

Comment on treatment of inflation in the AER's PTRM and the RFM

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1 Introduction

1.1 Background

In the context of the Australian Energy Regulator's (AER's) ongoing consultation on amendments to its roll-forward model (RFM), the Energy Networks Association (ENA) has asked Frontier Economics to consider whether the current treatment of inflation within the post-tax revenue model (PTRM) and the RFM is internally consistent and would likely promote the National Electricity Objective (NEO).

The AER's approach is to begin with an estimate of the nominal required return, which is computed as the product of the weighted average cost of capital (WACC) and the regulatory asset base (RAB). The AER then determines the amount by which it expects inflation to cause an increase in the RAB over the regulatory control period. This is based on the AER's forecast of expected inflation. The AER then deducts this figure from the nominal required return and the remainder becomes part of the allowed revenue that the service provider is able to recover. This is all done within the PTRM. The RFM then increases the RAB each year based on actual outturn inflation.

That, is the AER's forecast of expected inflation is deducted from the return to investors and then actual outturn inflation is added back. There are potentially two sources of difference between what is deducted and what is added back:

- There may be difference between the AER's forecast of inflation over the regulatory control period and the best unbiased forecast. Any such difference would result in an *ex ante* expected violation of the NPV neutrality principle over the period because the business would in expectation receive revenues that either over/under-recover its efficient costs.
- There may be a difference between the best unbiased forecast of inflation and outturn inflation. By definition, the expected difference between an unbiased forecast and actual outcomes is zero.

Thus, the main issue that we consider in this report is the prospect that the AER's approach to forecasting expected inflation over the regulatory control period is not the best unbiased forecast commensurate with the prevailing conditions in the market.

1.2 Key findings

Our key findings, which are set out more fully in the remainder of this report, are the following:

- 1. When determining allowed revenues, regulators should do so in a way that compensates investors for expected inflation. This is entirely consistent with established regulatory practice:
 - a. Unless investors are compensated for market expectations of inflation, they will anticipate that the real efficient returns associated with investing in the regulated business will be gradually eroded over time. In other words, the returns will be insufficient to cover the nominal expected cost of capital of the investment.
 - b. If allowed revenues over-compensate regulated businesses for market expectations of future inflation, investors can expect to earn more than the cost of capital, and consumers will, in expectation, pay too much relative to the efficient cost of delivering the regulated services.
- 2. Under either of these circumstances, the incentives for regulated businesses to make efficient investments would be undermined.
- 3. Under the current framework established by the National Electricity Rules (NER), it is clear that:
 - a. The intention under the NER is to compensate regulated businesses for future inflation; and
 - b. Part of the compensation for inflation occurs through growth of the regulatory asset base (RAB) in line with actual (i.e., realised) inflation. This adjustment occurs in the RFM.
- 4. However, the NER also requires the AER to index the RAB within a regulatory control period, in the PTRM, when determining maximum allowed revenues for each year. Due to the fact that the NER specifies the use of a nominal rate of return, for the purposes of determining maximum allowed revenues, the NER requires the AER to apply a cash flow adjustment that offsets exactly the effect of the indexation of the RAB within the regulatory control period. This avoids double-counting the compensation for inflation. However, the NER does not specify what measure of inflation should be used for these purposes within the PTRM.
- 5. In the absence of any such guidance in the NER, the AER has developed its own method of forecasting inflation, which will typically deliver a return that is very close to the midpoint of the inflation range targeted by the Reserve Bank of Australia (RBA)—i.e., 2.5%.
- 6. Average inflation outturns over the long-run will tend to be fairly close to the RBA's midpoint target. However, in individual years and, often, over a series of years, actual inflation (which must be used in the RFM) may differ materially from the RBA's midpoint target—and also differ from the forecast of inflation used by the AER in the PTRM.

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- 7. Inflation has been persistently and significantly below the AER's forecast of inflation over the past two years. This is consistent with weak inflation globally. The RBA has noted recently that inflation is expected to remain below its midpoint target for some time. Market-based evidence (e.g., break-even inflation) also suggests that investors are currently expecting inflation to remain well below the AER's forecasts for some time.
- 8. We show in this report that mismatches between the AER's forecast and actual inflation can lead to businesses over/under-recovering relative to the nominal returns used by the AER when determining maximum allowed revenues. Specifically, if actual inflation is lower than inflation forecast by the AER, regulated businesses will earn *nominal* returns that are lower than the *nominal* returns allowed by the AER when determining maximum allowed revenues—and vice versa. A particular problem arises when the AER's forecast of inflation over the regulatory control period is not the best unbiased forecast available at the time. This results in an *ex ante* violation of NPV neutrality over that regulatory control period.
- 9. If the AER assumes that the nominal allowed returns it uses to determine maximum allowed revenues are commensurate with the cost of capital faced by regulated businesses, the circumstances described above would amount to over/under-recovery of regulated businesses' efficient costs.
- 10. The magnitude of such mismatches can be material. For instance, over/under-recovery of allowed returns by a margin of 0.5% (which is not inconceivable), due to bias in the AER's inflation forecast would result in:
 - A revenue impact of approximately ± \$16 million per annum for an average-sized electricity distribution network service provider; and
 - b. A revenue impact of nearly \pm \$13 million per annum for an average-sized electricity transmission network service provider.
- 11. In addition, a mismatch between the AER's forecast of inflation and the investors' expectations of inflation embedded within the nominal returns used to set businesses' allowed revenues would result in businesses earning a return that is either too high or too low compared to the *real* return that investors require in order to commit capital to the business.
- 12. In our view, the scope for material over/under-recovery of efficient costs (including the cost of capital) would undermine the revenue and pricing principles in the National Electricity Law. Nor would such outcomes promote the long-term interests of consumers, which means that such outcomes are unlikely to be consistent with the NEO.
- 13. No over/under-recovery occurs if actual inflation matches the AER's forecasts. Whilst it will be impossible for the AER to forecast perfectly, it

could improve its forecasts (for use in the PTRM) by adopting an unbiased forecast of the market's expectation of inflation embedded in the nominal returns used by the AER to set allowed revenues.

- 14. As this problem is essentially a consequence of bias in the AER's inflation forecasts, there is nothing that consumers or regulated businesses can do to mitigate any resulting over/under-recovery of revenues.
- 15. In our view the AER should consider ways of improving its inflation forecasts and/or explore other means to mitigate the effect of forecast errors on returns and prices.
- 16. History shows that actual inflation can depart from the RBA's midpoint target for sustained periods. Further, current market expectations are that inflation will remain below the RBA's midpoint target for some time. If these expectations are realised, future outturn inflation will be below the AER's forecast of inflation, which would lead to under-recovery of efficient costs by regulated businesses. We recommend that the AER give urgent attention to address this issue.

1.3 Structure of this report

The remainder of this report is organised as follows:

- Section 2 explains, using first principles, why it is essential for a sound *ex ante* regulatory framework to ensure that allowed revenues are determined in a way that compensates investors for expected inflation. Section 2 also explains how inflation is treated within the regulatory framework under the NER.
- Section 3 explains why errors in the AER's forecasts of inflation would lead to over/under-recovery, provides indicative estimates of the magnitude of the consequences of these outcomes, and discusses why it is essential that this issue be addressed by the AER.
- The Appendix to this report provides extended worked examples that demonstrate the nature of the problem.

2 Accounting for inflation when setting regulated revenues

2.1 First principles

The rate of return that investors require in order to invest in a regulated business must cover the nominal cost of capital. The nominal cost of capital reflects the market's forward-looking expectations of:

- The risks and opportunity costs associated with the investment; and
- Inflation over the investment horizon.

In other words, embedded within the nominal cost of capital is the market's expectations over future inflation. More formally:

Nominal cost of capital \approx Real cost of capital + Expected inflation

where the real cost of capital reflects the risks and opportunity costs associated with the investment, and the remaining component of the nominal cost of capital reflects the market's expectations of future inflation.

Unless the rate of return that investors can expect to earn from the investment in question is sufficient to cover these two components, it would not be economic for the investment to proceed. For instance, if the expected return was sufficient to cover the real cost of capital but not high enough to also cover expected future inflation, the investor will anticipate that the value of their future returns would be eroded gradually by inflation.

Under systems of *ex ante* regulation, of the kind administered by the AER, it is essential that the total returns that regulated businesses are permitted to earn are at a minimum high enough to cover the nominal cost of capital. Unless this condition is met, regulated businesses will be unable to attract the capital they require.

2.2 Treatment of inflation under the NER

In regard to the treatment of inflation within the existing regulatory framework that applies to electricity networks, the National Electricity Rules (NER) specify that:

- 1. The allowed rate of return must be determined using a nominal rate (which embeds the market's expectation of inflation);¹
- 2. The regulatory asset base (RAB) must be indexed in each year within a regulatory control period using a measure of inflation;²
- 3. The building block that involves indexation of the RAB comprises a negative adjustment equal to the amount referred to in 2 above;³ and
- 4. The value of the RAB should be rolled forward from one regulatory control period to the next using "actual inflation".⁴

The fact that inflation is provided for explicitly within the NER makes clear that it is an objective of the regulatory framework to ensure that investors are, in an *ex ante* sense, compensated for inflation. This is consistent with the principles discussed in section 2.1.

The return on capital that the regulated business is permitted to earn is calculated by multiplying the allowed rate of return by the RAB. By providing that the value of the RAB must be rolled forward from one regulatory control period to the next using actual (i.e., realised) inflation, the NER contemplates that investors should receive *some* compensation for inflation through growth in the RAB over time. This occurs in the AER's RFM.

However, the NER also specifies (as noted in point 2 above) that the RAB must be indexed for inflation through the regulatory control period, and that the allowed rate of return must be a nominal rate (i.e., point 1 above). The application of a nominal rate of return to a RAB that is indexed for inflation would result in doublecounting of inflation. To avoid this, the NER requires that a negative adjustment be applied to remove the effect of the indexation. In practice, the AER does this via a cash flow adjustment that reduces the nominal depreciation allowance in the PTRM by the value of the indexation of the RAB in each year of the regulatory control period.

As we discuss in the next section, unless the treatment of inflation within the RFM and the PTRM is internally consistent, regulated businesses may be either overcompensated or under-compensated (and, commensurately, consumers may pay too much or too little).

- ² NER rr S6.2.3(c)(4) and S6A.2.4(c)(4).
- ³ NER rr 6.4.3(b)(1)(ii) and 6A.5.4(b)(1)(ii).
- ⁴ NER rr 6.5.1(e)(3) and 6A.6.1(e)(3).

¹ NER, rr 6.5.2(d)(2) and 6A.6.2(d)(2).

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3 Problems under the current approach

3.1 The AER's forecast of inflation used in the PTRM

3.1.1 The AER's current method

The NER provides no guidance on what measure of inflation the AER must use when it indexes the RAB within a regulatory control period and when it makes an offsetting adjustment to cash flows to remove the impact of indexation within a regulatory control period. In the absence of any guidance in the NER, the AER has developed its own forecasting approach, which involves taking a 10-year geometric average of:

- the Reserve Bank of Australia's (RBA's) inflation forecasts over two years; and
- the midpoint of the RBA's inflation targeting band (i.e., 2.5%) over the remaining eight years.

Table 1 below presents forecasts made by the AER in recent Decisions for Victorian DNSPs.

Table 1: AER's approach to	forecasting inflation in	Decisions for	Victorian DNSPs

Expected	linflation	2016-17	2017-18	2018 to 2025	Geometric average					
AER preli	minary decision	2.5 ^a	2.5 ^a	2.5	2.50					
AER final decision update		1.5 ^b	2.0 ^b	2.5	2.32					
Source:	ce: RBA, Statement on Monetary Policy, August 2015, p. 67; RBA, Statement on Monetary Policy, May 2016, p. 61.									
(a) In August 2015, the RBA published a range of 2–3 per cent for its December 2016 and December 2017 inflation forecasts respectively. Where the RBA published ranges, we select the mid-points.										

(b) In May 2016, the RBA published a range of 1–2 per cent and a range of 1.5–2.5 per cent for its December 2016 and December 2017 CPI inflation forecasts respectively. We select the mid-point from this range.

Source: AusNet Services Distribution Final Decision, Table 3-23

3.1.2 Actual inflation and market expectations of inflation are well below the AER's current forecasts

Actual inflation

Since the RBA began targeting an inflation range of 2% to 3% in the early 1990s,⁵ the *average* rate of inflation has been very close to 2.5%. However, as Figure 1 below shows, in any given year, the actual rate of inflation can depart materially from this midpoint target. Because the AER's approach effectively places 80% weight on the

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

RBA's midpoint target, the AER's forecast will typically be very close to 2.5% at any point in time. This means that in any given year, actual inflation can deviate significantly from the AER's forecast as well.

At present, actual inflation in Australia remains very low by historical standards. The RBA data presented in Figure 1 shows that outturn inflation over the 12 months to June 2015 was 1.5%, and over the 12 months to June 2016 was 1.0%. This means that over the last two years, actual inflation has been well below both the RBA's midpoint target and the AER's inflation forecasts.

Figure 1: Actual CPI inflation (June-to-June) vs. RBA midpoint target



Source: ABS data, Frontier analysis

The RBA noted in its most recent (August 2016) Statement on Monetary Policy that actual inflation in Australia has been low for some time, and explained that this had been driven by macroeconomic factors, such as spare capacity in domestic labour and product markets and heightened retail competition (including by new overseas entrants) in recent years:⁶

Inflation has been low. A confluence of factors is contributing to weakness in domestic cost pressures. This includes spare capacity in labour and a number of product markets, which has been associated with low wage growth and pressures on costs and margins. Some of the weakness in domestic cost pressures also reflects the adjustment to the decline in the terms of trade and mining investment over recent years, while the depreciation of the Australian dollar over the past few years has put upward pressure on the costs of tradeale items.

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^{...}

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

The final prices of tradable items depend on the world market price and exchange rate movements, although there is still a significant domestic cost component. The substantial heightened retail competition over recent years, including from new foreign entrants, has placed downward pressure on retail prices.

The RBA noted in the same Statement on Monetary Policy that inflation remains low globally, and monetary policy pursued by central banks around the world reflects expectations of low inflation looking forward over "an extended period":⁷

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

Market expectations of inflation

Market expectations of future inflation, like recent outturn inflation, also remain low at the present time. This is reflected in recent statements by policymakers and also in market data.

For instance, in its latest Monetary Policy Decision, the RBA announced that inflation is expected to remain low for some time:⁸

The global economy is continuing to grow, at a lower than average pace. Labour market conditions in the advanced economies have improved over the past year, but growth in global industrial production and trade remains subdued. Actions by Chinese policymakers have been supporting growth, but the underlying pace of growth in China has been moderating. Inflation remains below most central banks' targets.

Inflation remains quite low. Given very subdued growth in labour costs and very low cost pressures elsewhere in the world, this is expected to remain the case for some time.

These sentiments are consistent with measured break-even inflation (i.e., the difference between yields on nominal government bonds and inflation-indexed bonds). Because break-even inflation is derived from yields on traded bonds, it is commonly regarded as one possible measure of bond investors' expectation of inflation. In a recent study, CEG showed that break-even inflation in Australia has

⁷ RBA, Statement on monetary policy, August 2016, p.1.

⁸ Statement by Philip Lowe, RBA Governor, Monetary Policy Decision, 4 October 2016.

been (a) very similar to actual inflation over time; and (b) is currently much lower than the AER's forecast of inflation (see Figure 2).



Figure 2: Break-even inflation versus AER's forecast of inflation

3.2 Over/under-recovery due to forecasting errors

As noted above, the AER's forecast of inflation can differ from actual inflation:

Overall inflation mismatch = AER forecast - Actual inflation

Part of this overall mismatch will relate to a difference between the AER's forecast of inflation and the market's expectation of inflation embedded in nominal returns (which is likely to be an unbiased estimate).⁹ The remainder of the mismatch will relate to the difference between the market's expectation of inflation and actual outturn inflation. These two forms of mismatch are represented formulaically below:

Overall inflation mismatch = (AER forecast – Market expectation) + (Market expectation – Actual inflation)

Source: CEG, Best estimate of expected inflation, September 2016, Figure 2

⁹ 'Unbiased' in this context means the forecast will not be systematically too high or systematically too low.

When the actual rate of inflation departs from the AER's forecast rate (which, as noted above will tend to be very close to 2.5%), the return on capital that regulated businesses actually receive can turn out to be higher or lower than the return on capital the AER intended the businesses to earn.

A systematic difference between the AER's forecast of inflation and the market's best unbiased expectation of inflation embedded within nominal returns (i.e., the first term in the equation above) will result in expected real returns being either lower or higher than investors require. In this case, there would be an *ex ante* violation of NPV neutrality over the regulatory control period as the deduction in relation to the AER's inflation forecast would differ from the expected increase in the RAB. By contrast, if market expectations of inflation are the best unbiased forecasts available, then (by definition) the difference between market expectations and actual inflation will cancel out over time and there would be no expected violation of NPV neutrality. Consequently, the more important issue is any differential between the AER's forecast and the best unbiased forecast of inflation over the regulatory control period.

We discuss these issues in the sections below.

3.2.1 Mismatch between AER forecast and outturn inflation

The potential for over/under-recovery of the nominal cost of capital, arising from a mismatch between the AER's forecast and actual inflation, can be demonstrated using a stylised example. This example illustrates the issue using just a single year. The Appendix to this report extends the example to a number of years, spanning two regulatory periods, to show that the same result obtains under a more complex setup.

Assumptions

Consider a business that has a RAB of \$100 million. For simplicity, assume that that the RAB is not subject to any depreciation, and that the business's allowances for opex, capex and tax will be zero over the regulatory control period. Finally, assume that the business is allowed a nominal rate of return of 6.0%, and that the AER forecasts inflation over the regulatory control period to be 2.5%.

Under these assumptions, the business would receive a maximum allowed revenue in the first year of \$3.5 million. This would comprise:

- A return on capital of \$6 million (i.e., 6.0% rate of return \times \$100 million RAB);
- Less a cash flow deduction in the PTRM of \$2.5 million to reflect the expected indexation of the RAB over the first year of the regulatory control period at forecast inflation (i.e., 2.5% forecast rate of inflation × \$100 million RAB).

Scenario 1 – Outturn inflation matches forecast inflation

If actual inflation turns out to be 2.5% in the first year of the regulatory control period, as forecast by the AER, then the business will receive (through the RFM) an increase in the RAB of \$2.5 million. This is because, at the start of the second regulatory period, the RFM would inflate the opening RAB in the first regulatory period using outturn inflation. The gain in the value of the asset could be thought of as something akin to a capital gain.

Under this scenario, the investor would have received a total return of exactly \$6 million (i.e., a nominal return of 6.0%), which would comprise:

- A return on capital of \$6 million;
- Less a cash flow deduction in the PTRM of \$2.5 million to reflect the expected indexation of the RAB over the first year of the regulatory control period at forecast inflation;
- *Plus* an increase in the value of the RAB over the first year of the regulatory control period worth \$2.5 million to reflect an actual increase in the value of the assets due to outturn inflation.

In other words, the business would have earned exactly the nominal return that the AER had intended the business to earn.

Scenario 2 – Outturn inflation is less than forecast inflation

Suppose, instead, that actual inflation turns out to be 1.0% rather than 2.5% as forecast by the AER. (As Figure 1 shows, actual CPI inflation for the 12 months to June 2016 was 1.0%.) Under this scenario, the business will have earned a total return of only \$4.5 million, which would comprise:

- A return on capital of \$6 million;
- Less a cash flow deduction in the PTRM of \$2.5 million to reflect the expected indexation of the RAB over the first year of the regulatory control period at forecast inflation;
- *Plus* an increase in the value of the RAB over the first year of the regulatory control period worth \$1 million to reflect an actual increase in the value of the assets due to outturn inflation.

This would represent a shortfall of \$1.5 million, or an under-recovery of the nominal return intended by the AER by a margin of 1.5%.

In other words, the business would have received returns that are below the efficient level, and consumers would have paid less than the business's efficient costs.

Scenario 3 – Outturn inflation is greater than forecast inflation

Finally, if actual inflation turns out to be 4.0% rather than 2.5%, then in relation to the first year, the business will receive a total return of \$7.5 million. This would comprise:

- A return on capital of \$6 million;
- Less a cash flow deduction in the PTRM of \$2.5 million to reflect the expected indexation of the RAB over the first year of the regulatory control period at forecast inflation;
- *Plus* an increase in the value of the RAB over the first year of the regulatory control period worth \$4 million to reflect an actual increase in the value of the assets due to outturn inflation.

This would represent an over-recovery of \$1.5 million, relative to the nominal return that the AER had intended the business to recover, and consumers would have paid more than the business's efficient costs.

Cause of over/under-recovery

It is clear that the cause of the over/under-recovery in the examples above is a mismatch between the AER's forecast of inflation and actual inflation. The mismatch cannot be mitigated by any action taken by either consumers or regulated businesses.

Magnitude of the impact of forecasting errors on cost recovery

Table 2 below presents the annual impact on revenues (over/under-recovery), on an average-sized network service provider, arising from a $\pm 0.5\%$ overall mismatch between the nominal rate of return allowed by the AER and the return actually received, due to errors in the AER's inflation forecast. This is not an inconceivable scenario. As the Table shows, the revenue impact would be very material—i.e., nearly \$16 million per annum for the average distribution business and nearly \$13 million per annum for the average transmission business. Table 2: Annual revenue impact caused by mismatches between allowed and actual return for the average network service provider (\$, million)

	Distribution	Transmission
Median RAB value	3,190.00	2,539.00
Revenue impact caused by 1.5% mismatch between allowed and actual returns	47.85	38.09
Revenue impact caused by 0.5% mismatch between allowed and actual returns	15.95	12.70

Source: Data on RAB values collected from 2015 AER State of the Energy Market report; Frontier analysis

3.2.2 Mismatch between AER's forecast and market expectation of inflation

In its Explanatory Statement on proposed amendments to the RFM, the AER states the following:¹⁰

A nominal WACC, not a real WACC, is the input to the PTRM at the start of each AER final decision.

This is a somewhat ambiguous statement because, whilst the AER's PTRM does compute a real rate of return (by deflating its estimate of the nominal rate of return using its forecast of inflation), the PTRM does not actually use this real return to set allowed revenues.

However, as discussed above, the AER subtracts from the annual depreciation allowance a cash flow that is equivalent to the value of the growth in the RAB through the regulatory control period at a rate equal to its forecast of inflation. The effect of this is akin to applying a real rate of return when determining the allowed return on capital.

Because the nominal allowed rate of return is based on market data (e.g., market prices of government bonds) it reflects the market's expectation of future inflation. If the market expectation is less than the AER's forecast rate of inflation, then the real return on capital received by the business will be lower than the real return expected by the market.

To see this, consider a business that has a RAB of \$100 million and assume that the RAB is not subject to any depreciation, and that the business's allowances for opex, capex and tax will be zero over the regulatory control period. Also, assume that the business is allowed a nominal rate of return of 6.0%, the AER forecasts

¹⁰ AER, Explanatory statement – Proposed amendment Electricity distribution network service providers – Roll forward model (version 2), 31 August 2016, p.26.

inflation over the regulatory control period to be 2.5% and that the market's expectation of inflation over the regulatory control period is 2.0%.

Under these assumptions, the business would (as in section 3.2.1) receive a maximum allowed revenue in the first year of \$3.5 million comprising:

- A return on capital of \$6 million (i.e., 6.0% rate of return \times \$100 million RAB);
- Less a cash flow deduction in the PTRM of \$2.5 million to reflect the AER's expected indexation of the RAB over the first year of the regulatory control period at forecast inflation (i.e., 2.5% forecast rate of inflation × \$100 million RAB).

However, the market would have expected/required a real return of \$3.92 million:

Real return = Real WACC × RAB =
$$\left(\frac{1+6.0\%}{1+2.0\%}-1\right) \times 100 = 3.92$$

In other words, the business would have been allowed revenues that were lower than the level required by investors in the market. This occurs because the AER deducts from the business's allowed revenues a certain capitalised value of inflation that is higher than investors expect. This is problematic because debt service costs are typically specified in nominal terms. This means, if debt investors anticipate a lower rate of inflation than the AER assumes for the purposes of its depreciation adjustment, the business would be allowed insufficient revenues to meet its efficient debt service costs.

If the market's expectation of inflation is higher than the AER's forecast, the exact opposite will be true: the business would be allowed a return on capital that is too high compared to its efficient debt service costs, in which case consumers would have paid too much.

The AER anticipates this problem in its Explanatory Statement on proposed amendments to the RFM:¹¹

The real WACC (which drives PTRM outcomes) is derived from the nominal WACC by deducting the expected inflation rate. Hence, an overestimate of inflation means the real WACC will be too low (and vice versa).

However, it goes on to assert that this problem is mitigated because:¹²

...the forecast inflation and the nominal WACC are jointly estimated on consistent terms.

¹¹ AER, Explanatory statement – Proposed amendment Electricity distribution network service providers – Roll forward model (version 2), 31 August 2016, p.26.

¹² AER, Explanatory statement – Proposed amendment Electricity distribution network service providers – Roll forward model (version 2), 31 August 2016, p.26.

By way of explanation for this claim, the AER notes:¹³

As noted above, this is why forecast inflation in the PTRM is a constant inflation rate with a 10 year horizon.

And:14

...the expected inflation used in the PTRM is estimated as a constant inflation forecast over a 10 year horizon, in order to be consistent with the estimated rate of return on capital.

The AER's implication is that by deriving a forecast of inflation over a 10-year horizon, that forecast would automatically be consistent with the market's expectation of inflation over a 10-year horizon. There is no reason why this statement should be true. There is no evidence at all that bond investors use the same forecasting method employed by the AER when forming their expectations of future inflation. In fact, quite to the contrary (as illustrated by Figure 2) there is evidence that investors' inflation expectations have diverged significantly from the AER's forecasts in the prevailing conditions in the market.

3.3 Legislative considerations

Section 16(2)(a) of the National Electricity Law (NEL) states that the AER:

must take into account the revenue and pricing principles-

- (i) when exercising a discretion in making those parts of a distribution determination or transmission determination relating to direct control network services; or
- when making an access determination relating to a rate or charge for an electricity network service;

The revenue and pricing principles, which are set out in section 7A of the NEL, state that:

(2) A regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs in—

(a) providing direct control network services; and

(b) complying with a regulatory obligation or requirement or making a regulatory payment.

¹³ AER, Explanatory statement – Proposed amendment Electricity distribution network service providers – Roll forward model (version 2), 31 August 2016, footnote 67.

¹⁴ AER, Explanatory statement – Proposed amendment Electricity distribution network service providers – Roll forward model (version 2), 31 August 2016, footnote 30.

In our view, this means that, in regards the AER's treatment of inflation in the PTRM and RFM, the scope for material under/over-recovery of efficient costs (including the cost of capital) would undermine the revenue and pricing principles.

Further, the National Electricity Objective (NEO), as set out in s 7 of the NEL, states that:

The objective of this Law is 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.

For the reasons explained in section 2.1, unless a regulated business is able to earn at least its cost of capital, it is unlikely to be able to invest efficiently. This would, in our view, likely undermine the achievement of the NEO.

3.4 Symmetry of outcomes

As the examples above show, under-recovery by regulated businesses will occur when outturn inflation is lower than the AER's forecast and vice versa. One possible response to this observation is that in some years actual inflation will overshoot the forecast and in other years actual inflation will undershoot the forecast, but these unders and overs will even out in the long-run.

It may be the case that over the long-run mismatches between forecast and actual inflation will even out, thereby smoothing out over/under-recovery of allowed returns. However, in individual years the impact of errors in the AER's inflation forecast can have a material impact on regulated businesses' returns and on prices faced by consumers. This means that, as noted in section 3.2.2, mismatches in individual years can have an adverse impact on businesses' ability to service debt obligations, which are typically specified in nominal terms. This, in turn, would increase financeability risks to businesses.

Moreover, errors in the AER's forecasts (which in most years will be very close to the RBA's midpoint target) can persist for a number of years, rather than cancelling out neatly in consecutive years. This is apparent from Figure 3, which plots the deviation between outturn inflation and the RBA's midpoint target for all years since 1990. This means that the impact of errors in the AER's inflation forecast, on returns and prices, may not only be large in individual years but may also endure over a number of consecutive years.



Figure 3: Deviations in actual inflation (June-to-June) away from forecast inflation

In its 2012 Rule Change Decision on the economic regulation of network service providers, the Australian Energy Markets Commission (AEMC) noted (when discussing the need for allowed returns to reflect changing market conditions) that it would not be in the long-term interests of consumers if the allowed rate of return does not reflect the return required by capital market investors at the time a regulatory decision is made:¹⁵

It was determined that a robust and effective rate of return framework must be capable of responding to changes in market conditions. If the allowed rate of return is not determined with regard to the prevailing market conditions, it will either be above or below the return that is required by capital market investors at the time of the determination. The Commission was of the view that neither of these outcomes is efficient nor in the long term interest of energy consumers.

This suggests that a regulatory approach that relies on periods of over-recovery relative to efficient costs to offset periods of under-recovery relative to efficient costs is not an approach that would promote the long-term interests of consumers. Such an approach cannot, in our view, be consistent with the NEO. Rather, the regulatory objective should be to set an allowed return that equates to the efficient cost in *every* regulatory control period.

Source: ABS data, Frontier analysis

AEMC, National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012 and National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012— Rule Determination, 29 November 2012.

3.5 Implications

The analysis above suggests to us that the impact of errors in the AER's forecast of inflation can be material on both consumers and on regulated businesses. In our view the AER should consider ways of improving its inflation forecasts. The AER will not be able to forecast inflation perfectly. However, the overall inflation mismatch could be minimised if the AER were to ensure that its forecast inflation is an unbiased estimate of the market's expectation of inflation.

Recall that the overall inflation mismatch is given by the following equation:

Overall inflation mismatch = (AER forecast – Market expectation) + (Market expectation – Actual inflation)

If the AER were to use an inflation forecast that is a truly unbiased estimate of market expectations, the first term in the equation above would on average be zero, and the overall inflation mismatch would simply be the difference between the best unbiased estimate of market expectations and actual inflation—which should typically be fairly small in each year, and also zero on average.

The AER could also explore other means to mitigate the effect of forecasting errors on returns and prices.

History shows that actual inflation can depart from the RBA's midpoint target for sustained periods. Further, current market expectations are that inflation will remain below the RBA's midpoint target for some time. If these expectations are realised, future outturn inflation will be below the AER's forecast of inflation, which would lead to under-recovery of efficient costs by regulated businesses. We recommend that the AER give urgent attention to address this issue.

Appendix – Illustration of over/underrecovery using a multi-year setup

This Appendix shows that the insights from the simple example presented in section 3 hold when the example is extended to cover multiple years and regulatory periods. As in section 3, we consider three scenarios:

- 1. Actual inflation (2.5%) matches the inflation forecast (2.5%) see Table 3;
- Actual inflation (1.0%) is less than the inflation forecast (2.5%) see Table 4; and
- 3. Actual inflation (4.0%) exceeds the inflation forecast (2.5%) see Table 5.

For the purposes of this example, we assume that the allowed nominal rate of return is 6.0% in all years, and that the RAB is depreciated using the straight line method over 10 years. For simplicity, we assume that the business incurs no opex, capex or corporate income tax.

The Tables below calculate the revenue over/under-recovery under each of the scenarios above.

Table 3: Scenario 1 – Actual inflation (2.5%) matches inflation forecast (2.5%)

	1 st Regulatory period						2 nd Re	egulatory perio	d	
Year	1	2	3	4	5	6	7	8	9	10
Within-period RAB for return on capital										
Opening RAB	100.00	92.25	84.05	75.38	66.23	56.57	46.39	35.66	24.37	12.49
Within period indexation	2.50	2.31	2.10	1.88	1.66	1.41	1.16	0.89	0.61	0.31
Less nominal depreciation	10.25	10.51	10.77	11.04	11.31	11.60	11.89	12.18	12.49	12.80
Closing RAB	92.25	84.05	75.38	66.23	56.57	46.39	35.66	24.37	12.49	0.00
RAB roll-forward										
Opening RAB	100.00	92.25	84.05	75.38	66.23	56.57	46.39	35.66	24.37	12.49
Indexation	2.50	2.31	2.10	1.88	1.66	1.41	1.16	0.89	0.61	0.31
Less nominal depreciation	10.25	10.51	10.77	11.04	11.31	11.60	11.89	12.18	12.49	12.80
Closing RAB	92.25	84.05	75.38	66.23	56.57	46.39	35.66	24.37	12.49	0.00
			Breakdow	n of returns						
Required return on capital	6.00	5.54	5.04	4.52	3.97	3.39	2.78	2.14	1.46	0.75
Allowed revenue for return of capital	10.25	10.51	10.77	11.04	11.31	11.60	11.89	12.18	12.49	12.80
Allowed revenue for return on capital	3.50	3.23	2.94	2.64	2.32	1.98	1.62	1.25	0.85	0.44
Benefit of RAB inflation	2.50	2.31	2.10	1.88	1.66	1.41	1.16	0.89	0.61	0.31
Actual nominal return on capital	6.00	5.54	5.04	4.52	3.97	3.39	2.78	2.14	1.46	0.75
Over/under-recovery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix – Illustration of over/under-recovery using a multi-year setup

Table 4: Scenario 2 – Actual inflation (1.0%) is less than inflation forecast (2.5%)

	1 st Regulatory period						2 nd	Regulatory per	iod	
Year	1	2	3	4	5	6	7	8	9	10
Within-period RAB for return on capital										
Opening RAB	100.00	92.25	84.05	75.38	66.23	52.55	42.27	31.44	20.04	8.05
Within period indexation	2.50	2.31	2.10	1.88	1.66	1.31	1.06	0.79	0.50	0.20
Less nominal depreciation	10.25	10.51	10.77	11.04	11.31	11.60	11.89	12.18	12.49	12.80
Closing RAB	92.25	84.05	75.38	66.23	56.57	42.27	31.44	20.04	8.05	-4.55
RAB roll-forward										
Opening RAB	100.00	90.90	81.61	72.12	62.44	52.55	42.46	32.16	21.66	10.94
Indexation	1.00	0.91	0.82	0.72	0.62	0.53	0.42	0.32	0.22	0.11
Less nominal depreciation	10.10	10.20	10.30	10.41	10.51	10.62	10.72	10.83	10.94	11.05
Closing RAB	90.90	81.61	72.12	62.44	52.55	42.46	32.16	21.66	10.94	0.00
			Breakdov	wn of returns						
Required return on capital	6.00	5.54	5.04	4.52	3.97	3.15	2.54	1.89	1.20	0.48
Allowed revenue for return of capital	10.10	10.20	10.30	10.41	10.51	10.62	10.72	10.83	10.94	11.05
Allowed revenue for return on capital	3.50	3.23	2.94	2.64	2.32	1.84	1.48	1.10	0.70	0.28
Benefit of RAB inflation	1.00	0.91	0.82	0.72	0.62	0.53	0.42	0.32	0.22	0.11
Actual nominal return on capital	4.50	4.14	3.76	3.36	2.94	2.36	1.90	1.42	0.92	0.39
Over/under-recovery	1.50	1.40	1.29	1.16	1.03	0.79	0.63	0.46	0.28	0.09

Appendix – Illustration of over/under-recovery using a multi-year setup

Table 5: Scenario 2 – Actual inflation (4.0%) exceeds inflation forecast (2.5%)

	1 st Regulatory period					2 nd Regulatory period				
Year	1	2	3	4	5	6	7	8	9	10
Within-period RAB for return on capital										
Opening RAB	100.00	92.25	84.05	75.38	66.23	60.83	50.76	40.14	28.96	17.19
Within period indexation	2.50	2.31	2.10	1.88	1.66	1.52	1.27	1.00	0.72	0.43
Less nominal depreciation	10.25	10.51	10.77	11.04	11.31	11.60	11.89	12.18	12.49	12.80
Closing RAB	92.25	84.05	75.38	66.23	56.57	50.76	40.14	28.96	17.19	4.82
RAB roll-forward										
Opening RAB	100.00	93.60	86.53	78.74	70.19	60.83	50.61	39.48	27.37	14.23
Indexation	4.00	3.74	3.46	3.15	2.81	2.43	2.02	1.58	1.09	0.57
Less nominal depreciation	10.40	10.82	11.25	11.70	12.17	12.65	13.16	13.69	14.23	14.80
Closing RAB	93.60	86.53	78.74	70.19	60.83	50.61	39.48	27.37	14.23	0.00
			Breakdow	n of returns						
Required return on capital	6.00	5.54	5.04	4.52	3.97	3.65	3.05	2.41	1.74	1.03
Allowed revenue for return of capital	10.40	10.82	11.25	11.70	12.17	12.65	13.16	13.69	14.23	14.80
Allowed revenue for return on capital	3.50	3.23	2.94	2.64	2.32	2.13	1.78	1.40	1.01	0.60
Benefit of RAB inflation	4.00	3.74	3.46	3.15	2.81	2.43	2.02	1.58	1.09	0.57
Actual nominal return on capital	7.50	6.97	6.40	5.79	5.13	4.56	3.80	2.98	2.11	1.17
Over/under-recovery	-1.50	-1.44	-1.36	-1.27	-1.15	-0.91	-0.76	-0.58	-0.37	-0.14

Appendix – Illustration of over/under-recovery using a multi-year setup

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