver the return provided for in the RORI, the PTRM needs to remove one of the following from the nominal cost of debt and equity. a. Remove the inflation compensation that is embedded in the nominal cost of equity and/or debt pursuant to the estimation process set out in the RORI; b. Remove the inflation compensation that is expected to be provided via revenue and RAB RFM indexation over the regulatory period The AER's current method for converting the nominal cost of debt to a real cost of debt does not do either of these. The AER subtracts a 10 year purely forward looking (prevailing) inflation forecast from the historical trailing average cost of debt then adds back 5 years of actual inflation. This neither removes inflation compensation built into the nominal return (a 10-year trailing average) nor removes the future inflation compensation that the regime expects to provide.

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	Even if inflation exactly matches the inflation assumed by the AER in the five-year regulatory period, the nominal compensation for debt will be higher or lower than the nominal cost of debt depending on whether the AER's forecast of inflation is lower or higher. Consequently, the residual compensation for equity holders will not match the targeted cost of equity (in neither real nor nominal terms).
3. Should we instead target a nominal or hybrid return?	Whether or not a real, nominal or hybrid return is targeted should not be the scope of this review. The RORI is the current instrument to set out what return should be provided. The current RORI determines a nominal return on debt and a nominal return on equity. The nominal return on debt is estimated by assuming that the efficient cost of debt is incurred by re-contracting for one tenth of debt in each year of the regulatory period in nominal terms. The nominal return on debt can only be maintained by ensuring that the roll-forward of the debt component of the RAB occurs using the same inflation applied in estimating the nominal return on debt. This ensures that the estimated efficient cost of debt moves with the debt proportion of the RAB and not a RAB less the forecast error. This negates the need to be precise in the forecast of expected inflation for the purpose of converting the nominal cost to real as an input to the PTRM. Nevertheless, the forecast of expected inflation that might be incurred in the nominal return on debt should reflect the expected inflation in each year of the regulatory period, not the average inflation that might be expected over a 10-year period at the commencement of the period. In relation to equity, while this is determined in nominal terms in the RORI it is estimated using the CAPM with a nominal risk-free rate. The CAPM is a model that, for it to be internally consistent, must be specified purely in real terms. The nominal cost of equity estimated in the RORI can only be sensibly be used in the PTRM if all inflation compensation built into the nominal risk-free rate is removed in the PTRM.

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Attachment B: Response from Competition Economist Group to questions from Spark Infrastructure

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COMPETITION ECONOMISTS GROUP

Questions put by Spark Infrastructure in relation to the AER inflation review

July 2020

COMPETITION ECONOMISTS GROUP

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1 Introduction

1. This report answers questions put to Competition Economist Group (CEG) by Spark Infrastructure in relation to the AER's 2020 "review of treatment of inflation". We have also provided analysis for the Energy Networks Association (ENA report), which we rely on in answering the questions put to us by Spark Infrastructure.

2. The questions CEG has been asked to address, including the relevant background information, are set out below.

Instructions/background

The relevant legislative instruments and rules that govern the AER's decisions on the regulatory treatment of inflation include the National Electricity Law (NEL) (and in particular, the National Electricity Objective (NEO) and the Revenue and Pricing Principles (RPP)), the Rate of Return Instrument (RORI) and the National Electricity Rules (NER) relating to inflation which include:

- *adopting the best estimate of inflation in the Post Tax Revenue Model (PTRM), and;*
- *adjusting the regulatory asset base (RAB) in the roll-forward model (RFM) to maintain the real value of the RAB consistent with the method used for indexation.*

Please assume that the best estimate is that estimate which best promotes the NEO and the RPP.

This regulatory framework (comprising the legislation and rules) has changed since the AER's 2017 review of inflation in that previously the NER contained rules for the rate of return and the Allowed Rate of Return Objective (ARORO). These have now been replaced by the binding RORI.

Questions

i. Please describe your understanding, as a matter of economics, of how the RORI, PTRM and revenue and RAB RFM indexation combine to deliver a nominal return on each of debt and equity.

ii. How accurate has the AER's method of estimating actual inflation been over the last decade?

iii. *If the RORI sets nominal return on debt and equity, why are these converted to real returns in the PTRM?*

iv. *Should the inflation compensation removed in the PTRM be the same for both the return on debt and the return on equity?*

v. *What inflation compensation estimates should the PTRM remove from the return on debt and equity in order that the regime give effect to the return on debt and equity estimated in the RORI?*

vi. *How do your answers to question 5 compare to AER current practice?*

vii. *Does improving the accuracy of compensation for NSP's debt costs impose any costs or risks onto consumers?*

viii. *Explain how any differences in your proposed approach to the AER's current approach better serve the NEO and the RPP?*

2 Answers to questions

2.1 Please describe your understanding, as a matter of economics, of how the RORI, PTRM and revenue and RAB RFM indexation should combine to deliver a nominal return on each of debt and equity

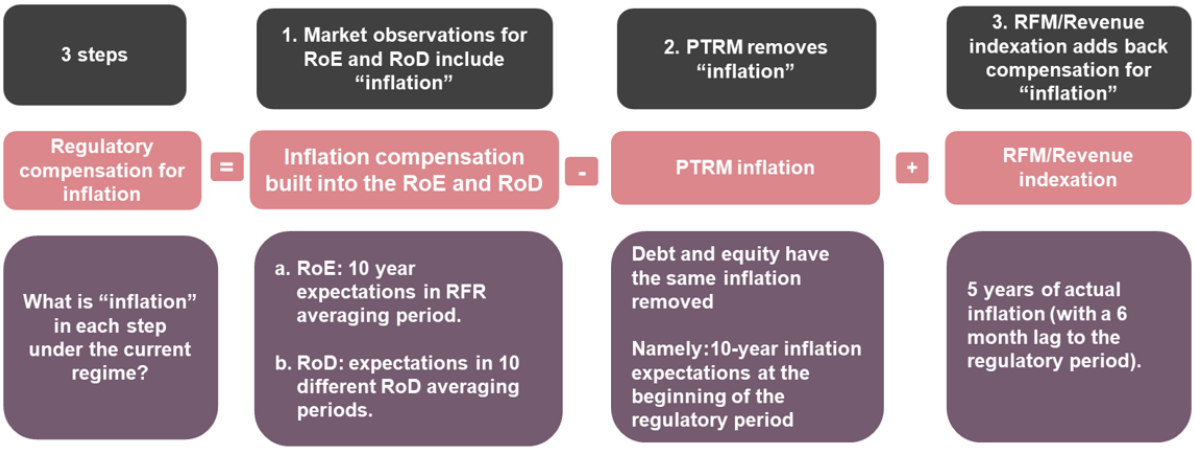
3. The current regulatory regime, as it relates to determining the real and nominal return on equity and debt, is summarised in the graphic below. Inflation enters (and leaves) the regulated return in three places:

   i. Market rates of inflation compensation are embedded in nominal yields for the risk-free rate and trailing average cost of debt estimated pursuant to the RORI;

   ii. The PTRM derives real returns by removing inflation from debt and equity returns;[1]

   iii. Compensation for actual inflation is added back via indexation of the RAB in the RFM (and, to a lesser extent, via indexation of revenues).

Figure 2-1: Summary of current regime



4. It can be seen that the RORI establishes one nominal return (in step 1). This is converted into a real return via the deduction of PTRM inflation (in step 2). The final

[1] This is achieved by deducting "negative depreciation" from the nominal returns on the equity and debt portions of the RAB. The amount deducted is equal to PTRM inflation multiplied by the opening value of the equity and debt portions on the RAB each year.

nominal return achieved is determined by the level of actual inflation experienced over the regulatory period (i.e., by RAB RFM and revenue indexation in step 3).

5. The actual nominal return achieved will only match the nominal return determined in the RORI if inflation "added back" in step 3 (primarily in the RFM) is the same as inflation removed in step 2 (in the PTRM).

6. The tasks of the PTRM and RFM are to deliver the compensation consistent with the AER's determination of efficient costs, including the efficient cost of debt and equity as set out in the RORI. The PTRM and RFM should not alter the returns determined in the RORI. The treatment of inflation and the operation of the models is critical in this respect. The models should operate to give effect to the RORI and might reasonably be expected to be reviewed for each new RORI.

2.2 How accurate has the AER's method of estimating actual inflation been over the last decade?

7. The AER's method has resulted in estimates of expected inflation that are materially higher than actual inflation outcomes. However, it is important to note that this does not prove that the AER estimate was an inaccurate estimate of inflation expectations. Investors may have, themselves, overestimated the likely inflation outcomes.

8. However, it is interesting to note that market measures of expected inflation more accurately predicted actual inflation outcomes. Statistically, market measures of expected inflation have been a considerably more accurate predictor of subsequent inflation since March 2007 (when the RBA first began publishing the forecasts now relied on by the AER). While this is true over the whole period, it is especially true over the last decade.

9. The full data and analysis we rely on to make the above conclusions are included in Appendix C. The Appendix provides the analysis for break-even expectations of inflation[2] as well as CPI swaps.[3] However, the chart below is an illustration of the analysis provided in Appendix C.

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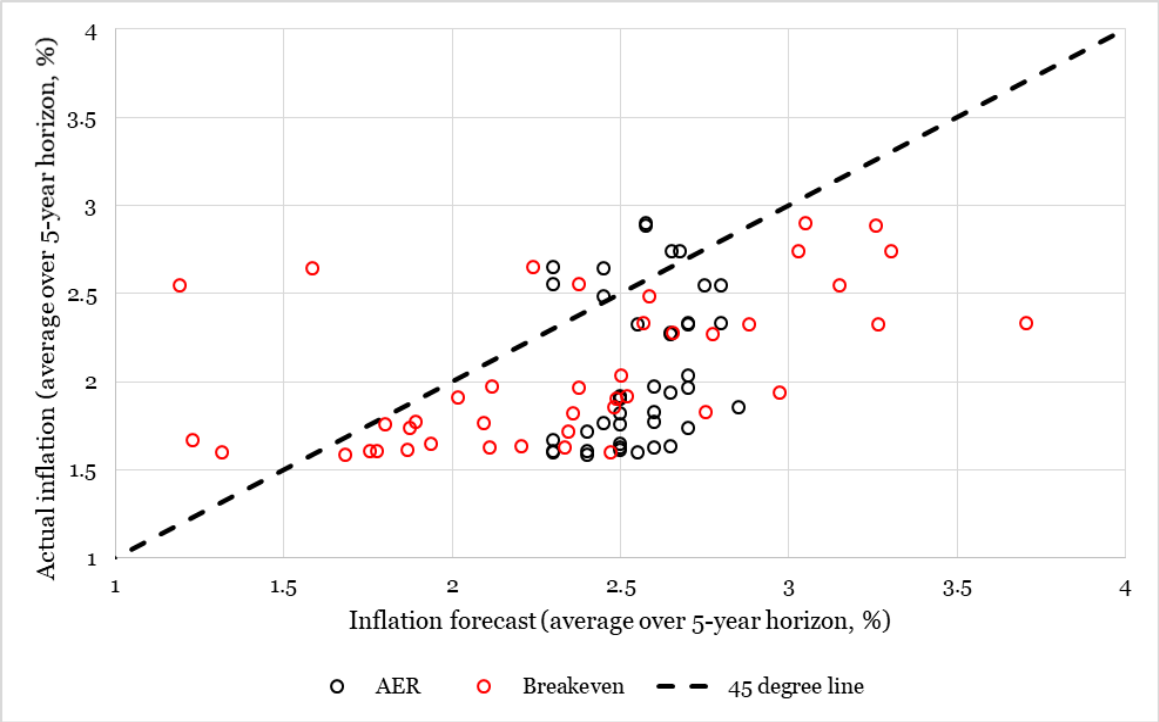
[2] These are both market measures of inflation. Break even inflation is the difference in yields on nominal and inflation indexed Commonwealth government securities (CGS). The difference in yields is a market measure of expected inflation because it represents the actual inflation outcome at which an investor who holds the inflation indexed CGS to maturity will receive the same nominal return as an investor who holds the nominal CGS to maturity.

[3] CPI swaps are a contract between two parties where the first agrees to pay the second a fixed return on a notional amount over a defined period (e.g., 2% on $100 over 5 years) and the second agrees to pay the

10. The chart shows forecasts on the horizontal axis and actual inflation on the vertical axis. A perfect forecast would lie on the dotted 45 degree line. Forecasts derived by applying the AER method to every quarterly RBA Statement on Monetary Policy forecast are black while break even forecast are red. The red dots are closer to, and spread along, the dotted black line. By contrast, the black dots are further from the dotted black line and are clumped in one position (around a 2.5% forecast) and do not tend to be correlated at all with actual inflation outcomes.

Figure 2-2: AER quarterly forecasts and breakeven inflation vs 5-year ahead actual inflation*

"n"=5 such that comparison is only made where there is 5 years of actual data to compare to forecast*



*Source: RBA, ABS, AER inflation forecast method, CEG analysis. *Values below the 45 degree line imply that the inflation forecast was higher than actual inflation over the subsequent period. The further to the right of the line the worse the over-estimate.*

first whatever actual CPI turns out to be on the same notional amount over the same period (e.g. CPI×$100 over 5 years).

11. For the reasons set out in paragraph 7, these results do not prove that break even inflation has been a better proxy for expected inflation. However, they are suggestive of this conclusion.

2.3 If the RORI sets nominal return on debt and equity, why are these converted to real returns in the PTRM?

12. As set out in our instructions, the rules require that:

> *the roll forward of the regulatory asset base from the immediately preceding regulatory control period to the beginning of the first regulatory year of a subsequent regulatory control period entails the value of the first mentioned regulatory asset base being adjusted for actual inflation, consistently with the method used for the indexation of the control mechanism (or control mechanisms) for standard control services during the preceding regulatory control period.*

13. Critically, this means that a return on investment that compensates for actual inflation over the regulatory period will be provided in the RAB RFM. However, the RORI specifies the return on debt and the return on equity in nominal terms – which already includes some form of compensation for inflation.

14. It follows that, to avoid "double compensation" for inflation, the PTRM must remove inflation compensation from the debt and equity returns that are compensated via PTRM revenues.

15. In summary, the PTRM converts nominal RORI returns into real returns because the RFM (and revenue indexation) are intended to automatically provide compensation for inflation over the regulatory period.

2.4 Should the inflation compensation removed in the PTRM be the same for both the return on debt and the return on equity?

16. In our answers to question 1 and question 3 we explain that inflation compensation is provided in both:

- The RORI: via the nominal cost of debt and equity; and
- The RAB RFM (and revenue indexation): via indexation of the RAB and revenues to inflation over the regulatory period.

17. The role of PTRM inflation is to remove compensation for inflation to avoid double counting of inflation compensation. This means that there are only two possible values that PTRM inflation can logically be attempting to remove. Specifically, either:

    A. The inflation compensation that enters the regime via the nominal values determined in the RORI; or

    B. The inflation compensation that enters the regime via the inflation indexation applied in the RAB RFM (and to revenues) over the five year regulatory period.

18. Given the options are narrowed down to two alternatives, the question still remains: which of these should PTRM inflation be seeking to remove?

19. The answer depends on whether the costs estimated in the RORI have been incurred in nominal or real terms. If the costs are real, then "A" is the correct answer but if the costs are nominal then "B" is the correct answer.

20. This follows from the fact that, if RORI returns are nominal then, in order for the regime to deliver compensation that matches the nominal RORI return, The PTRM must remove the same amount of inflation compensation that the RAB RFM will add back. Similarly, if RORI returns are real then the real return set in the PTRM needs to be based on the PTRM removing the inflation compensation built into the RORI return.

21. Dr Lally[4] has provided a mathematical proof of these findings.

    - Dr Lally proves that, if discount rates applied to regulated cash-flows are nominal, then the NPV=0 condition requires that PTRM inflation is based on expected inflation over the regulatory period.
    - Dr Lally's proof can also be simply amended to show that if discount rates are real, then the NPV=0 condition is only met if the PTRM attempts to remove the inflation compensation embedded in the nominal return derived in the RORI.

22. This analysis can be found in Appendix A of our report for the ENA which we reproduce in Appendix A of this report. However, the same conclusion can be arrived at discursively and we supply that discussion in Appendix A of this report also. I also address these conclusions in section 4.1 to 4.3 of our report for the ENA.

23. Consistent with the logic outlined above, the deduction for inflation applied in the PTRM for debt and equity should be:

4 Lally, Review of the AER's inflation forecasting methodology, 8 July 2020

- **The same** if both debt and equity are nominal costs. That deduction should be the inflation compensation expected to be provided over the course of the 5 year regulatory period in the form of inflation indexation of the RAB and revenues.
- **Different** if both debt and equity are real costs. This is because the RORI requires debt and equity returns to be built from different observation windows for different instruments that necessarily have different inflation compensation built into them.
- **Different** if debt is a nominal return and equity is a real return. In this case, the PTRM needs to remove inflation compensation that is:
  - For equity: embedded in the RORI return on equity; and
  - For debt: expected to be provided via revenue and RFM indexation.

24. This is an important conclusion. The only context in which the same inflation deduction should be applied to both equity and debt returns in the PTRM is if they are both treated as nominal costs.

2.5 What inflation compensation estimates should the PTRM remove from the return on debt and equity in order that the regime give effect to the return on debt and equity estimated in the RORI?

25. We explain below that the RORI estimates a nominal cost of debt and a real cost of equity. Consistent with this and our answers to questions 3 and 4, the PTRM needs to remove inflation compensation that is:

- For equity: embedded in the RORI return on equity; and
- For debt: expected to be provided via revenue and RFM indexation for debt.

26. My conclusion that the RORI estimates a nominal return on debt and a real return on equity is based on the following facts and analysis.

2.5.1 The return on equity

27. The RORI produces a nominal estimate for both the return on debt and the return on equity. Superficially at least, this might appear to suggest that both debt and equity should be treated as purely nominal costs.

28. However, the return on equity is estimated pursuant to the capital asset pricing model (CAPM). The CAPM specifies the required return on equity as the sum of a real (zero

inflation risk) risk free rate and an equity risk premium (where the latter is the equity beta specific to an asset multiplied by the market risk premium common to all assets).

29. This model is taken from finance theory where it is specified in real terms and where it only holds if it is implemented in real terms. This requires that the risk free rate is specified in real terms. Nonetheless, the RORI implements the CAPM by requiring that a nominal risk free rate is used (i.e., a risk free rate that includes exposure to, and compensation for, inflation risk).

30. This specification of the RORI can only be consistent with the use of the CAPM if the PTRM removes the inflation compensation built into the nominal risk free rate. If the PTRM does this, then the regime will deliver the real return on equity that is consistent with the use of the CAPM in the RORI.

31. We note that Sapere provides advice to the AER that is consistent with the above – as we explain in section 3.1.2 of our report for the ENA.

32. It is also the case that equity investors do not contract for nominal returns. Equity investors are, by definition, residual claimants to a company's cash flows. Purely as a matter of economics, such investors care only about the magnitude of real, not nominal, returns. An equity investor with a nominal return of 10% in a 10% inflation environment earns a purchasing power adjusted return of zero. That same equity investor would prefer a 5% nominal return in a 0% inflation environment because that delivers a 5% real return (purchasing power adjusted).

33. It follows that the use of the CAPM (being a model specified in real terms) in the RORI is consistent with the actual equity funding (which is also provided on the expectation of real returns).

34. It is critical that an accurate estimate inflation compensation embedded into the nominal risk free rate (estimated as is required by the RORI) is used in the PTRM to convert the nominal equity return into a real equity return in the PTRM. It is this real PTRM equity return that investors can expect to achieve. If the inflation estimate is above/below the best estimate then the real return investors can expect to achieve will be above/below efficient costs (as estimated in the RORI). Such an outcome does not serve the NEO or the RPP (as we discuss in our response to question 8).

2.5.2 The return on debt

35. By contrast, there is no similar rationale under which the RORI estimate of the return on debt can be viewed as anything other than a nominal cost. The RORI specifies that the cost of debt be estimated as a trailing average of 10-year nominal debt observations. There is no implication in the construction of the trailing average

nominal cost of debt that the RORI is attempting to estimate an underlying real return on debt.

36. Moreover, the historical context for the adoption of a trailing average cost of debt was clearly based on the key rationale that this reflected efficient debt funding practices for NSPs (this is demonstrated in Appendix B). We also note that debt information requests from the AER clearly show that NSPs, similar to all other Australian corporates, overwhelmingly fund themselves with nominal debt. That is, they contract with debt providers to pay nominal returns. The reason that they do so is because less costly overall to issue nominal debt – as we explain in section 4.2.1 of our report for the ENA.

2.5.2.1 Compensating for the nominal cost of debt accurately or only in expectation

37. If the RFM continues to use actual inflation to index the debt portion of the RAB then the regime can only create an expectation that the nominal cost of debt from the RORI is compensated. This expectation of the correct outcome can be achieved by deducting from the nominal return on debt in the PTRM a forecast of the nominal compensation expected to be provided via future indexation of the debt portion of the RAB in the RFM.

38. However, this is only an expectation that the correct compensation will be provided. If, for whatever reason, the forecast turns out to be wrong then the wrong nominal compensation will be provided (too high if actual inflation is greater than forecast and too low if actual inflation is lower than forecast).

39. An alternative approach would be to change the RFM so that the debt portion of the RAB is indexed by the same amount as the forecast used to index the debt portion of the RAB in the PTRM. This reform ensures that the correct compensation for the nominal cost of debt determined in the RORI. Consistent with the terminology used in my report for the ENA, we describe this as a "hybrid" approach.

40. If such a reform is made to the RFM then the importance of PTRM inflation applied to debt returns correctly forecasting future inflation is materially reduced. This is because, by construction, PTRM inflation applied to debt returns will perfectly "forecast" the inflation to be applied to the debt portion of the RFM. IN this context, the accuracy of the forecast merely determines how much compensation is provided in revenues versus RAB indexation. This contrasts with the current circumstances were the accuracy of the forecast is critical for accuracy of total compensation for debt costs (not just the allocation of this compensation across revenues and RAB indexation).

2.6 How do your answers to question 5 compare to AER current practice?

41. As explained in our answer to Questions 1, 3 and 4, there are only two conceivable objectives for PTRM inflation when it comes to deriving a real return:

    - Remove the nominal compensation built into the RORI returns; or
    - Remove the nominal compensation expected to be provided by future RAB RFM and revenue indexation.

42. The AER's current method does neither of these accurately for the reasons set out below.

43. Similarly, debt and equity returns are estimated differently in the RORI and they have different inflation compensation built into their nominal returns (see our answer to Questions 1, 3 and 4). However, the AER uses a single PTRM inflation and, as such, this cannot simultaneously be said to be removing nominal compensation built into both the return on debt and the return on equity estimated in the RORI returns.

2.6.1 Differences specific to debt

44. For debt, the RORI sets a trailing average of nominal debt costs over 10 historical years. The AER then deducts a 10-year estimate of expected future inflation at the beginning of the regulatory period. This results in a real return:

    - that does not bear any relation to the real debt costs that an NSP would actually incur if they funded themselves using inflation indexed debt. To achieve this objective the AER would have to remove a 10-year trailing average of expected inflation;[5]

    nor does it

    - result in an expectation that the nominal cost of debt estimated pursuant to the RORI will be recovered. This is true even if actual inflation exactly matches the AER 10-year forecast. This is because actual compensation for inflation is provided in the AER models over 5 years instead of 10 years.

45. Unlike the nominal risk free rate, the nominal yields that make up the trailing average cost of debt do not have embedded in them the 10 year expected inflation at the time of the regulatory decision. The trailing average nominal cost of debt has a range of

[5] And the AER would need to add a liquidity premium to reflect the difference in real yields between nominal and inflation indexed corporate debt.

different historical expectations of inflation from the time the debt was issued. Removing an estimate of expected inflation at the time of the regulatory decision cannot remove the inflation expectations embedded in the nominal trailing average cost of debt at the time the debt cost was contracted.

46. In any event, attempting to remove the inflation compensation embedded in the nominal trailing average cost of debt is not a sensible regulatory objective. One could imagine attempting to remove a trailing average of 10 year inflation expectations and, in so doing, deriving an estimate of the real cost of debt that would have existed if inflation indexed debt was raised instead of nominal debt.[6] However, it is well accepted, including by the AER, that the efficient debt management strategy is to issue nominal debts. It is, therefore, not a sensible objective to attempt to remove the inflation compensation embedded in the nominal yields. (See also our discussion of related issues in section 4.2 of our report for the ENA.)

47. In this context, the only economically sensible real return on debt to estimate is the real return that is expected to result in the nominal cost of debt being recovered. This means that the expected inflation deducted from the nominal cost of debt in the PTRM must be equal to the inflation that is expected to be compensated in the RAB RFM and revenue indexation. Given that the latter is over a 5 year horizon covering the regulatory period then so must the PTRM expected inflation (used to escalate the debt portion of the RAB within the PTRM) have the same 5 year horizon.

48. The following stylised example describes how the AER's current regime results in any difference between 10 and 5 year inflation expectations being removed from the expected nominal compensation for the cost of debt.

[6] Of course, this would also assume that the real yield on such instruments would be equal to nominal BBB+ yields less expected inflation. This is unlikely to be true given the lack of appetite amongst bond investors for inflation indexed debt.

Figure 2-3: Stylised numerical example

Variable	Role in AER models	Algebraic designation	Value
Nominal TA RoD	Input to PTRM	A	3.0%
10 year expected inflation	Input to PTRM	B	2.0%
AER "real" RoD	Output of PTRM	C (=A-B)	1.0%
5 year expected inflation	Expected input to RFM/revenue indexation	D	-1.0%
Expected nominal RoD compensation	Expected output of AER models	E (=C+D=A-B+D)	0.0%
Difference "input" cost of debt and output compensation		F (=E-C=D-B)	-3.0%

49. This example illustrates that a +3% nominal cost of debt input into the PTRM is turned into zero expected nominal compensation for the cost of debt if the 10 year expected inflation is 3% higher than 5 year expected inflation.

50. That is, even if inflation turns out to be exactly as expected (zero forecast errors) the combined AER models will deliver nominal compensation that is different to the estimate of nominal debt costs.

51. While the above example is hypothetical, the below example is a real-world application. In its 2020 regulatory decision's for SAPN, JGN and EQ the AER estimated 10 year inflation for to be 2.27%. However, the 5 year inflation forecast (using the AER method) would have been 1.80%. Even if inflation follows exactly the AER method's predicted path, the 47bp difference between 5 and 10 year expected inflation will be removed from the nominal compensation for these businesses over the 2020-25 regulatory period. That is, even if the AER's forecast method is perfectly accurate, 47bp greater inflation compensation will be removed in the PTRM than is added back in the RAB RFM and revenue indexation.

52. Because 60% of inflation on RAB is removed at 2.27% but only 1.8% of inflation is added back, the difference is lost forever and not compensated in the RAB at a later time. The AER has incorrectly assumed that it in its paper.

Figure 2-4: Real world (SAPN, JGN, EQ) numerical example

Variable	Role in AER models	Algebraic designation	Value (of return)
Nominal TA RoD	Input to PTRM	A	A
10 year expected inflation	Input to PTRM	B	2.27%
AER "real" RoD	Output of PTRM	C (=A-B)	A-2.27%%
5 year expected inflation	Expected input to RFM/revenue indexation	D	1.80%
Expected nominal RoD compensation	Expected output of AER models	E (=C+D=A-B+D)	A-0.47%
Difference "input" cost of debt and expected output compensation		F (=E-C=D-B)	-0.47%

53. There is nothing that these NSPs can do, or could have done, to avoid this loss. Even if the businesses had issued inflation indexed debt, it would still have been exposed to this loss of 47bp pa on its cost of debt. Accordingly, the NSPs have not been provided with a reasonable opportunity to recover its efficient cost (addressed further in my answer to question 8).

54. Reform is still needed to address this problem: even if a real return is targeted and even if the AER method for estimating expected inflation is perfect.

2.6.2 Differences specific to equity

55. In our answers to previous questions I explain that the only economically meaningful estimate of the real cost of equity requires that PTRM inflation remove inflation compensation embedded in the nominal return on equity.

56. The only place that inflation compensation enters the nominal cost of equity from the RORI is via the nominal risk-free rate. This means that the objective of the PTRM is to remove the same inflation compensation that is embedded in the nominal risk-free rate estimated pursuant with the RORI.

57. The inflation compensation that is embedded in the nominal risk-free rate is the sum of both:

    - The actuarially expected level of inflation by bond investors; plus

- Any inflation risk premium they demand due to being exposed to inflation risk (i.e., receiving a nominal return irrespective of actual inflation).

58. Both of these values will be 10-year values because that is the tenor of the risk-free rate. That is, a 10-year risk-free rate will have embedded in it a 10-year actuarially expected inflation estimate plus a 10-year inflation risk premium.

59. It follows that the AER's use of a 10 year estimate is appropriate (although this estimate should reflect expectations during the risk free rate averaging period). However, the AER's estimate is purely an estimate of actuarially expected inflation. As explained in section 3 of our ENA report, this will be a biased estimate of total inflation compensation built into the nominal risk free rate – including any inflation risk premium.

60. On this basis, we consider that the AER should give more weight to market based estimates of expected inflation because these include both actuarially expected inflation and any associated inflation risk premium.

2.7 Does improving the accuracy of compensation for NSP's debt costs impose any costs or risks onto consumers?

61. If debt costs are efficiently incurred in nominal terms it is logical that compensation for those costs is provided in the most accurate manner.

62. We can see no reason to make the compensation for those costs:

- Biased (as is currently the case when the AER uses a 10 year inflation estimate in the PTRM when a 5 year inflation estimate is required for accuracy);

nor

- Dependent on the accuracy or otherwise of a forecast of actual CPI (as will continue to be the case until RFM debt indexation matches PTRM debt inflation).

63. The current regime, without either of these reforms, does not protect consumers from inflation risk. Rather, it does the opposite. It makes consumers pay:

- biased estimate of true efficient costs in expectation (which may be higher or lower depending on the relationship between 5 and 10 year expected inflation).
- higher (above cost) prices for NSP services if actual inflation turns out to be higher than the AER forecast and lower (below cost) prices if inflation is lower than the AER forecast.

64. Improving the accuracy of the compensation to match efficient costs does not create risk for any stakeholder – it reduces risk for all stakeholders. The existing risk that compensation does not match efficient cost is entirely created 'out of thin air' by the current regime making compensation dependent on the accuracy of an inflation forecast when efficient (debt) costs do not depend in any way on the variable being forecast.

2.8 Explain how any differences in your proposed approach to the AER's current approach better serve the NEO and the RPP?

65. The National electricity objective (NEO) seeks to:

> *promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:*
>
> *(a) price, quality, safety, reliability and security of supply of electricity; and*
>
> *(b) the reliability, safety and security of the national electricity system.*

66. Consistent with this, the revenue and pricing principles state that, inter alia:

> *(2) A regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs…*
>
> *(5) A price or charge for the provision of a direct control network service should allow for a return commensurate with the regulatory and commercial risks involved in providing the direct control network service to which that price or charge relates.*
>
> *(6) Regard should be had to the economic costs and risks of the potential for under and over investment by a regulated network service provider in, as the case requires, a distribution system or transmission system with which the operator provides direct control network services.*

67. In our view, these objectives and principles will be best served if the regime provides a level of compensation for debt and equity returns that is as accurate as possible in terms of reflecting the efficient risk adjusted costs of that funding.

68. Consistent with our answer to question 5, this requires that debt and equity returns estimated pursuant to the RORI are treated differently in the PTRM (and, ideally, in the RFM). This reflects their different constructions in the RORI (equity being a spot estimate and debt being a trailing average) and the fact that equity is fundamentally

and efficiently a real funding cost while debt is fundamentally and efficiently a nominal funding cost.

69. The AER's current method does not result in NSPs having an expectation that they will recover the nominal return on debt determined in the RORI (unless, by chance, 5 and 10 year inflation expectations happen to be the same). This is, in our view, in tension with the revenue and pricing principle that:

> *A regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs*

70. This failure to accurately compensate for efficient cost similarly is also in tension with promoting:

> *efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity as required by the NEO.*

71. At a minimum, the AER would need to adopt a 5 year estimate of expected inflation in the PTRM for the purpose of deriving a real cost of debt. However, as explained in our answer to question 5, this would only create an expectation of efficient cost recovery. In order to ensure that this was the case, the RAB RFM would also need to be amended so that the debt portion of the RAB is indexed by the same inflation rate as was used in the PTRM to convert the nominal return on debt into a real return on debt.

72. In relation to equity the AER currently correctly attempts to convert this into a real return by removing a 10 year inflation compensation estimate in the PTRM. However, the AER's method for estimating that inflation compensation explicitly excludes any attempt to capture the inflation risk premium built into the RORI return on equity (via the nominal risk free rate).

73. In order to capture the inflation risk premium, the AER should give more weight to market based measures – which automatically capture any inflation risk premium. Doing so would result in a more accurate estimate of the real cost of equity and, therefore, would be more consistent with the revenue and pricing principles and better promote the NEO.

74. We consider that the RORI sets out efficient debt returns incurred (contracted) in nominal terms and equity returns reflect equity investors expectations of real returns.

75. Our understanding is that the PTRM and RFM should act as instruments to deliver the efficient returns estimated pursuant to the RORI. Our proposed approach ensures

that they do. On the face of it, this would also be more consistent with the revenue and pricing principles and better promote the NEO.

Appendix A Lally's proof that PTRM inflation should be 5 years

76. Dr Lally proves, on pages 4 and 5 of his report, that PTRM inflation must anticipate inflation over the regulatory period in order to satisfy the NPV=0 result.

77. We agree that Dr Lally's proof is well constructed and valid. However, we note that it implicitly assumes that the discount rate is a nominal discount rate. This means that for the cost of debt, which we agree is a nominal cost, Dr Lally and we agree that the PTRM inflation (used to index the debt portion of the RAB) should reflect expected inflation over the course of the regulatory period.

78. However, Dr Lally's proof does not apply to equity given that equity is a real cost. we use the framework established by Dr Lally to show that PTRM inflation applied to equity should be estimated over the same horizon as the risk-free rate (10 years).

A.1 Dr Lally's proof applied to nominal costs

79. Dr Lally has a simplified model with no building blocks other than capital returns and zero depreciation/capex and with a single year regulatory period. In this model, the value of the opening RAB (A_o) must equal the present value of nominal expected revenues plus the expected indexed value of the opening RAB ($A_o[1 + E(i_1)]$).

$$A_o = \frac{E(REV_1) + A_o[1 + E(i_1)]}{1 + k_0} \qquad (1)$$

80. From this incontrovertibly correct position, Dr Lally simply rearranges terms to derive the correct real rate of return consistent with the NPV=0 condition (equation 1).

$$E(REV_1) = A_o[k_0 - E(i_1)] \qquad (2)$$

81. Equation 2 is the cash return that the PTRM must deliver such that, in combination with indexation in the RFM (equation 1), the NPV=0 principle.

82. Dr Lally's equation (2) proves that the NPV=0 principle requires that PTRM revenues must be derived by deducting the same inflation that is expected to be added to the RAB (i.e., $E(i_1)$).

A.2 Dr Lally's proof applied to real equity costs

83. Dr Lally's proof can also be applied to real costs. However, we need to replace k_0 with real discount rate k_0^r and we need to divide the right hand side of equation (1) by one plus expected inflation $(1 + E(i_1))$ to convert into real terms.

$$A_o = \frac{E(REV_1) + A_o[1 + E(i_1)]}{(1 + k_0^r)(1 + E(i_1))} \qquad \text{(1 real)}$$

84. Now, when we solve for $E(REV_1)$ by rearranging the real version of Dr Lally's equation (1), we get the following.

$$E(REV_1) = A_o \cdot k_0^r \cdot [1 + E(i_1)] \qquad \text{(2 real)}$$

85. Equation "2 real" shows that the PTRM must deliver cash returns that are equal to the real discount rate (k_0^r) indexed by actual inflation over the course of the course of the regulatory period.

86. When costs and discount rates are real, Dr Lally's amended proof simply requires that the PTRM delivers an economically sensible value for k_0^r. As described in section **Error! Reference source not found.** of our report for the ENA, this requires that t he PTRM remove 10 year expected inflation from the nominal cost of equity because the nominal cost of equity has 10 year of expected inflation embedded in it (via the nominal risk free rate estimated pursuant with the RORI).

A.3 Arriving at the same conclusion discursively

A.3.1 PTRM inflation's role if efficient funding costs are nominal

87. If the return estimated in the RORI is fundamentally a nominal cost, then the regime must aim to deliver a nominal return that matches the nominal cost estimated in the RORI. This can only be achieved if the PTRM attempts to remove the same value of inflation compensation that is expected to be provided via indexation of the RAB/revenues over the regulatory period.

88. For example, assume that debt costs are efficiently incurred (contracted) in fixed nominal terms. This means that debt contracts specify a given interest rate that must be paid over the life of the debt and that the interest rate does not vary with the level of inflation over the life of the debt. Further assume, for the sake of illustration, that:

- the debt interest costs estimated by the RORI were 5.0% - being the trailing average of debt observations for 10 year bonds over the last 10 years;
- the inflation expectations at the time for each of these 10 different debt observations ranged from 1% to 2%pa expected inflation – averaging 1.5%;
- expected inflation over the next regulatory period is 3.0%;
- expected inflation over the next 10 years is 4.0%.

89. Now consider the final return earned if PTRM inflation attempts to remove:

A. 1.5% - being the inflation compensation that enters the regime via the nominal values determined in the RORI; or

B. 3.0% - being the inflation compensation that is expected to enter the regime via the inflation indexation applied in the RAB RFM (and to revenues) over the five year regulatory period.

C. 4.0% - being neither of the above but, rather, the inflation rate averaged over the next 10 years.

A.3.1.1 PTRM removes 1.5%

90. If the PTRM removes 1.5% then the final compensation provided for the cost of debt will be 6.5% (=5.0% from the RORI *less* 1.50% from the PTRM *plus* 3.0% from revenue and RAB indexation). This is 1.5% more than the actual nominal cost of debt estimated in the RORI.

91. The reason for this departure is that the inflation compensation embedded in the nominal cost of debt (estimated pursuant with the RORI) is a historical average value and this is lower than the inflation compensation expected in the future. As a result, less inflation compensation is removed than is expected in the future – with the effect that the return expected to be achieved is above the nominal cost estimated in the RORI.

92. If historical debt costs are, in fact, efficiently contracted in nominal terms then this means that the network service provider (NSP) will expect to be overcompensated for their efficiently incurred costs.

A.3.1.2 PTRM removes 3.0%

93. By contrast, if the PTRM removes the inflation compensation expected over the five year regulatory period (3.0%) then the expected nominal compensation for debt will

match the estimate from the RORI (5.0%=5.0% from the RORI *less* 3.0% from the PTRM *plus* 3.0% from revenue and RAB indexation).

94. If historical debt costs are, in fact, efficiently contracted in nominal terms then this means that the network service provider (NSP) will expect to be correctly compensated for their efficiently incurred costs.

A.3.1.3 PTRM removes 4.0%

95. If the PTRM removes a 10 year forecast of inflation (4.0%) then the expected nominal compensation for debt over the regulatory period will be 1.0% lower than the estimated nominal cost of debt from the RORI (4.0%=5.0% from the RORI *less* 4.0% from the PTRM *plus* 3.0% from revenue and RAB indexation).

96. If historical debt costs are, in fact, efficiently contracted in nominal terms then this means that the network service provider (NSP) will expect to be undercompensated for their efficiently incurred costs.

A.3.2 PTRM inflation's role if efficient funding costs are real

97. If the return estimated in the RORI is fundamentally a real cost, then the regime must aim to deliver a real return that matches the real cost embedded in the RORI return estimate. This can only be achieved if the PTRM attempts to remove the same value of inflation compensation that embedded in the nominal RORI estimate.

98. For example, assume that equity costs are efficiently incurred in real terms. This means that equity investors bear the risks associated with a real (inflation protected) investment – such that their nominal returns move up and down with inflation while their real expected returns are unaffected by inflation.

99. In order for the regulatory regime to compensate for the real cost of equity it is necessary that the RORI and the PTRM combine to deliver that real cost of equity. If this is done then the indexation of the RAB by actual inflation will, by only adding compensation for actual future inflation, automatically ensure that this real return is achieved.

100. However, for the RORI and the PTRM to combine in this way, PTRM inflation applied to the equity portion of the RAB must be the same as the inflation compensation built into the nominal equity return estimated pursuant with the RORI. Only then will the real return delivered by the PTRM match the real return embedded in the nominal return on equity from the RORI.

101. The RORI estimates the nominal return on equity by adding a fixed 3.66% (=0.6 equity beta × 6.1% MRP) risk premium to a nominal 10 year risk free rate estimated in the risk free rate averaging period immediately prior to the commencement of the regulatory period. The inflation compensation embedded in the nominal risk free rate observation is the inflation compensation embedded in the RORI return on equity. It follows that, assuming equity funding is a real cost, PTRM inflation should seek to remove the inflation compensation embedded in the nominal risk free rate.

102. For the sake of illustration, assume that:

- the 10 year nominal risk free rate is 5.0% such that the return on equity estimated pursuant to the RORI is 8.66%;
- the nominal risk free rate estimated pursuant to the RORI included 4.0% inflation compensation (being expected inflation over the next 10 years); and
- expected inflation over the next regulatory period is 3.0%.

103. The first two dot points imply the real return on equity is 4.66%. That is, the PTRM must remove 4.0% from the nominal return on equity of 8.66% to deliver implied real return estimated in the RORI.

104. Importantly, if this is done then the actual nominal return expected to be compensated will be 7.66% (7.66%=8.66% from the RORI *less* 4.0% from the PTRM *plus* 3.0% from revenue and RAB indexation). This is lower than the 8.66% nominal return estimated in the RORI. However, this is appropriate because actual inflation over the regulatory period (3.0%) is lower than the inflation compensation embedded in the RORI estimate of the return on equity. If equity is a real cost, then it is appropriate that nominal compensation is lower when actual inflation is lower than inflation compensation embedded in the nominal RORI estimate.

A.4 Summary

105. This appendix shows that Lally's proof that PTRM inflation must match the term of the regulatory period only applies to debt. we have separately explained that, in terms of targeting a real return, there are only two valid objectives for PTRM inflation.

A. Remove the inflation compensation embedded in the nominal cost estimated pursuant to the RORI (step 1 in Figure 2-1)? or

B. Remove the inflation compensation expected to be provided via revenue/RAB indexation (step 3 in Figure 2-1)?

106. In this report we have explained that the answer depends on whether the costs estimated in the RORI have been incurred in nominal or real terms. we have argued

that if the costs are real (equity) then "A" is the correct objective but if the costs are nominal (debt) then "B" is the correct objective.

107. Lally mathematically proves our position in relation to nominal costs. we amend Lally's proof to also prove our position in relation to real costs.

Appendix B Historical context for the trailing average cost of debt in RORI

108. The historical context for the adoption of a trailing average cost of debt was clearly based on the key rationale that this reflected efficient debt funding practices for NSPs. For example, when proposing a rule change, consumers in 2011 noted that there was a divergence between the AER's regulatory allowance (based at that time on the spot cost of debt) and the efficient cost of debt (reflecting the observation that firms tend to issue debt on a staggered maturity basis).

109. The Energy Users Rule Change Committee rule change submission observed that:

> *The guiding principle here, equally applicable to the other regulatory building blocks, is that the notional level [regulatory allowance] should reflect what an efficient provider in a competitive environment would incur.*[7]

110. The Major Energy Users group also submitted that the regulatory allowance should reflect the efficient cost of debt:

> *The MEU notes that the draft rules require that the return on debt would be based on the structure that an efficient entity would provide efficient financing costs. This is an appropriate test and allows the regulator to assess what might be seen as an efficient debt financing structure.*[8]

111. Similarly, when adopting the trailing average approach, the AER stated that:

> *We propose to apply a trailing average portfolio approach to estimate the return on debt. This approach means that the allowed return on debt more closely aligns with the efficient debt financing practices of regulated businesses.*[9]

112. The AER further explained its rationale for seeking to equate its regulatory allowance with the efficient costs in each regulatory period as follows:

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[7] Energy Users Rule Change Committee Rule Change Request, supporting report, by CEPA, October 2011, Estimating the debt margin, p. 9.

[8] Energy Users Rule Change Committee Rule Change Request, supporting report, by CEPA, October 2011, Estimating the debt margin, p. 9.

[9] AER, December 2013, Final Rate of Return Guideline: Explanatory Statement, p. 12, emphasis added.

> *If the expected [required] return on debt (and equity) raised in a period is different from the return on debt (and equity) allowance for the period, this difference may distort intertemporal investment and consumption decisions. That is, it may result in dynamic inefficiency. In particular, if the return on debt allowance is below the expected return on debt this might result in under–investment. On the other hand, if the return on debt allowance is above the expected return on debt this would lead to over–compensation for the regulated business and customers paying prices that are above efficient levels.*
>
> *Under the trailing average portfolio approach, movements in the market return on debt from year to year are reflected in the allowed return on debt. Reflecting market changes during the regulatory control period reduces the scope for sub-optimal investment and consumption levels.*[10]

113. When explaining its decision to annually update its return on debt allowance, the AER stated:

> *Annual updating minimises the potential mismatches between the benchmark efficient entity's return on debt and allowed return on debt during the regulatory control period. This, in turn, reduces the scope for dynamic inefficiency…*
>
> *Option one (no annual updating) may lead to mismatches between the benchmark efficient entity's return on debt during the regulatory control period and the regulatory return on debt allowance. This could create investment distortions for the benchmark efficient entity and result in dynamic inefficiency. This problem would be exacerbated where there is a prolonged period of increasing or decreasing rates of return on debt [or, in the current case, a prolonged period of low inflation.]* [11]

[10] Major Energy Users, October 2012, MEU Response to AEMC Draft Rule Change Amendments, p. 13, emphasis added.

[11] AER, December 2013, Final Rate of Return Guideline: Explanatory Statement, p. 112, emphasis added.

Appendix C Performance of the AER vs market measures at forecasting actual inflation

114. The AER method can be used to generate a unique forecast of inflation every quarterly publication of the RBA's Statement on Monetary Policy and this can be done for any forecast horizon from 1 to 10 years. This can then be compared with break-even inflation[12] as well as CPI swaps[13]for the same period.

C.1 5 year forecast accuracy

115. In this section we focus on 5 year forecasts because adopting a longer time horizon materially reduces the actual inflation against which a comparison can be made. In addition, it is consistent with our view that any inflation forecast deducted from the nominal trailing average cost of debt should have a 5 year horizon to match the period over which RFM indexation occurs. Given debt is 60% of the RAB this makes the accuracy of the 5 year forecast critical.

116. Figure 2-2 shows the relative accuracy of the AER method versus break-even inflation at forecasting actual inflation over a 5-year horizon starting in March 2007. March 2007 is when the RBA first began releasing its forecasts.[14] Each of the black 'dots' in the below chart is a forecast obtained using the AER's method and each red dot is a break-even estimate taken at the same time.

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12 These are both market measures of inflation. Break even inflation is the difference in yields on nominal and inflation indexed Commonwealth government securities (CGS). The difference in yields is a market measure of expected inflation because it represents the actual inflation outcome at which an investor who holds the inflation indexed CGS to maturity will receive the same nominal return as an investor who holds the nominal CGS to maturity.

13 CPI swaps are a contract between two parties where the first agrees to pay the second a fixed return on a notional amount over a defined period (e.g., 2% on $100 over 5 years) and the second agrees to pay the first whatever actual CPI turns out to be on the same notional amount over the same period (e.g. CPI×$100 over 5 years).

14 we use a 5-year forecast horizon because applying a 10-year forecast horizon over a 10-year sample period would have generated only one observation that includes the full set of forecasts.

117. The horizontal axis is the forecast and the vertical axis is actual inflation over the next 5 years.[15] If the forecast is equal to the corresponding actual inflation outcome then the dot will lie on the 45 degree dotted line. If the dot is below and to the right of the 45 degree line, then this means that the forecast was too high. If the dot is above and to the left of the 45 degree line, then this means that the forecast was too low.

118. For each quarterly forecast there are a pair of red and black dots that represent with the same values for the vertical axis (i.e., the same actual inflation outcome that corresponds to the value the forecasts were attempting to predict). If the black dot is to the right of the red dot it means that the AER method forecast was higher than the break-even forecast (and *vice versa*).

119. Break-even inflation estimates have been materially more accurate than AER method estimates since 2007. Both tend to be to the right of the 45 degree line suggesting that both have under-forecast inflation. However, the black dots are almost always to the right of the 45 degree line and almost always further to the right than the red dots.

120. By way of further elaboration one of the black dots represents the AER's inflation forecast methodology applied to the February 2010 RBA SoMP. This results in an average inflation forecast over the next 5 years of 2.55%.[16] However, actual average inflation over that period was just 2.33%. Therefore, one of the "dots" in the chart has 2.55% on the horizontal axis and 2.33% on the vertical axis.

121. If less than 5 years of actual inflation data is available we still report a comparison of forecast to actual inflation provided at least "n" years of actual inflation are available.[17] we present results for "n" equals 3, 4, and 5.[18] It can be seen that actual

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15 If less than 5 years of actual inflation data is available (as is the case for inflation forecasts after March 2015) we use the actual inflation data that is available plus the most recent Maty 2020 RBA forecast of trimmed mean inflation as a proxy for the likely inflation in 2021 and 2022. Beyond March 2017 there is less than 5 years of actual data available (even when actual data is supplemented with the RBA's May 2020 forecasts). In this situation we simply report the actual + RBA forecast data that is available provided that there is at least "n" years of that data (actual data to March 2020 plus 2 years of RBA forecast).

16 RBA forecast for June 2011 (2.5%); RBA forecast for June 2012 (2.75%); forecasts for subsequent years assumed to be 2.5%; **AER inflation = 2.55%.**

17 Noting once more that, in this context, the actual inflation series is extended to June 2022 by assuming the RBA May 2020 forecasts will be borne out by actual data.

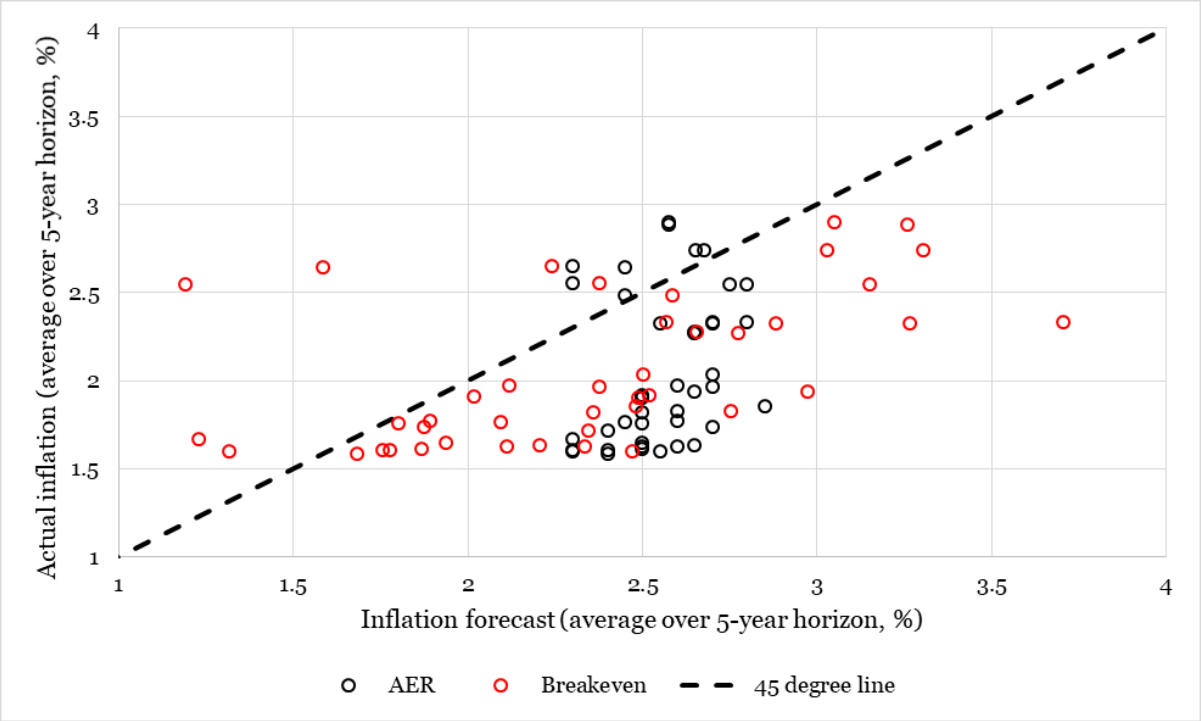
18 That is, we impose a restriction that an estimate for the actual inflation series must have at least "n" observations, meaning that the series ends in March 2019 less "n" years.

inflation is consistently below the forecasts obtained from the AER's approach irrespective of the value of "n" applied.

122. There is a clear positive relationship between breakeven forecast inflation and actual inflation. This positive relationship is absent from the AER method.

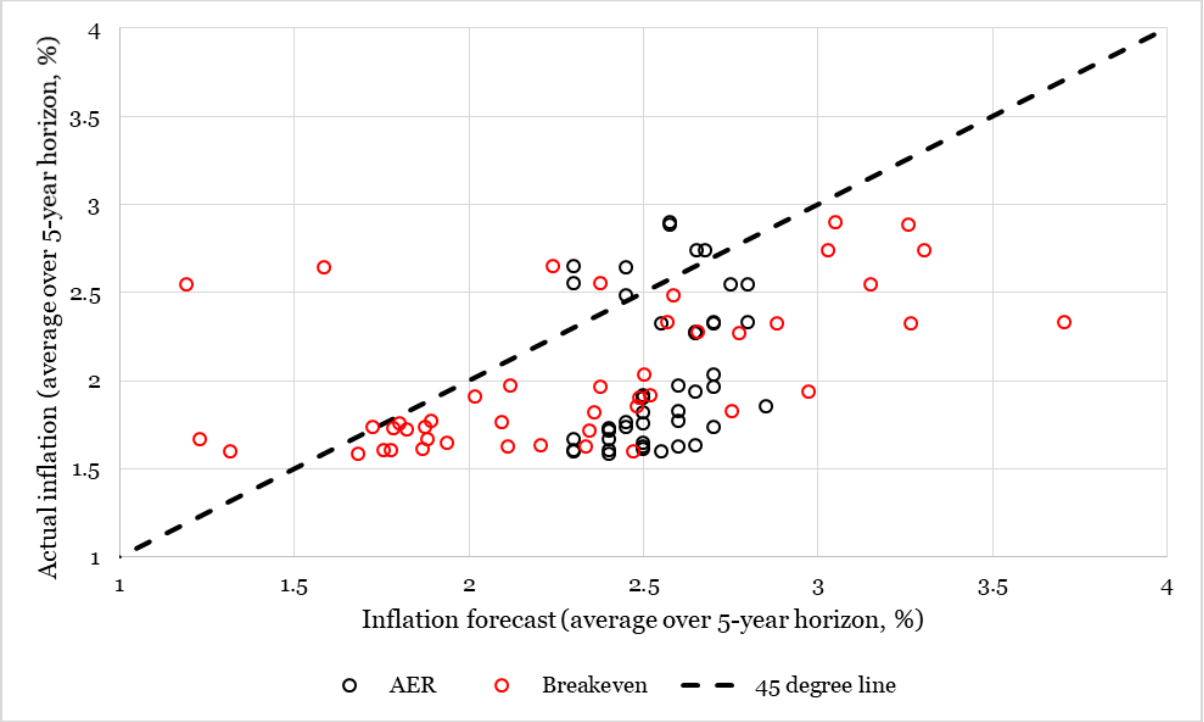
Figure 2-5: AER quarterly forecasts and breakeven inflation vs 5-year ahead actual inflation*

"n"=5 such that comparison is only made where there is 5 years of actual data to compare to forecast*



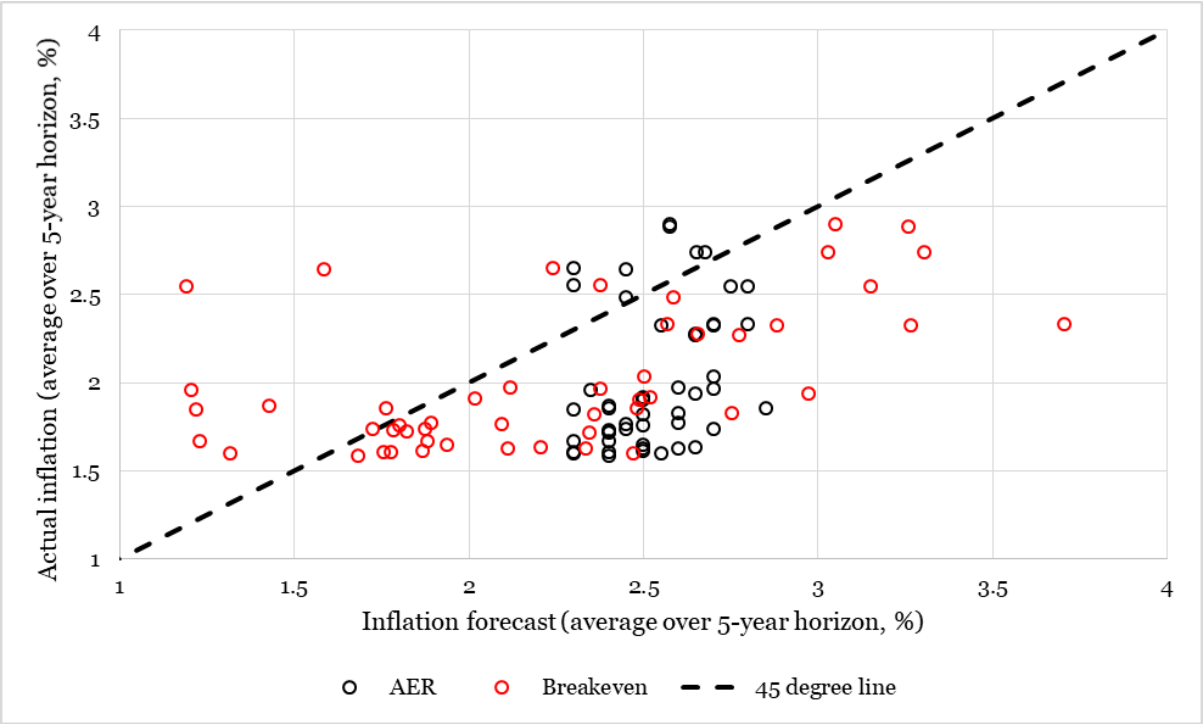
*Source: RBA, ABS, AER inflation forecast method, CEG analysis. *Values below the 45 degree line imply that the inflation forecast was higher than actual inflation over the subsequent period. The further to the right of the line the worse the over-estimate.*

"n"=4 (i.e., comparison is only made where there is 4 years of actual data to compare to forecast)



**Values below the 45 degree line imply that the inflation forecast was higher than actual inflation over the subsequent period. The further to the right of the line the worse the over-estimate.*

"n"=3 (i.e., comparison is only made where there is 3 years of actual data to compare to forecast)

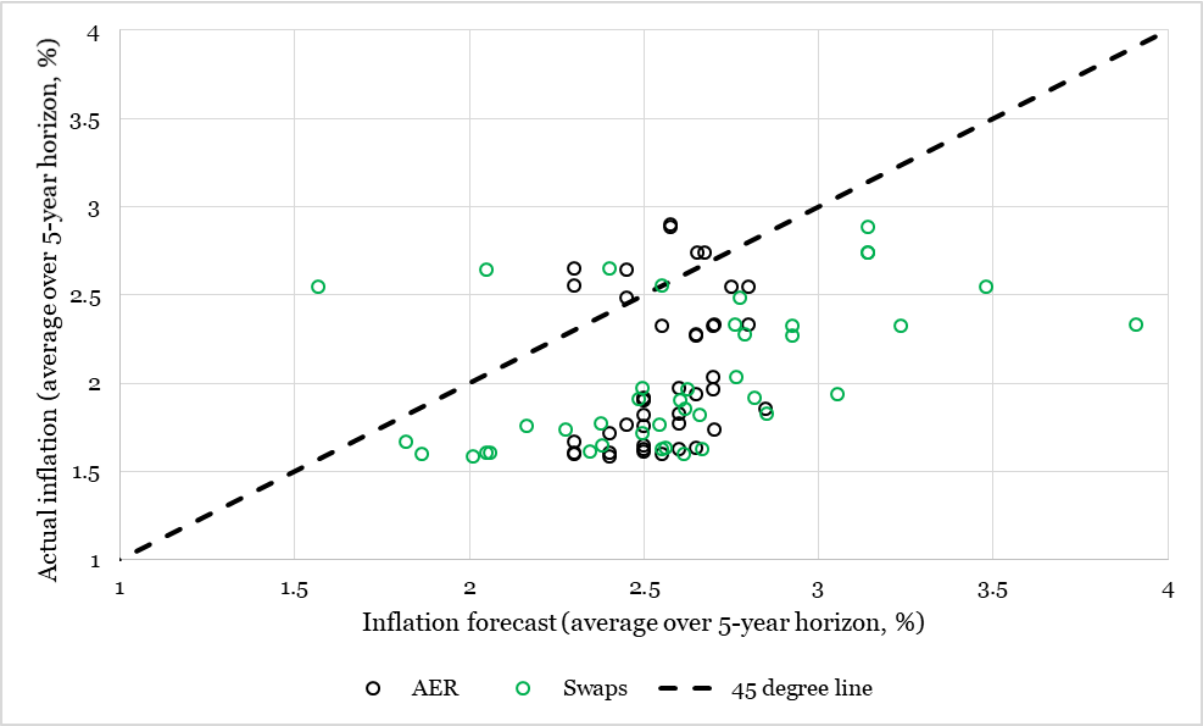


**Values below the 45 degree line imply that the inflation forecast was higher than actual inflation over the subsequent period. The further to the right of the line the worse the over-estimate.*

123. The same charts comparing the AER method to CPI swaps are presented below. Note that, as with breakeven inflation, there is a clear positive relationship between forecast inflation and actual inflation. This positive relationship is absent from the AER method.

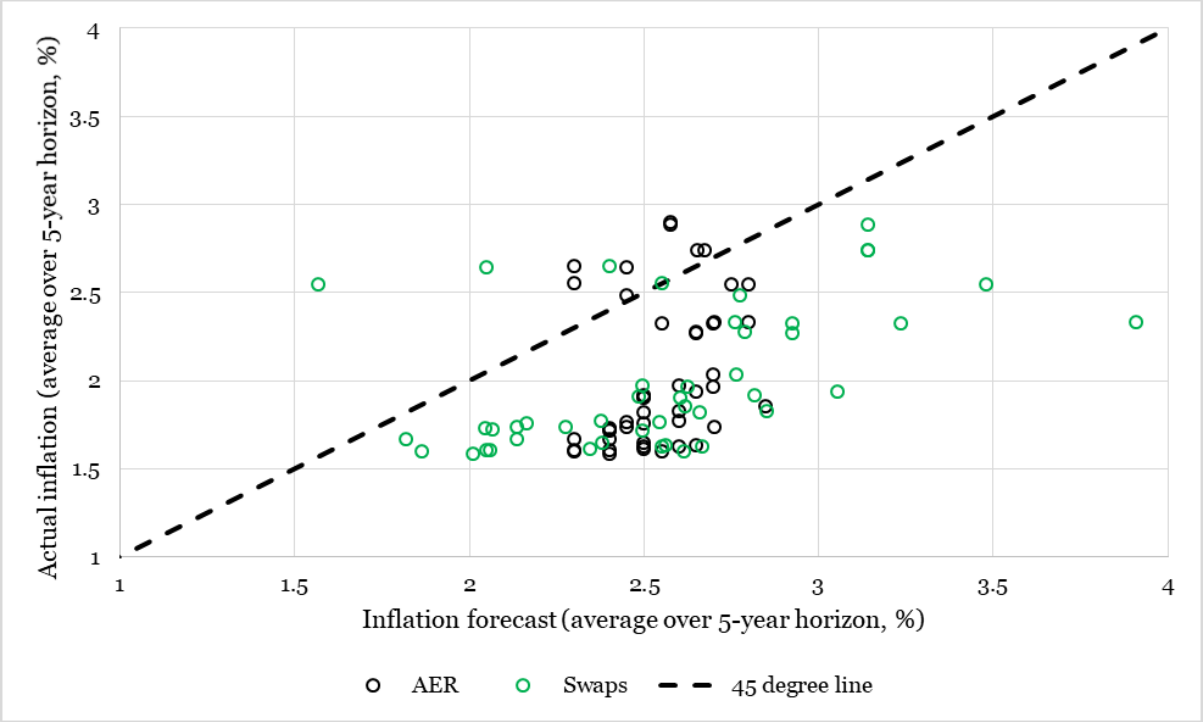
Figure 2-6: AER quarterly forecasts and swaps inflation vs 5-year ahead actual inflation*

"n"=5 such that comparison is only made where there is 5 years of actual data to compare to forecast*



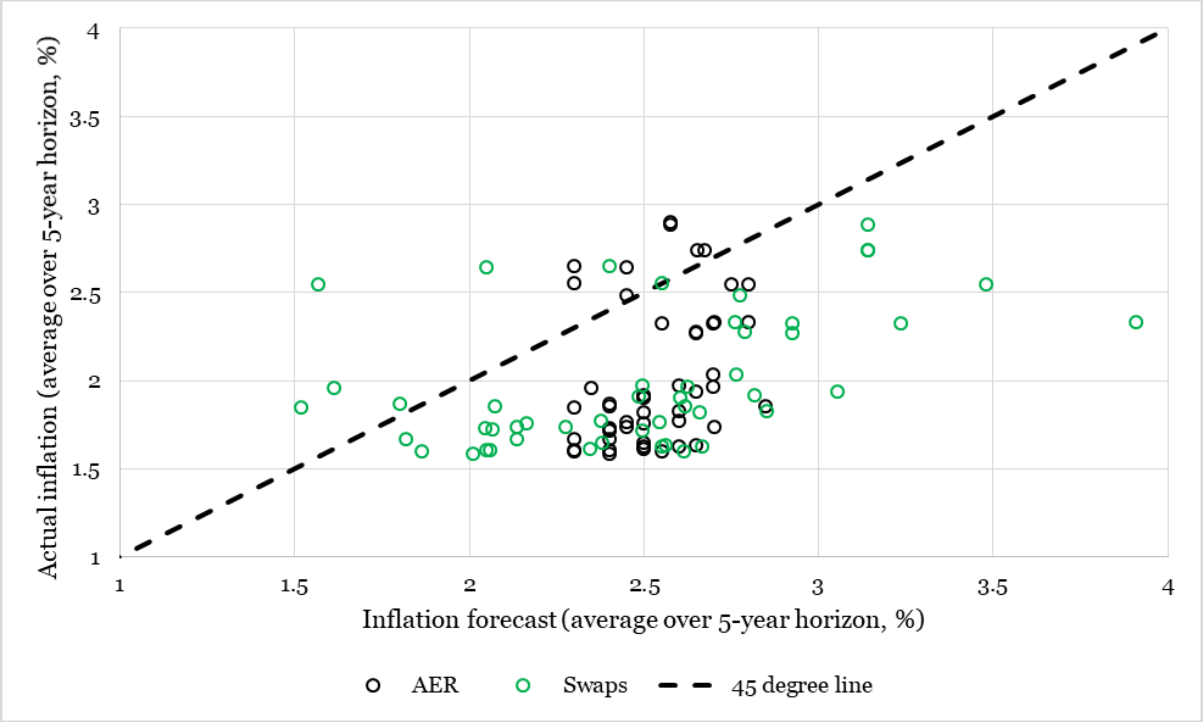
*Source: Bloomberg, RBA, ABS, AER inflation forecast method, CEG analysis. *Values below the 45 degree line imply that the inflation forecast was higher than actual inflation over the subsequent period. The further to the right of the line the worse the over-estimate.*

"n"=4 (i.e., comparison is only made where there is 4 years of actual data to compare to forecast)



**Values below the 45 degree line imply that the inflation forecast was higher than actual inflation over the subsequent period. The further to the right of the line the worse the over-estimate.*

"n"=3 (i.e., comparison is only made where there is 3 years of actual data to compare to forecast)



**Values below the 45 degree line imply that the inflation forecast was higher than actual inflation over the subsequent period. The further to the right of the line the worse the over-estimate.*

C.2 2 to 5 year forecast accuracy

124. The figures below compare the relative accuracy of break-even inflation and the AER method in forecasting actual inflation over the subsequent "t" years – where t is 2 to 5 years.

125. The date on the horizontal axis represents the quarter that actual inflation is measured to with the forecasts being taken "t" years before. For example, where "t" is 2 years, the blue bar for June 2012 shows:

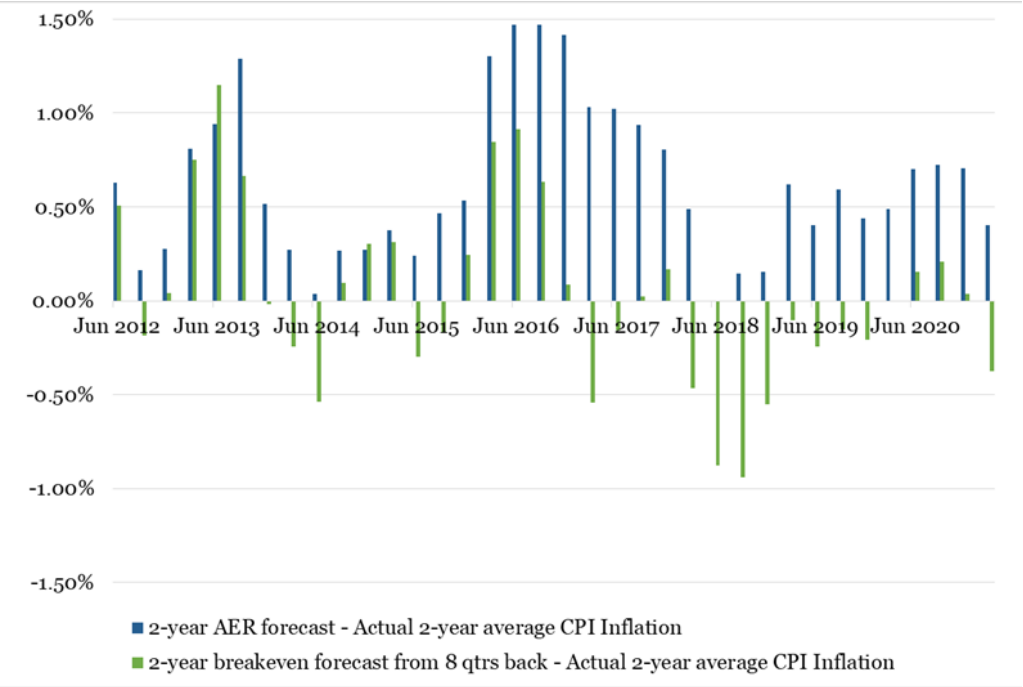
- the 2 year forecast to the end of June 2012 using the AER method at May 2010; less
- actual inflation over the 2 years to June 2012.

126. The green bar involves the same calculation but using break-even inflation.

127. Note also that the charts are extended out to 2021 even though there is currently no actual CPI figures available beyond March 2020. We have done so by assuming actual

inflation in those periods matches the most recent (May 2020) RBA forecasts of trimmed mean inflation.

Figure 2-7: 2 year break-even inflation vs AER method*



*Source: AER, RBA, CEG analysis. * Note that forecasts being tested are made 2 years prior to the date shown on the horizontal axis*

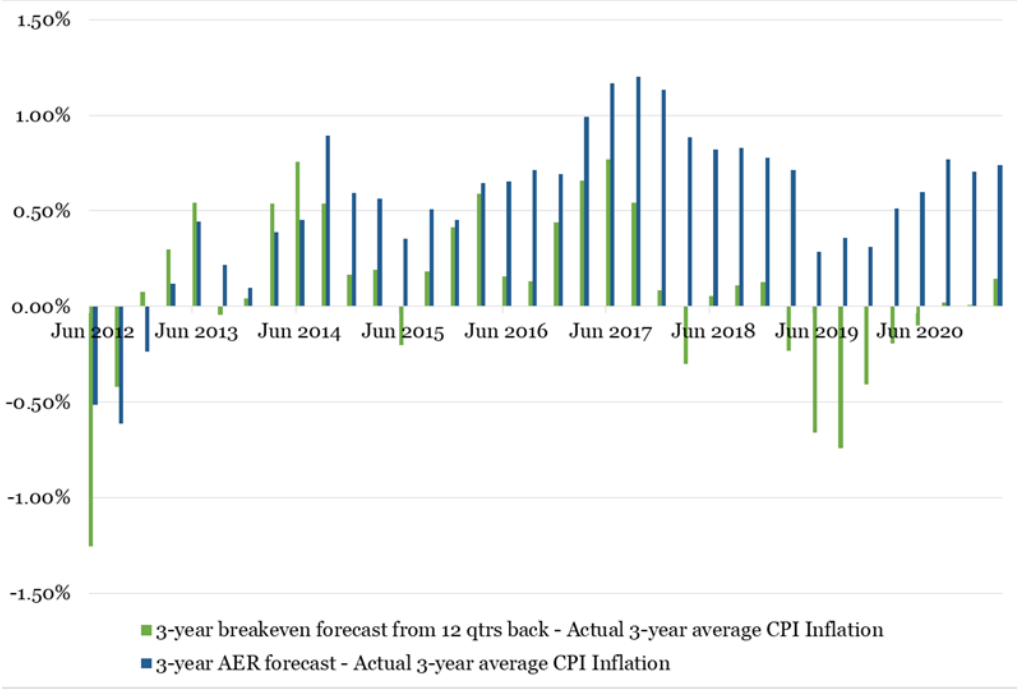
128. It can be seen that even with a 2 year forecast horizon break-even inflation performs better than the AER method both in terms of having:

   - Smaller absolute forecast errors in all but 5 quarters; and
   - Having a mix of under and over forecasts. By contrast, the AER method over-forecasts in every period except in June 2018 where it fractionally under-forecasted.

129. This is a notable result because the AER method applied to a 2 year horizon relies solely on the RBA forecasts (i.e., does not rely on an assumption of 2.5% inflation beyond the RBA forecast horizon). This means that break-even inflation was a materially better forecast of actual inflation than the RBA forecasts.

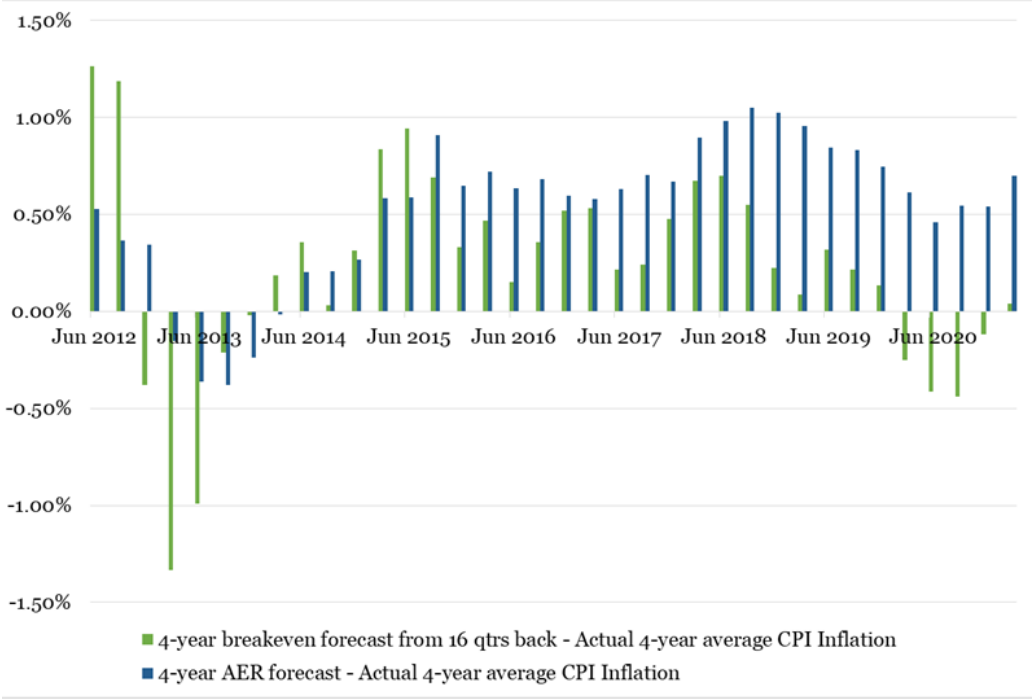
130. Similar but stronger conclusions apply at longer forecast horizons. When the AER method is applied to 3, 4 and 5 year forecast horizons it performs progressively worse – both in absolute terms and relative to break-even inflation.

Figure 2-8: 3 year break-even inflation vs AER method*



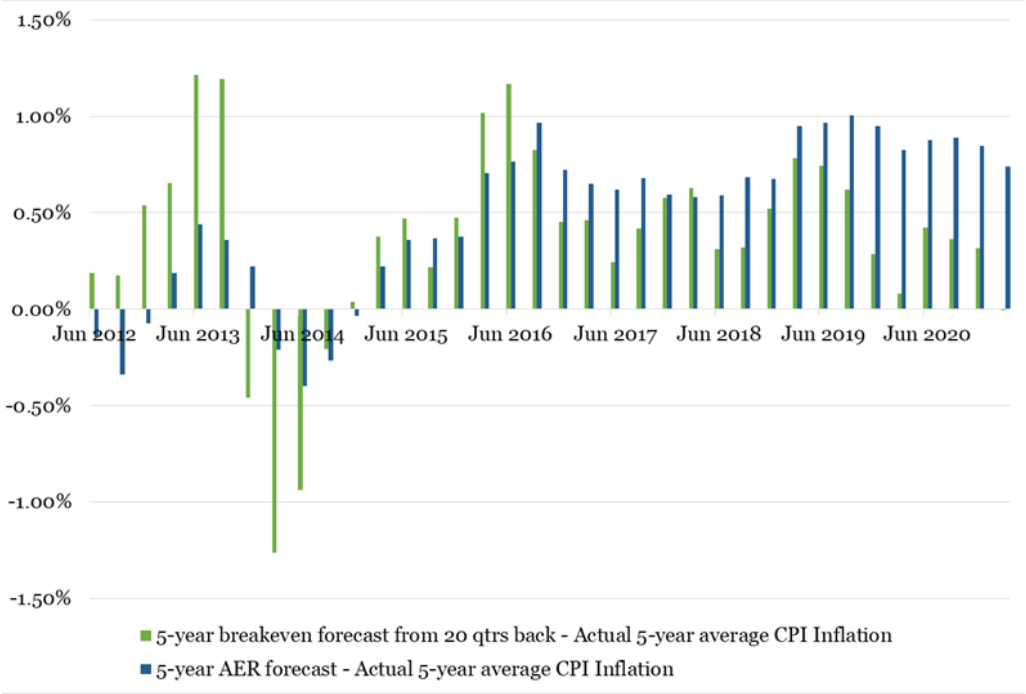
*Source: AER, RBA, CEG analysis. * Note that forecasts being tested are made 3 years prior to the date shown on the horizontal axis*

Figure 2-9: 4 year break-even inflation vs AER method*



*Source: AER, RBA, CEG analysis. * Note that forecasts being tested are made 4 years prior to the date shown on the horizontal axis*

Figure 2-10: 5 year break-even inflation vs AER method*



*Source: AER, RBA, CEG analysis. * Note that forecasts being tested are made 5 years prior to the date shown on the horizontal axis*