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3 July 2017

Ms Paula Conboy
Chair
Australian Energy Regulator

REGULATORY TREATMENT OF INFLATION

Dear ~~Ms Conboy~~, Paula,

Energy Consumers Australia appreciates the opportunity to participate in the review of the regulatory treatment of inflation. We appreciate the work of AER staff in the clear explanation of the issues in the review and for the ACCC/AER working paper which provides a thorough review of technical issues.

The Energy Consumers Australia submission attached focuses on the objectives of the regulatory regime, the promotion of the long term interests of consumers through economic efficiency. The choice of method for estimating inflation needs to result in current and future consumers paying no more than necessary.

To assist us Energy Consumers Australia has engaged two experts whose reports are attached to our submission. The first of these reports demonstrates that neither of the two market based approaches proposed by networks better promotes the long term interests of consumers than the current RBA based approach. The second report identifies that using the top of the RBA inflation target range better allocates inflation risk and hence promotes the long term interests of consumers than the current approach.

Questions on the substance of this submission should be directed to David Havyatt at david.havyatt@energyconsumersaustralia.com.au or on 02 9220 5508.

Yours sincerely,

Rosemary Sinclair

Rosemary Sinclair
Chief Executive Officer

Regulatory treatment of inflation

Response to AER discussion paper

June 2017

ENERGY CONSUMERS AUSTRALIA

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Introduction

The Australian Energy Regulator (the AER) has commenced a review of the *Review of expected inflation* (the Review)[1]. In April 2017 the AER published a *Discussion paper* (the Paper) for the Review.[2] The Paper in turn was informed by an ACCC/AER working paper (the Working Paper) *Best estimates of expected inflation: a comparative assessment of four methods.* (Mathysen, 2017).

This submission is made by Energy Consumers Australia in response to the Paper. Energy Consumers Australia's Senior Economist, David Havyatt, is a member of the AER's Consumer Reference Group but this submission is not made on behalf of that group.

Energy Consumers Australia has engaged two experts to assist it in the Review, and their reports are attached to this submission. Alex Georgievski from Woollahra Partners has reviewed the methods considered in the Working Paper and has also analysed the consequences of variation between expected and actual inflation (Attachment A). John Quiggin has provided a more fundamental review: *Reconciling regulatory estimates of inflation with the interests of electricity consumers* (Attachment B)

As the estimate of inflation is used for economic regulation, this submission starts with a discussion of the context of the decision. This reviews the policy objectives, the rationale for regulation and the consequences of the objective and rationale for the use of inflation.

The following section reviews the use of inflation in the models used for economic regulation and summarises the two expert reports attached.

These reports conclude that there is no basis to move from an estimate linked to the RBA target band to a market based estimation. However, while the current approach of estimating inflation as the geometric average of the two year RBA forecast and eight years of the midpoint of the RBA target range is preferable to the market estimates, inflation risk is best allocated by using the top of the RBA target range as the estimate.

Context

Policy objectives

The regulatory framework for the Australian energy system is encompassed by the overarching objective of the Australian Energy Market Agreement: "the promotion of the long term interests of consumers with regard to the price, quality and reliability of electricity and gas services." The objective of the National Electricity Law (the NEL) and National Gas Law (the NGL) are expressed as the promotion of the efficient investment in, and operation and use of, energy services for the long term interests of consumers. Both the Australian Energy Market Commission (the AEMC) and the AER are

[1] (AER, 2017)
[2] (AER, 2017)

required to exercise their functions in such a way that will, or is likely to, contribute to the achievement of the objective of the Law.[3]

Given the centrality of the concept of promoting the long term interests of consumers to the policy and regulatory framework, Energy Consumers Australia has published its approach to *Interpreting the long term interests of consumers*. (Energy Consumers Australia, 2016). This paper concludes that the long term interests of consumers is best promoted through economic efficiency, and results **in current and future consumers paying no more than necessary**. We conclude that the promotion of economic efficiency requires:

- the ongoing separation of potentially competitive markets from natural monopoly;
- implementing market design so that potentially competitive markets are effectively competitive; and
- 'best practice' regulation of natural monopoly.

Whether regulation is 'best practice' or not depends on the rationale for regulation

The rationale for economic regulation of networks

Decker (2015, pp. 14-35) identifies three normative rationales (efficiency, monopoly power, externalities) and two main alternative rationales (interest group theory, long term contract) for the economic regulation of 'utilities.'

The efficiency rationale is the familiar concept that a monopolist has a profit maximization incentive to reduce output and hence increase price above the 'efficient' level, the focus being on allocative efficiency.

The second rationale is distinguished from the first by controlling the conduct of the firm so it does not harm consumers, either through charging higher prices than cost or from degrading quality or failing to invest. This rationale puts more focus on productive efficiency

The externalities rationale is particularly relevant in those utilities that have the potential for significant environmental degradation, where regulation attempts to redress the negative consequence of costs not included within the market They are also relevant in the case of network effects, where regulation focuses on ensuring the realisation of the benefits from increasing participation.

Interest group theory is most associated with the idea of 'regulatory capture', that regulators primarily exist to serve the particular interests of one societal group. In the extreme form of the theory the interest being served is that of the regulated entities. This rationale is most often used as part of an argument for deregulation.

[3] For example, in the NEL S88 "The AEMC may only make a Rule if it is satisfied that the Rule will or is likely to contribute to the achievement of the national electricity objective." S16 "The AER must, in performing or exercising an AER economic regulatory function or power, perform or exercise that function or power in a manner that will or is likely to contribute to the achievement of the national electricity objective"

The final main rationale is regulation as a form of administration of a long-term contract. There is a long-term contract between the utility and the community it serves that needs to be administered because all the terms cannot be agreed upfront.

Biggar (2009) argues that this rationale more accurately reflects the actual conduct of regulators, and that the rationale is the protection of the sunk investments made by consumers. Others (e.g. Goldberg (1976)) have analysed the rationale as a 'bidding for the market paradigm.'

Having become used to government owned networks that were (mostly) subsequently privatized, it is easy to forget that franchise bidding was the original model for developing electricity networks. For example, the Sydney Municipal Council established its own 'Undertaking' to provide street lighting including the Pyrmont Powerhouse. Over the next ten years it was contracted to provide lighting to the nearby Councils of Paddington, Camperdown, Annandale, Mascot, Randwick and Woollahra. Balmain Borough Council grated a franchise to the newly-formed Balmain Electric Light and Power Supply Corporation. This enterprise won the rights to serve Newtown, Leichhardt, Ashfield and Petersham from is Balmain power-station. (Darroch, 2014, pp. 26-28)

Decker links the long term contract rationale to recent interest in the UK on negotiated settlement, claiming it moves the focus of the regulator from making final decisions on revenue determinations to being a facilitator of well-informed participants reaching agreements that are mutually beneficial.

Energy Consumers Australia notes that the way the objectives of the energy market laws are stated, with the focus on efficiency for the long term interests of consumers, is amenable to all of these rationales. However, there is particular merit in the long term contract approach.

Firstly, it is historically accurate. Secondly, it places the focus on the long term outcomes for the parties – not the current year, not the current determination, but the life of the asset. Thirdly, it places the focus on the investors rather than the business itself. Fourthly, it places the focus of economic regulation on the whole outcome, not components of it individually.

We also agree that the focus on the long term agreement implies that the objective is outcomes that are beneficial to both parties; as framed by Scott Hempling (2016) the objective is the alignment of consumer and producer interests, not the balancing of them. However, the ability of the regulator to function as a facilitator is first dependent on the parties' ability to participate equally, and until they have the regulator needs to stand in the shoes of the consumer.

Consequences for regulatory treatment of inflation

Energy Consumers Australia is approaching the review of the regulatory treatment of inflation from this perspective of the long term contract. In particular, we emphasise that the analysis needs to be from the point of view of investors and consider the long term.

When we analyse the interest of investors in the historic context we are reminded that the value of franchise bidding, of bidding for the market, is that two proponents with identical technology would bid on the rate of return. That is, the rate of return that is relevant isn't the return investors could get in other businesses, but the return they require to invest in this business.

The corollary to this is that not all investors are the same, as reflected in the different risk profiles offered to superannuation investors. Investment theory states that investors value having the option to blend their own risk profile between secure low return investments and more volatile higher return investments.

The interest of consumers in utilities in low prices is served by attracting investors who value a lower stable return. The regulatory framework gives some effect to this by guaranteeing investors the opportunity for a return of their efficient costs (the Revenue and Pricing Principles).

It is in consumers interest to limit regulatory risk; to keep the cost of capital low.

When we use the term 'investor' we are referring to the equity investors. Providers of debt are borrowers not investors. The investors, through management, are the people who determine whether they want to secure debt financing and the terms under which they provide it.

The focus on the long term means that the evaluation of the consequences of regulatory design need to be modelled over the life of the longer operating assets (i.e. over the time scale in which all costs can be varied).

Energy Consumers Australia notes that a member of the Consumer Challenge Panel sub-panel observed that the two times that networks have sought a change in methodology for estimating expected inflation it has been because the alternative estimate is lower than the one currently used. As nominal WACC is estimated, but the PTRM provides a return based on a real WACC plus actual inflation, this results in a higher revenue allowance for the business irrespective of outturn inflation.

This conduct is unsurprising; one doesn't expect the networks to advocate for changes that reduce their revenue. However, the approach violates one of the other benefits of the long term contract rationale for regulation which is the focus on the outcome as a whole.

Reviewing inflation in isolation is the same kind of cherry-picking that networks have been accused of in their approach to limited merits review. The policy intent was, however, made clear in the legislative amendments that put the emphasis on the need for the decision as a whole to promote the long term interests of consumers.

Regulatory Treatment of Inflation

Use in the models

The current consultation is constrained to the method the AER should use for estimating inflation in future regulatory determinations and access arrangements. In the remainder of this submission Energy Consumers Australia will focus on electricity distribution for simplicity.

The rules require the AER to determine the best estimate of expected inflation. The Working Paper makes the distinction between estimating expected inflation and the best forecast of inflation. There is a particular difficulty in that the latter is unique, there is only one best forecast of inflation. But there are as many best estimates of expected inflation as there are individuals or groups of individuals whose expectations re being estimated.

The community of interest is primarily the investment community because we are estimating the inflation expectations inherent in the rate of return of both debt and equity. It is also possible that those two communities have different inflation expectations, but we only estimate one.

Drawing this distinction also implies that investors are fallible; their expectation might not be the best forecast. The question, as we will address later, is who should bear the risk inherent in the fallibility of the investors to forecast inflation.

The estimate of inflation is modelled in the PTRM as one parameter *f* that is used in three ways in the model. Firstly, it is used to convert the nominal WACC to a real WACC, however this is inherently two processes because the one inflation estimate is used against two rate of return estimates. The third use is for the calculation of the *X* factor in the smoothing calculation. This factor is what is then used in combination with actual inflation to determine the nominal revenue allowance in each pricing review from the revenue allowance in the previous year.

In the first two uses the methodology for estimating the rate of return for debt and equity is different. Equity is estimated at a point in time for a tenor of 10-years and so using a market method to estimate expected inflation at a matching point in time might be valid. However, the return on debt is estimated as a trailing average to reflect the fact that the current cost of debt of a firm is the blend of its issuance over the previous ten years. The ‘real’ value should presumably be determined by estimating expected inflation also as a trailing average.

The third use is one where the most appropriate value of *f* is one that is indisputably the best forecast of inflation, not the estimate, and arguably should be estimated over five years not ten.

The method for estimating inflation needs to be suitable for the three disparate uses of inflation in the linked models (PTRM, annual pricing, and roll forward model (RFM)). It may be that it is appropriate to move to having different estimates for different purposes but that is a change to the models and is out of scope for this review.

Expert Reports

Energy Consumers Australia has commissioned two expert reports which are attached to this submission; Woollahra Partners (Attachment A) and Prof John Quiggin (Attachment B).

The Woollahra Partners report

Woollahra Partners (Woollahra) has provided a report on the comparative trade-offs in estimation techniques, the importance of integrated modelling over the three sub-models for the entire asset life, and some modelling results.

Woollahra was asked to provide its advice on the premise that the objective of the inflation estimation is to eliminate regulatory risk so that current and future consumers pay no more than necessary.

The report compares the consequences of using three of the four approaches modeled in the Working Paper; the current RBA approach, the Zero Coupon Inflation Swaps (ZCS) approach and the Bond Breakeven Inflation Rates (BBIR) approach. The latter two are both estimates that are based on estimating the way the market is pricing inflation risk.

The current RBA approach provides the least volatile estimates. Both the ZCS and BBIR approach have high volatility rates. The AER notes that the decision to move away from the BBIR approach was based in a loss of liquidity in the market. Woollahra Partners notes that there has been a significant decline in liquidity in the swaps market arising from post GFC regulation.

The future liquidity of either market cannot be guaranteed and a move to either estimate creates a significant regulatory risk to the regulated network businesses.

Woollahra notes that the RBA approach is currently resulting in the highest estimate, while the BBIR approach is resulting in the lowest estimate. The fundamental issue is what the consequence is of these varying estimates.

Woollhara has therefore modelled the long term consequences of a deviation between expected inflation and actual inflation using a replica of the AER Log Term Analysis Spreadsheet (LTAS) model. Is has been modelled under two assumptions. The first is a constant real WACC while the second is a constant nominal WACC.

The conclusion is that in the cases where real WACC is held constant, that is where what is modelled is the variation between estimated expected inflation and actual inflation, is relatively small and virtually symmetrical. Where the analysis considers the impact of estimated expected inflation deviating from the inflation inherent in the estimate of the WACC (i.e. where nominal WACC is held constant) then the variation is greater though again symmetrical for the same sized deviation.

When expected inflation has been set at 3% (for reasons explained later) and the actual inflation has been set as the actual outcome for the last eighteen years and then 2.5% the deviations are lower or the case of constant nominal WACC. This reflects that outcome inflation over the last

eighteen years has been more volatile than the RBA target range would imply.

The conclusion of this analysis is that the use of market measures of expected inflation introduces unwarranted regulatory risk into the revenue determination. It also demonstrates that there is no systemic bias from differences between expected and actual inflation.

The Quiggin report

Professor Quiggin's report focuses more directly on the question of how the determination of expected inflation impacts on the regulatory goal of promoting the interests of consumers.

He notes that the Paper and the Working Paper both treat the derivation of the estimated rate of inflation as a purely technical exercise "with no consideration of the interests of the parties." He further notes that those parties are the owners of the assets (investors) and consumers, and that the failure to address those issues "would fail to deliver the objective of delivering electricity efficiently and at the lowest possible cost."

Quiggin then provides the very clear analysis of how the estimate of inflation is used to provide regulated firms with a real WACC calculated by subtracting estimated inflation from estimated nominal WACC. The regulatory nominal WACC is then derived by adding actual inflation to the real WACC.

The consequence is that once the real rate of return is determined, asset owners are **completely** insulated from inflation risk, which is borne entirely by consumers; and that consumers are **completely** exposed to the full risk of inflation.

If the range of inflation rates is bounded within a given range, then consumers can be protected from 'upside' inflationary risk by setting the regulatory estimated rate at the upper end of the range. The RBA operates monetary policy with an aim to achieve an inflation rate between 2 and 3 per cent average over time.

Quiggin concludes that the appropriate inflation estimate to appropriately allocate inflation risk is at the top of the RBA band of 3%, concluding:

> *Given that the regulatory system provides asset owners with a guaranteed rate of return, while providing no guarantees to consumers of stable real prices, it is important that consumers should not be exposed, in addition, to upside inflation risk. This can be prevented by setting the regulatory rate of inflation at the upper end of the RBA target range.*

Conclusion

The AER has conducted this review of the estimation of inflation in response to submissions from a number of networks. The review needs to be guided by the overall objective of the regulatory framework; the promotion of the long term interests of consumers.

There are a number of different rationales for economic regulation, which aren't necessarily in conflict. The understanding of regulation as the administration of a long term contract emphasizes a focus on investors, long term outcomes and the need to focus on the whole decision.

The proposal to base estimates of inflation on market indicators is inappropriate in this context as it introduces unnecessary regulatory risk. The appropriate estimate is to use the RBA target band to provide a consistent measure. Investors make their investment choices on the basis of nominal rates, not an implied real rate. Setting estimated inflation at the top of the RBA band appropriately allocates inflation risk to investors.

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Attachments

Attachment A: Woollahra Partners Report

Regulatory Treatment of Expected Inflation
Modelling of Regulatory Processes
Report for Energy Consumers Australia
Alex Georgievski, Managing Partner
Woollahra Partners

Attachment B: Professor Quiggin Report

Reconciling regulatory estimates of inflation with the interests of electricity consumers
Report to Energy Consumers Australia
Professor John Quiggin
Australian Laureate Fellow, University of Queensland

Regulatory Treatment of Expected Inflation

Modelling of Regulatory Processes

Report for Energy Consumers Australia

29th June 2017

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Mr David Havyatt
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29 June 2017

Dear David

Regulatory Treatment of Expected Inflation: Modelling of Regulatory Processes

In accordance with our scope of work we are pleased to provide Energy Consumers Australia (ECA) with our report into the Regulatory Treatment of Expected Inflation: Modelling of Regulatory Processes. We would like to thank ECA staff for providing support throughout the preparation of the report.

Please contact me on +61 2 8005 8234 or direct on +61 416 328 316 should you have any questions in relation to the report

Yours sincerely,

Alex Georgievski
Managing Partner

WOOLLAHRA PARTNERS

Contents

Executive Summary

The Australian Energy Regulator (AER) has commenced a review into the regulatory treatment of inflation. This is largely a response to concerns raised by stakeholders in relation to the appropriate compensation for inflation within the current regulatory framework. ECA is keen to ensure that to the greatest extent possible, and consistent with the Revenue and Pricing principles, regulatory risk is eliminated for network businesses so that current and future consumers pay no more than necessary.

The critical analysis of the current and alternative market approaches to estimating expected inflation undertaken by the Australian Competition and Consumer Commission (ACCC) / AER can be summarised at a high-level as follows:

- **Current Reserve Bank of Australia (RBA) Approach**: The current approach of using combined RBA forecasts and RBA inflation targeting over 10 years provides the **least** volatile estimates of expected inflation and the **highest** current estimates of expected inflation.

- **ZCS Approach:** The use of implied Zero Coupon Inflation Swaps will provide more volatile estimates of expected inflation in comparison to the current RBA approach and lower estimates of expected inflation in prevailing market conditions.

- **BBIR Approach**: The use of implied Bond Breakeven Inflation Rates provides the **highest** volatility in estimates of expected inflation and the **lowest** current estimates of expected inflation in prevailing market conditions.

Prior to the consideration or conclusion of ZCS as an alternative estimate requires deep analysis into the market micro-structure, capital costs, regulatory capital requirements and collateralisation manifesting in these markets under different market conditions; in addition to the demand / supply imbalances between ZCS and bond markets that impact the spread of estimates across approaches. This approach may introduce unintended risks for network service providers in future. Practical observations on the implementation challenges of the alternative approaches are provided within the report.

The building block approach administered by the AER establishes the economic regulatory framework that determines annual revenue requirements for network service providers. The relevant building blocks impacted by the regulatory treatment of inflation are:

- Return of Capital (depreciation of the asset base); and

- Return on Capital (WACC of the asset base);

Indicative scenario modelling of inflationary outcomes in the regulatory processes and supporting models is undertaken using a replica of the AER's Long Term Analysis Spreadsheet (LTAS) Model.

The outcomes of the scenario modelling show:

- The impact of an estimate of expected inflation deviating from actual inflation over multiple regulatory periods is relatively small indicating this impact is not significant, symmetrical and as theory would predict, is largely irrelevant; and

- The impact of an estimate of expected inflation deviating from 'true' expected inflation over multiple regulatory periods is a larger deviation which indicates this to be the more significant impact and more relevant one.

Further modelling of outcomes is recommended, with perhaps the relaxation of some modelling assumptions, prior to concluding on the regulatory treatment of inflation in the current regulatory processes, and indeed in advance of any changes to the existing framework.

1. Introduction

1.1 Background and Context

The building blocks approach administered by the AER establishes the economic regulatory framework that determines annual revenue requirements for network service providers.

Building blocks refer to the following components of annual revenue requirements:

- Operating Costs;
- Return of Capital (depreciation of the asset base);
- Return on Capital (WACC of the asset base); [1] and
- Tax liabilities.

This high-level framework is implemented via three inter-related regulatory processes as executed by the underlying Roll Forward Model (RFM) and Post Tax Revenue Model (PTRM).

Figure 1 illustrates the interrelatedness of regulatory processes and models.

Figure 1: High-level interrelated regulatory processes and models:

Asset base values flow from the RFM into the PTRM where they are used in the calculation of **nominal** annual revenue requirements which ultimately flow into the network charges paid by consumers. Inflation plays a significant role within the regulatory processes. Expected inflation and actual inflation are two discreet and separate inputs into the models.

Expected inflation is unobservable. The regulatory framework is premised on a systematically unbiased estimation of expected inflation to avoid the under / over estimation of the real WACC. This report is prepared on the assumption that this approach ensures network service providers are appropriately compensated for inflation within the regulatory framework and that annual pricing requirements reflect their efficient costs. To the extent this is achieved, so is economic efficiency, and consumers are no worse off.

The AER has commenced a review into the regulatory treatment of inflation. This is largely a response to concerns raised by stakeholders in relation to the appropriate compensation for inflation within the regulatory framework. In addition to a discussion paper the AER has published a comprehensive joint

[1] WACC refers to the Weighted Average Cost of Capital in terms of equity and debt financing.

working paper with the ACCC on best estimates of expected inflation. A public inflation workshop was hosted in Sydney on 14th June providing stakeholders with the opportunity to present their views openly for consideration and discussion.

ECA has commissioned this report from Woollahra Partners into the regulatory treatment of expected inflation: modelling of regulatory processes. ECA is keen to ensure that to the greatest extent possible, and consistent with the Revenue and Pricing principles, regulatory risk is eliminated for network businesses so that current and future consumers pay no more than necessary.

1.2 Scope of Work

Woollahra Partners was engaged to undertake the following concise scope of work in relation to the regulatory treatment of expected inflation: modelling of regulatory processes:

- Set out the relationship between estimating future inflation, estimating expected inflation and actual inflation in the current regulatory framework;
- Identify how the alternative methods of estimating expected inflation can influence regulatory uncertainty for networks;
- Discuss the relevant considerations in the choice of inflation estimation ensuring current and future customers pay no more than necessary by removing risk premia in the cost of capital;
- Discuss the benefits of an approach to estimation not dependent upon the current state of liquidity of any market or a view on the adequacy of macroeconomic and monetary policy;

1.3 Inherent Limitations and Disclaimer

This report contains general information only and neither Woollahra Partners, nor any of its related entities, is providing any professional advice or services through its publication. To the extent the report contains information on financial products this does not constitute the provision of financial product advice or services. You should seek the advice of a qualified professional advisor before making any financial decisions that may affect you or your business based upon any information contained herein.

Neither Woollahra Partners, nor any of its related entities may be held responsible for any loss by any person relying on information contained in this publication.

1.4 Acknowledgement

Woollahra Partners has prepared this report using the gracious input of targeted consultation amongst its network of regulatory and financial markets professionals and acknowledges this input. We would also like to thank ECA for making staff available and providing support throughout the term of the engagement.

1.5 Report Structure

This report is prepared in accordance with the following structure to address ECA's defined scope of work:

- Section 2 outlines the concepts of actual inflation, expected inflation and expected future inflation. It also discusses the AER's current approach to estimating expected inflation and presents practical observations on the challenges with implementing market implied estimation approaches for further consideration;

- Section 3 describes the interrelated regulatory processes and regulatory models supporting the processes over multiple regulatory periods. The functionality of the AER's LTAS Model is leveraged into a replica model, with underlying assumptions, so that inflationary impact scenario modelling may be undertaken over the long term;

- Section 4 presents the results of the scenario modelling to identify any potential systemic bias and assess impacts over the life of the asset base under the implicit assumptions of the model.

The appendix contains a list of references.

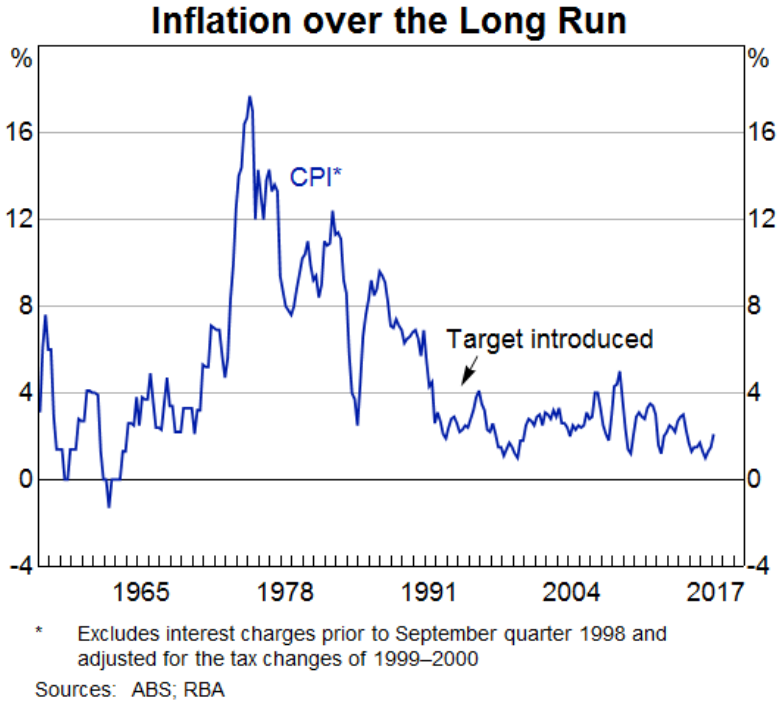
2. Actual Inflation, Expected Inflation, Expected Future Inflation

2.1 Underlying Concepts and Relationships

Inflation is the general increase in prices and the fall in the purchasing value of money. Actual inflation is the verifiable increase of prices and falling purchasing power according to an acceptable measure. The Consumer Price Index (CPI), reported by the Australian Bureau of Statistics (ABS), measures price level changes in the basket of goods and services purchases that are made by households. The CPI is published quarterly and is the general measure of inflation used in regulatory determinations and price indexations affecting financial markets, businesses and consumers; notwithstanding there are other measures. An important distinction is that Actual inflation is the realisation of inflationary outcomes.

Actual inflation is observable as illustrated by the history of CPI shown in Figure 2.

Figure 2 Historical CPI as Actual inflation including when inflation targeting policy was introduced (source: Reserve Bank of Australia (RBA website)):



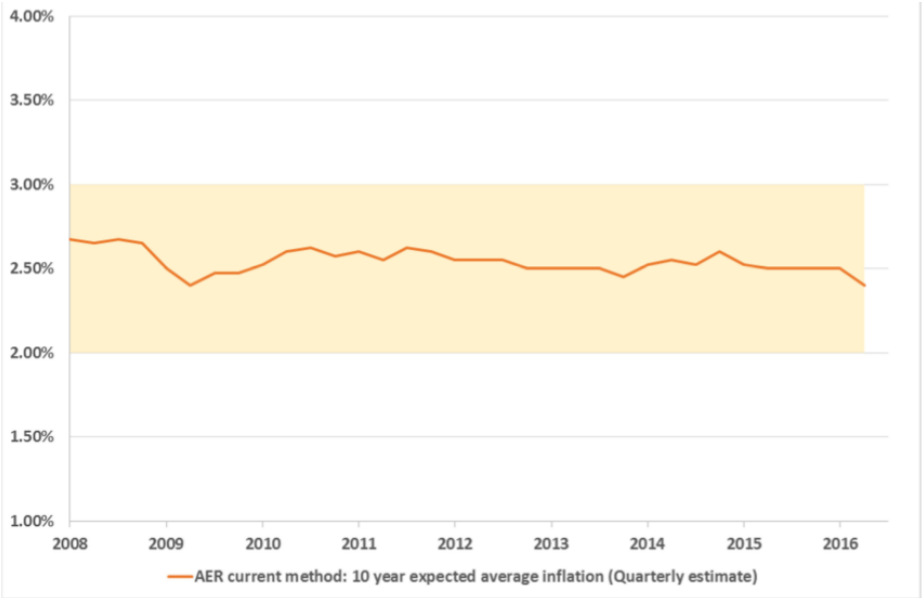
Expected inflation represents the views and beliefs on the outcome of actual inflation prior to its realisation. There may be many potential outcomes spanning the expectations of inflation and individuals form subjective assessments based on available prior information. Expected inflation is embedded within nominal bond rates but is not directly observable and must be estimated using an efficient and systematically unbiased approach. Actual inflation is a single outcome, which may or may not have been considered in the prior subjective assessments of expected inflation. Expected inflation is the relevant ‘forward looking’ consideration of inflation for planning and investment.

Expected inflation references actual inflation over a defined period (e.g. 10-year horizon). Expected future inflation references the forward starting expected inflation in-between certain years of the 10-year horizon. For example: 5yr5yr forward inflation is the expected future inflation over years 6 to 10 of the 10-year horizon. With available market zero coupon inflation curves (ZCS) from year 1 to year 10 of the 10-year horizon the implied forward inflation may be calculated using similar techniques to that employed in the construction of nominal forward interest rates.

2.2 Current and Alternative Estimation Methods

Estimates of expected inflation flow into the calculation of the building blocks. The AER's current approach to estimating expected inflation over a 10-year horizon involves incorporating the RBA CPI forecast for the first 2 years of the 10-year horizon and the midpoint of the RBA inflation target of 2 to 3 per cent for the remaining 8 years.[2] The estimate is then calculated as the geometric average over the 10-years. Figure 3 shows the estimates using the AER's approach in comparison with the RBA's inflation target. The approach provides for relatively stable estimates in comparison to the volatile actual inflation outcomes in Figure 2.

Figure 3 AER's current method of estimating the 10-year expected inflation rate, March quarter 2008 to June quarter 2016, and using quarterly data (Page 14):



The historical background to the current approach to the estimation of expected inflation within the regulatory framework is discussed in the AER discussion paper. It is also discussed comprehensively in the ACCC / AER working paper which critically assesses the alternative market estimation methods. There is in-depth research provided with respect to market implied estimation methods using 10-year bond breakeven inflation rates (BBIR) and ZCS.

The ACCC / AER workpaper points out the influence of estimated expected inflation within the framework (underlined for emphasis):

> 'The efficiency implications of not employing best estimates may be assessed through changes to the real WACC. The real WACC is calculated from the nominal WACC and the estimates of expected inflation used in the PTRM at the start of the regulatory control period. <u>If estimates of expected inflation deviate from market expectations, the real WACC may no longer correspond to the real cost of capital of a comparable benchmark efficient entity</u>. This may distort the investment and consumption decisions of the regulated business and consumers, respectively. The distortion in the behaviour of these economic agents may not result in the efficient use, operation of and investment in monopoly infrastructure'. (Para 12, Page 8).

This refers to the potential for embedding a systemic bias in the expected inflation estimate within the regulatory processes. Section 4 of the report undertakes scenario modelling to identify potential systemic

[2] The AER previously moved to this approach in response to illiquidity in market for Commonwealth Government Security (CGS) Indexed Bonds.

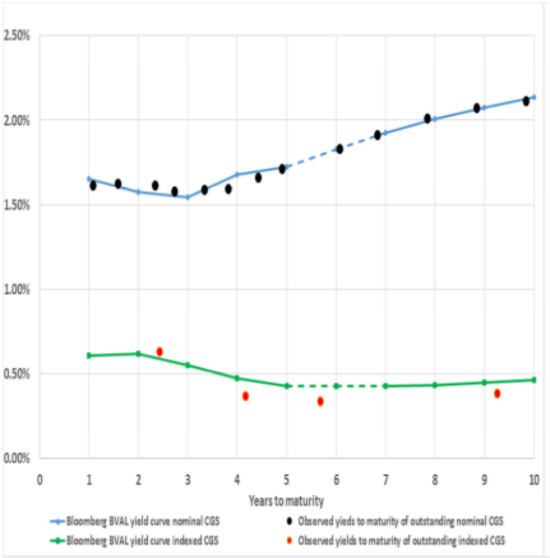
biases in inflationary outcomes and to assess its impact on the outcomes of regulatory processes based on implicit modelling assumptions.

The remainder of this section presents observations on the practical challenges associated of using BBIR and ZCS implied estimates of expected inflation for the further consideration by the AER in assessing the incremental risk premia and cost introduced by a move to alternative estimation methods. The observations are informed by targeted regulatory and financial market consultation and enquiries undertaken for the report.

2.3 Observations on Bond Breakeven Inflation Rates (BBIR)

Figure 4, replicated from the ACCC / AER working paper, illustrates the paucity of observed yields for indexed CGS relative to nominal CGS. A lack of data for indexed CGS (i.e. only 4 tenors) will warrant a model based interpolation and curve fitting technique to estimate BBIR. This potentially introduces unstable BBIR estimates that deviate from market implied expected inflation estimates because the approach increasingly becomes a model implied BBIR instead of a market implied one. This issue is raised by the working paper and may present an estimation challenge; particularly during periods displaying curve convexities and limited data. Although not insurmountable the chosen fitting methods will have to be transparent and replicable under various market conditions and this introduces computational burden.

Figure 4 Nominal and Indexed CGS, 20 business day average, 2 June 2016 to 30 June 2016 (Page 26 of ACCC / AER working paper:



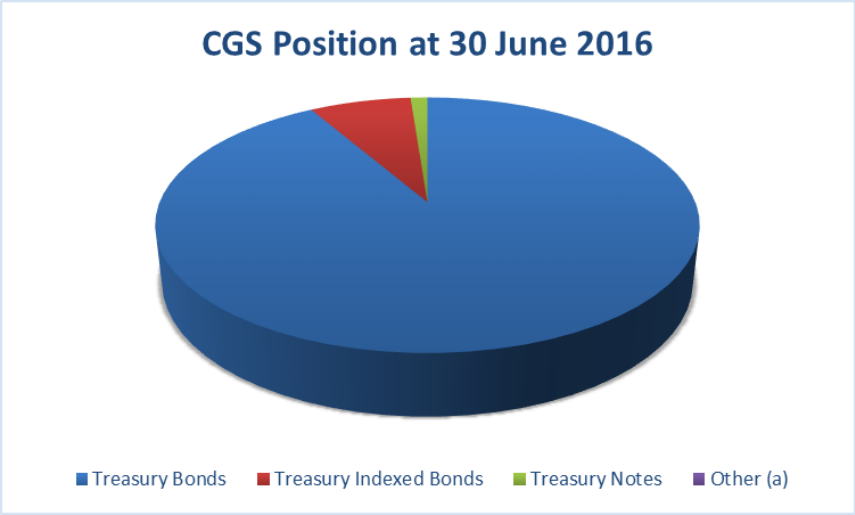
There is reference in working paper of the substantial and recent increase of indexed CGS: (underlined for emphasis):

> 'The supply of outstanding indexed CGS has increased sharply in recent years, from approximately <u>$6 billion in 2007–08 to approximately $29 billion in 2015–16</u> (monthly average). The increase in the supply of nominal CGS was even greater. From 2007– 08 to 2015–16, the supply of outstanding nominal CGS has increased by over 750 per cent, from approximately <u>$48 billion to approximately $370 billion</u> (monthly average). At 30 June 2016 there are 22 outstanding tenors of nominal CGS, 14 of which are up to approximately 10 years'. (Para 54, Page 24).

Although indexed CGS has grown in issuance from a small base it would appear this still presents illiquidity challenges as outlined in the working paper.

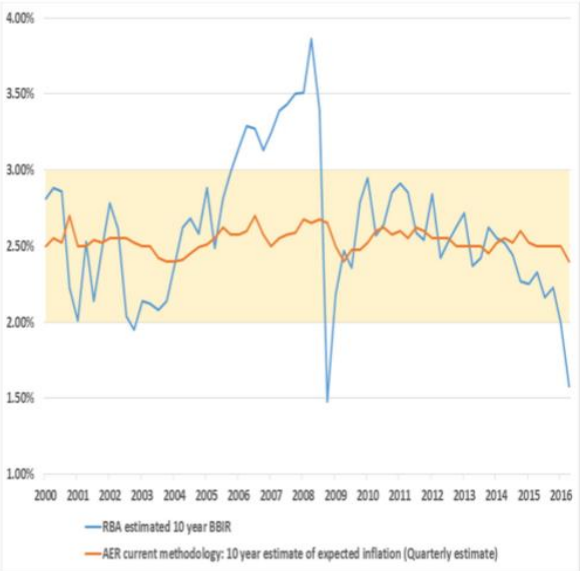
Figure 5 provides a snapshot of issued CGS.

Figure 5 CGS Portfolio at 30 June 2016 (Sourced from AOFM):



This illiquidity contributes to ongoing volatility of BBIR implied estimates of expected inflation as shown in Figure 6 replicated from the working paper. There is also uncertainty with respect to the level of illiquidity in future.

Figure 6: 10 year BBIR using RBA quarterly estimates and the AER current method. (Page 29 of workpaper):

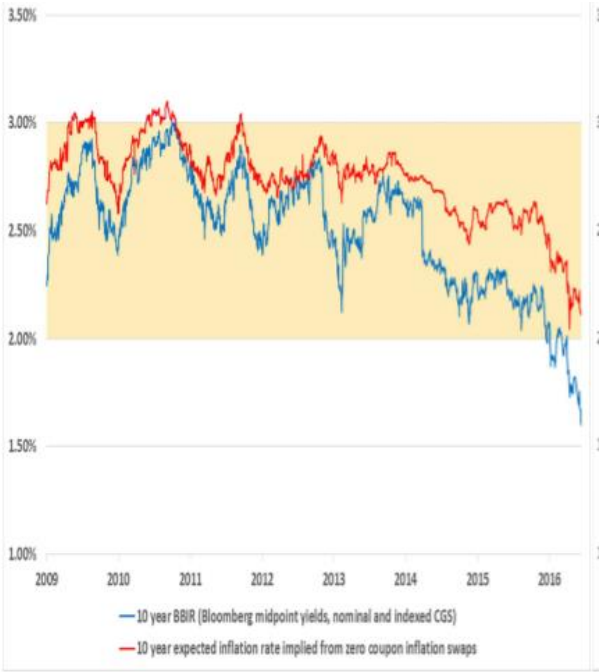


2.4 Observations on Zero Coupon Inflation Swaps (ZCS)

The working paper critically assesses the potential use of ZCS as implied estimates of expected inflation. The volatility of ZCS is significantly less than BBIR according to the analysis.

Figure 7, replicated from the working paper shows ZCS implied expected inflation to hover above BBIR implied expected inflation.

Figure 7: 10 year expected inflation rate implied from ZCS and 10-year BBIR: 9 October 2009 to 30 June 2016 (Page 71 of workpaper)



Although less volatile the location of the ZCS relative to BBIR will, for the most part, reflect the demand and supply imbalances between the markets for ZCS and nominal / indexed bonds influencing BBIR. This is addressed in the working paper regarding capital costs in associated repo markets: (underlined for emphasis):

> 'In replicating a long position of the swap in bond markets, the inflation swaps dealers may incur hedging costs. Hedging costs include all costs associated with opening, maintaining and closing positions in the market where the hedger seeks to offset their exposure in the inflation swap market. <u>In addition to the transaction costs, these costs may include the capital costs of participating in the repo market</u>, and the costs and difficulties arising from matching the timing, size and maturity of cash flows between the short position in the inflation swap market and the positions in the indexed and nominal bond markets.' (Para 164, Page 77).

This is further supported in the working paper with reference to research undertaken by the Treasury Department (underlined for emphasis):

> 'Devlin and Patwardhan (2012) suggest that the observed <u>difference between the inflation swap rate and the BBIR may be attributed to the capital costs of hedging</u> and the cost and difficulties of hedging the floating leg of the inflation swap with relatively illiquid indexed CGS' (Para 168, Page 79).
>
> '<u>Regulatory changes in the banking sector have meant that banks dealing in the inflation swaps market are required to set aside significantly more capital against any derivatives</u> exposures. Compensation demanded by banks for these higher capital charges may also have introduced a systematic bias into inflation swap rates. (Devlin and Patwardhan Page 12).'

Although ZCS implied estimates appear less volatile when compared to BBIR estimates, their consideration and implementation requires deeper analysis into the market micro-structure, capital costs, regulatory capital requirements and collateralisation manifesting in these markets.

2.5 Summary of the Comparative Trade-offs in Estimation Approaches

On deeper reflection of the critical analysis of alternative approaches undertaken in the working paper it can be summarised that:

- **Current RBA Approach**: The current approach of using combined RBA forecasts and RBA inflation targeting over 10 years provides the **least** volatile estimates of expected inflation and the **highest** current estimates of expected inflation.

- **ZCS Approach:** The use of implied Zero Coupon Inflation Swaps will provide more volatile estimates of expected inflation in comparison to the current RBA approach and lower estimates of expected inflation in prevailing market conditions.

- **BBIR Approach**: The use of implied Bond Breakeven Inflation Rates provides the **highest** volatility in estimates of expected inflation and the **lowest** current estimates of expected inflation in prevailing market conditions.

Prior to the consideration or conclusion of ZCS as an alternative estimate requires a deep analysis into the market micro-structure, capital costs, regulatory capital requirements and collateralisation manifesting in these markets under different market conditions; in addition to the demand / supply imbalances between ZCS and bond markets that impact the spread of estimates across approaches. This may introduce unintended risks for network service providers in future.

3. Regulatory Processes over the Life of Asset Base

3.1 Inter-related Regulatory Processes: RFM, PTRM and Annual Pricing

The building blocks approach and high-level interaction between the three regulatory processes and supporting models in the PTRM and RFM was outlined in the introduction. The relevant building blocks predominantly impacted by the regulatory treatment of inflation are:

- Return of Capital (depreciation of the asset base); and
- Return on Capital (WACC of the asset base);

This section focuses on the treatment of inflation with respect to these building blocks only.

The RFM establishes the value of the asset base within the regulatory period and across regulatory periods. Opening asset values flow as inputs into the PTRM (where they are combined with the other building blocks) to determine the annual revenue requirements for each year within the regulatory period.

Consumers pay **nominal** values in the future and these will include actual inflation outcomes in the future. However, because future inflation outcomes are unknown an estimate of expected inflation is required.

The PTRM uses 'X-factors' to adjust annual revenues across the regulatory period to 'smooth' them. 'X-factors' represent percentage changes in **real** annual revenues across each year of the regulatory period. 'X-factors' must meet certain constraints when moving between 'unsmoothed' and 'smoothed' revenues. Furthermore, depreciation assumes the 'straight-line' approach where equal amounts are treated in **real** terms over the life of the assets.

The next section establishes the abstract setting of the long-term inflation impact scenario modelling framework. The modelling undertaken leverages the existing functionality of the AER's LTAS Model and lays out the underlying assumptions of the modelling.

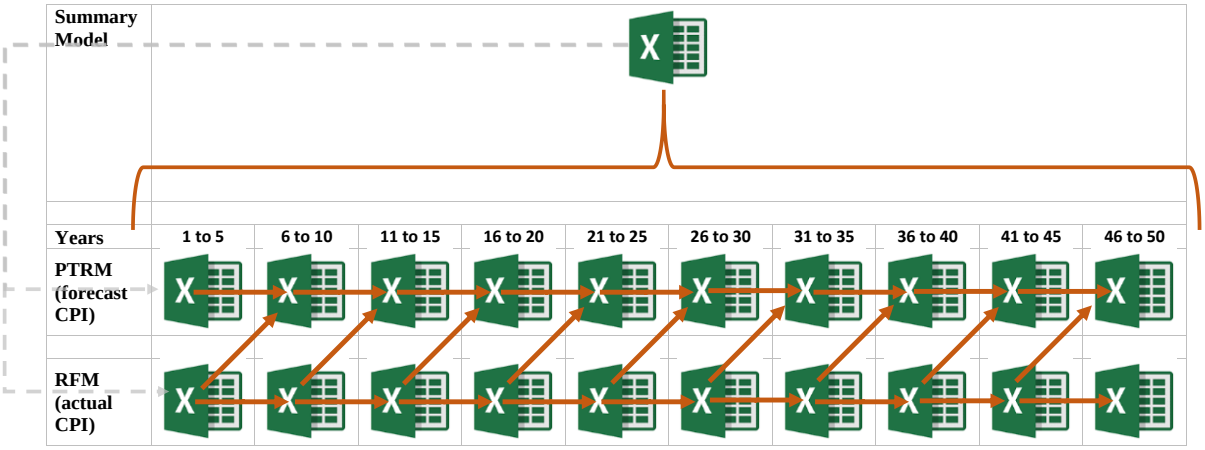
3.2 Replica of the Long-term Analysis Spreadsheet (LTAS) Model

A replica model of the AER's LTAS Model is constructed and includes the underlying assumptions. The LTAS model itself provides a concise and abstract summary of the interaction of regulatory processes and models over multiple regulatory period to capture the setting that asset lives generally span more than regulatory period.[3] The LTAS model is therefore a useful tool to leverage for scenario modelling of inflation impacts in the long term.

Figure 8 illustrates the replica of the LTAS model and its high-level architecture.

[3] LTAS is an abstracted model that makes many simplifications around aspects not related to inflation which greatly assists with modelling of inflation impacts.

Figure 8 Replica of the LTAS Model and its High-level Architecture:



The architecture of the replica includes the PTRM and RFM as 'slave' models supporting the summary model. These are identical models to those used by LTAS and the PTRMs and RFMs are actual operational models used in the same way they would be used in setting network service providers annual revenue requirements.

The assumptions underpinning the replica model are aligned to those of the LTAS model:

- The opening Regulatory Asset Base (RAB) is set to the same value in the LTAS model ($1037.4);
- The RAB has a remaining life of 30 years;
- Capex of $100 is assumed for each of the first 10 years;
- Capex is assumed to be forecasted perfectly such that forecast capex and actual capex are equal;
- Capex is depreciated individually to avoid the impact of Weighted Average Replacement Lives (WARL) affecting each reset;[4]
- No further Capex is assumed after year 10;
- Capex is depreciated over 30 years starting in the year following the year in which it is incurred;
- 'X-factor' assumptions are used like those in the LTAS model. That is, they are set to achieve an expected revenue matching the revenue requirement in each year.[5]

The assumptions underpinning the scenario modelling in the replica model are as follows:

[4] This abstraction from reality may have an impact on the RAB through indexation and further scenario modelling can be undertaken to isolate the potential impact of altering this assumption.
[5] Further scenario modelling can be undertaken to isolate potential impact of altering assumptions on 'X-factors'.

- A real WACC is applied and actual CPI added to determine nominal WACC;

- The replica model projects the PTRM for years 1 to 5 and this is used to determine the revenue requirement based on estimated expected CPI. The summary model calculates 'X-factors' that ensure expected revenue matches the revenue requirement.[6]

- Then the replica model projects the RFM for years 1 to 5 and this is used to calculate the RAB with actual CPI. This RAB represents the actual RAB customers should pay for and is used to re-calculate the revenue requirement as the actual requirement that would have been calculated with the **perfect foresight of inflation.** This nominal amount is what network service providers should recover from customers;

- This process is repeated for each regulatory period spanning the model, with each subsequent PTRM adopting the actual ORAB calculated in the preceding RFM which uses actual inflation;

- The replica model calculates X-factors consistently with the PTRMs that are set based on estimated expected CPI. It then uses these X-factors and actual CPI to calculate the revenue the network would recover under the annual pricing process;

- The replica model also calculates actual revenue that would result from the PTRM if it included actual CPI. This represents the true revenue that should be recovered to match the true revenue requirement and true underlying inflation;

- The replica model then compares the present value of each of the above two revenue streams to determine whether networks or customers benefitted from the use of expected CPI (instead of actual) in the PTRM;

- The replica model only includes the NPV of the revenue amounts because other cashflows are considered irrelevant to the analysis. The discount rate used in both calculations is the same - **nominal WACC based on actual CPI** – representing the WACC with perfect hindsight.

[6] This is the same assumption made in the LTAS ensuring that 'smoothing' assumptions do not interfere with the analysis.

4. Inflation Scenario Modelling of Regulatory Processes

4.1 Long Term Modelling Outcomes

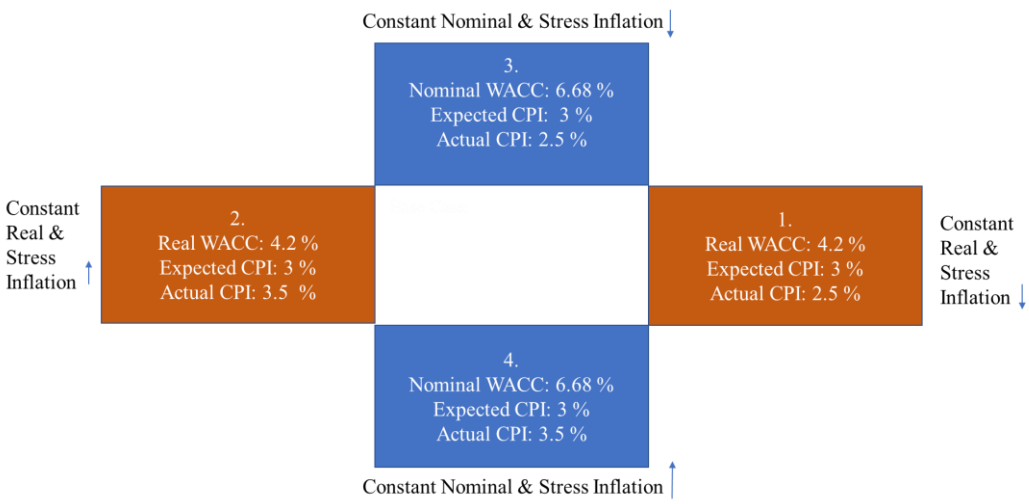
The replica model of LTAS and its underlying assumptions described in section 3.2 is used to model the impact of inflation over multiple regulatory periods. The purpose is to identify the impact of potential biases in the estimates of expected inflation. There are two separate effects that the scenario modelling will eventually capture:

- The impact of estimated expected inflation deviating from actual inflation; and
- The impact of estimated expected inflation deviating from a 'true' expected inflation.

The second effect is relevant in assessing the impact of systemic bias on the real WACC. As was outlined in section 2.2 from the ACCC / AER workpaper: 'If estimates of expected inflation deviate from market expectations, the real WACC may no longer correspond to the real cost of capital of a comparable benchmark efficient entity'.

The first modelled scenarios 1 and 2 involve holding real WACC constant at 4.20 % to capture the effect of estimated expected inflation deviating from actual inflation. These are represented by the orange boxes in Figure 9. To capture the impact of estimated expected inflation deviating from a 'true' expected inflation within the LTAS framework, modelled scenarios 3 and 4 involve holding nominal WACC constant at 6.68 %. These are represented by the blue boxes in Figure 9.[7] An estimate of expected inflation of 3 % is used and the impact of actual inflation outcomes of 2.5 % and 3.5 % are modelled.[8]

Figure 9 Inflation scenario's modelled by the replica model:



[7] These WACC inputs are obtained from the recent Ausgrid decision.

[8] Real WACC is set by the AER starting with a nominal WACC, which was deflated by expected inflation of 2.38% in the Ausgrid decision. Using an estimated expected inflation of 3 % may be viewed as internally inconsistent with the real WACC of 4.2% in the decision (i.e. using the estimate of 2.38 % in that decision). If the nominal WACC of 6.68% were held constant then estimated expected inflation is locked in. This is a nuance in the current modelling framework. If the modelling framework were changed then using a constant nominal WACC in the PTRM with a varying real WACC may be possible. This consideration is left for future ongoing modelling.

Table 1 summarises the outcomes of the modelled inflation scenarios.

Table 1: Summary of indicative inflation scenario modelling outcomes from the replica model:

Scenario	Description	Scenario Outcomes
1	Real WACC constant at 4.2 % Estimated Expected CPI at 3 % pa Actual CPI at 2.5 % pa.	NPV recovered: **$1,876** NPV that should be recovered**: $1,867** Outcome: **$9 *more* than should have been recovered**
2	Real WACC constant at 4.2 % Estimated Expected CPI at 3 % pa Actual CPI at 3.5 % pa	NPV recovered: **$1, 862** NPV that should be recovered: **$1,871** Outcome: **$9 *less* than should have been recovered**
3	Nominal WACC constant at 6.68 % Estimated Expected CPI at 3 % pa Actual CPI at 2.5% pa	NPV recovered: **$1, 781** NPV that should be recovered: **$1,871** Outcome: **$91 *less* than should have been recovered**
4	Nominal WACC constant at 6.68 % Estimated Expected CPI at 3 % pa Actual CPI at 3.5 % pa	NPV recovered: **$2,015** NPV that should be recovered: **$1,915** Outcome: **$100 *more* than should have been recovered** *Note:* The apparent asymmetry observed between scenarios 3 and 4 is explained by the different nominal cashflows to be recovered in nominal terms driven from using different actual CPIs: 2.5 % in scenario 3 and 3.5 % in scenario 4.[9] NPV recovered: **$1,963** NPV that should be recovered: **$1,871** Comparable Outcome:[10] **$91 *more* than should have been recovered**

[9] The NPV of the cashflows is different because a single discount of 6.68 % is used in both scenarios.
[10] From holding actual CPI at 2.5 % and Estimated Expected CPI at 2 %:

Another two inflation scenarios are modelled using the same setting as the above scenarios, but instead of using 2.5 % and 3.5 % as actual CPI outcomes, the historical time series of CPI between 2000 and 2018 is used CPI outcomes from the start of the replica model and when these year run out 2.5 % actual outcomes are assumed for the remaining years in the model.

Table 2 summarises the outcomes of the additional scenario modelling.

Table 2: Summary of indicative inflation scenario modelling outcomes using actual historical time series outcomes between 2000 and 2018 and then 2.5 % for the remainder of the model:

Scenario	Description	Scenario Outcomes
5	Real WACC constant at 4.2 % Estimated Expected CPI at 3 % pa Actual CPI using 2000-2018 historical time series then 2.5 %	NPV recovered: **$1,877** NPV that should be recovered**: $1,868** Outcome: **$8 *more* than should have been recovered**
6	Nominal WACC constant at 6.68 % Expected CPI at 3 % pa CPI using 2000-2018 historical time series then 2.5 %	NPV recovered: **$1,820** NPV that should be recovered: **$1,879** Outcome: **$58 *less* than should have been recovered**

4.2 Analysis of Modelled Outcomes

The outcomes of the scenario modelling indicate the following:

- The impact of an estimate of expected inflation deviating from actual inflation over multiple regulatory periods is relatively small indicating this is not significant, virtually symmetrical and as theory would predict, is largely irrelevant; and

- The impact of an estimate of expected inflation deviating from 'true' expected inflation over multiple regulatory periods is a larger deviation which indicates this to be the more significant impact.

Further modelling of outcomes is recommended, with perhaps the relaxation of some modelling assumptions, prior to concluding on the regulatory treatment of inflation in the current regulatory processes, and indeed in advance of any changes to the existing framework.

Appendix

A.1 List of References

[1] ACCC / AER Working Paper Series, Best Estimates of Expected Inflation: a comparative assessment of four methods, Working Paper No. 11, Economic Group, Australian Competition and Consumer Commission. February 2017.

[2] AER, Regulatory Treatment of Inflation - Discussion Paper, April 2017.

[3] AER, Inflation Review Public Forum - Presentation, Sydney, 14 June 2017.

[4] Consumer Challenge Panel, Review of Inflation Public Forum - Presentation, Sydney, 14 June 2017.

[5] Energy Networks Association, Review of Expected Inflation – Presentation, ENA Rate of Return Working Group, Sydney, 14 June 2017.

[6] Cambridge Economic Policy Associates, Estimate of Market Expected Inflation – Presentation, AER Workshop, 14 June 2017.

[7] Australian Pipeline and Gas Association, Regulatory Treatment of Inflation – Presentation, Stamford Plaza, Sydney Airport, 14 June 2017.

[8] Inflation over the long run publication: http://www.rba.gov.au/inflation/inflation-target.html

[9] Treasury Roundup Series, Measuring market inflation expectations, by Will Devlin and Deepika Patwardhan, Issue 2, pp. 5–17, 2012.

[10] Australian Office of Financial Management CGS data 2016: http://aofm.gov.au/statistics/historical-data/portfolio-position-at-end-of-financial-year/

[11] AER Long Term Analysis Spreadsheet (LTAS) Model: https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/roll-forward-model-distribution-december-2016-amendment/initiation

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Reconciling regulatory estimates of inflation with the interests of electricity consumers

Report to Energy Consumers Australia

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Reconciling regulatory estimates of inflation with the interests of electricity consumers

Introduction

The estimated rate of inflation used in determinations by the Australian Energy Regulator (QER) plays a crucial role in determining electricity prices for consumers and returns to the owners of distribution assets. Conversely, the rapid growth of electricity prices under the National Electricity Market (NEM) has been a substantial, and highly visible, contributor to inflation.

The impact on perceived and actual cost-of-living pressures has been particularly severe in view of the near-stagnation of nominal wages, the primary source of income for most households. In addition to bearing the costs of a trend increase in prices, consumers have also been exposed to substantial price risk, from which regulated asset owners have largely been insulated.

Increasing costs of electricity have also been a major concern for business. As an example, a recent letter from Glencore to the Queensland and Commonwealth governments (reported by Coorey and Ludlow 2017) stated that the company would no longer guarantee the continuation of its copper mining and processing operations, and pointed to the cost of energy as one of the factors motivating these concerns.

Current regulatory processes, including the determination of estimated inflation are dominated by the interests and concerns of asset owners and in particular the objective to ensure a return equivalent to a putative market rate of return on comparable assets. Unlike, for example, the procedure for dealing with Public Private Partnerships, there is no notion of a public sector comparator (see Quiggin 2004 for a discussion of this concept). Nor is any explicit account taken of consumer welfare.

The theoretical framework behind this process, resting implicitly on some version of the efficient markets hypothesis (Fama 1970, for a critique see Quiggin 2010), suggests that it should yield optimal investment decisions and cost-reflective prices. However, the practical outcomes have been radically different, and have generated greatly increased burdens on

consumers. The Productivity Commission (2013) noted that governance arrangements in the NEM are highly complex and 'are neither efficient nor effective in achieving good outcomes for consumers'. The problems have only worsened since then.

In any revision of the procedures, the opportunity to improve outcomes for consumers should be given substantial weight. While the determination of the estimated rate of inflation is only a small part of the regulatory process, it does provide modest opportunities for redressing the balance in favour of consumers.

The structure of the process so that asset owners receive a guaranteed real rate of return means that all inflation risk is reflected in uncertainty in the prices paid by consumers. Consumers can, and should be, insulated from inflation risk by setting the estimated rate of inflation at the highest value consistent with the existing policy framework, namely, the upper bound of the RBA target range, currently 3 per cent. At current 10-year bond yields of 2.4 per cent, this would imply a real bond rate of -0.6 per cent, which is consistent with the generally negative real (and in some cases nominal) bond rates that have prevailed globally in recent years.

This paper develops the argument for protecting electricity consumers from inflation risk. The paper is organized as follows. Section 1 is a summary of ACCC/AER Working Paper 11. Section 2 addresses a question which is largely overlooked or taken for granted by the ACCC/AER, namely how the choice of regulatory inflation rate interacts with the regulatory process as a whole. Section 3 presents the case for setting the regulatory estimated rate of inflation equal to the upper bound of the RBA target range. Finally, some concluding comments are offered.

1. ACCC/AER Working Paper 11: Summary

The AER recognises the distributional implications for asset owners of regulatory decisions in ACCC/AER Working Paper 11 (ACCC/AER 2017), which observes (para 11) that a difference of 0.5 per cent in the estimated rate of inflation could change allowable returns by 5.5 per cent over a regulatory period. In the illustrative case of Powerlink, a transmission network service provider, the difference amounts to $200 million.

It is self-evident that this change in revenue for a monopoly service provider corresponds to an equal change in the costs borne by consumers. However, this fact is not made explicit.

More importantly, ACCC/AER (2017) makes no reference to the interests of consumers[1] or to the way in which the risks of inflation are allocated in the regulatory process.

As a result, both ACCC/AER (2017) and the related Discussion Paper (2017) treat the derivation of the estimated rate of inflation as a purely technical exercise, with no consideration of the interests of the parties from whom they have received submissions (mostly asset owners) or those largely excluded from the process (consumers in general, and particularly household consumers). This approach would be consistent with a regulatory model subject to producer capture, a model which would fail to deliver the objective of delivering electricity efficiently and at the lowest possible cost.

Under the National Electricity Rules (NER) 6.4.2 (b)(1) the contents of the post-tax

revenue model (PTRM) must include:

> ‘a method that the AER determines is likely to result in the best estimates of expected inflation’

ACCC/AER (2017) defines the ‘best estimate’ as corresponding to ‘market expectations of the percentage growth in the Consumer Price Index (CPI) over a 10-year horizon’. A 10-year horizon is chosen because the 10-year nominal risk-free bond rate is a parameter in the regulated nominal weighted average cost of capital (WACC) of network service providers.

ACCC/AER (2017) examines four methods of estimating inflation which may be divided into pairs: two methods based on published estimates and two methods based on market rates of return to inflation-adjusted securities. In all cases, the relevant inflation measure is taken to be the consumer price index (CPI).

The published estimates considered are (a) RBA forecasts for CPI inflation 1 and 2 years ahead and the midpoint of the RBA’s target inflation band from 3 to 10 years ahead; and (b) survey-based estimates of inflation expectations over a 10-year horizon.

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[1] Consumers are mentioned several times in relation to survey-based estimates of inflation. These mentions refer to households in general rather than to consumers of electricity. The only point at which electricity consumers are mentioned as such is in para 12, where it is noted that errors in inflation forecasting may distort their decisions.

The market methods considered are (c) inflation rates implied by the bond break-even inflation rate (BBIR), that is, the difference between the yields on 10-year nominal and indexed (inflation-linked) Commonwealth Government Securities (CGS). (d) rates derived from market values of zero coupon inflation swaps.

ACCC/AER (2017) concludes that the currently preferred method (a), based on RBA forecasts is the best available, followed by the inflation swap approach and the BBIR approach.

2. How are estimates used?

The primary purpose of estimating inflation rates in the post-tax revenue model (PTRM) is in the determination of the estimated real weighted average cost of capital (WACC) used in determining regulated prices. This value, which may or may not correspond to the actual cost of capital for regulated firms, will be referred to as the 'regulatory real WACC'.

The procedure, described in detail in AER (2017) Discussion Paper, Regulatory Treatment of Inflation, is as follows

(a) Subtract the regulatory estimate of future inflation from the riskless nominal bond rate to obtain an estimated riskless real bond rate

(b) Add an estimated market risk premium, derived from some version of the capital asset pricing model (CAPM) to obtain the regulatory real WACC

Under the PTRM, regulated firms are guaranteed to receive the real WACC return on their regulated asset base (subject to some limitations in the first year of any regulatory period where forecast inflation isn't substituted with actual). This is achieved by providing them with a return equal to the sum of the real WACC and the actual rate of inflation, yielding the 'regulatory nominal WACC'.

The actual allowable return to capital is the product of the regulatory nominal WACC and the regulated asset base. Total revenue is then obtained by adding estimates of efficient operating costs, return of capital (depreciation) and net tax costs.

Implications of the treatment of inflation

For the purposes of the present submission, two features of the PTRM treatment of estimated inflation are relevant.

First, any change in the regulatory estimated rate of inflation implies an equal and opposite change in the real rate of return guaranteed to asset owners. That is, the higher is the estimated rate of inflation the lower is the real rate of return. That in turn implies that any reduction in the estimated rate of inflation benefits asset owners at the expense of consumers.

Second, once the real rate of return has been determined, asset owners are completely insulated from inflation risk, which is borne entirely by consumers. This is an instance of what Hacker (2006) describes as The Great Risk Shift, in which risk has been transferred from governments and business to households and workers. The Organisation for Economic Co-operation and Development (OECD) and others identify this as part a process of financialisation which has now reached the limits of acceptability and threatens to undermine the globalised economy (OECD 2017). The post-1990s approach to infrastructure regulation, with its reliance on financial market models, is an instance. OECD (2017) concludes that the downwards redistribution of risk, and the corresponding upwards redistribution of income and wealth associated with the process of financialisation, have contributed to sluggish economic growth and poor social outcomes in the last decade.

Insulating consumers from risk

Under rules that guarantee the real return of return for asset owners, consumers are necessarily exposed to any difference between the actual rate of inflation and the expected rate used in the regulatory process. In the technical sense used in economics and finance, they are exposed to the full risk of inflation.

In the ordinary sense of the term which is relevant here, however, consumers are only concerned about ‘upside’ inflationary risk, that is the risk that inflation rates will be higher than the regulatory estimated rate. This ‘upside’ inflationary risk corresponds to a downside risk in real income and consumption for consumers.

If the range of inflation rates relevant to the analysis is bounded within a given range, consumers can be protected from ‘upside’ inflationary risk by setting the regulatory estimated rate at the upper end of the range.

In the Australian context, the Reserve Bank of Australia operates monetary policy with a target ‘to achieve an inflation rate of 2–3 per cent, on average, over time.’

As this formulation implies, the policy allows for temporary deviations outside the target range. In particular, the RBA focuses on measures of ‘underlying’ inflation, and disregards temporary fluctuations in prices, such as those associated with the impact of tropical cyclones on fruit and vegetable prices (Richards and Rosewall 2010).

Based on this policy setting, and assuming that monetary policy is managed successfully, it is unlikely that the average rate of CPI inflation will be far outside the target range over a five-year period.

It may be noted that inflation rates have recently been below, or at the lower end of, the target range. Wage increases have similarly been depressed. The RBA has expressed concern about these developments. Based on the stated policy of maintaining average inflation over time within the target band, it seems likely that the RBA will seek to push the inflation rate towards the upper end of the target band in the medium term.

Is the real interest rate negative?

An immediate implication of the approach adopted here is that the proposed estimated rate of inflation exceeds the yield on 10-year government bonds, implying that the regulatory real rate of interest is negative. At current 10-year bond yields of 2.4 per cent, this would imply a real bond rate of -0.6 per cent.

A negative real interest rate may seem counterintuitive, in view of the common assumption that investments should yield positive real returns. However, negative real interests are not unusual in historical terms. The long term average real rate of interest for US government bonds was estimated by Mehra and Prescott (1985) at 1 per cent.

More importantly, in the decade since the global financial crisis of 2008, negative real interest rates have become the norm in developed countries, particularly for short term rates. The real novelty in this period has been the occurrence of negative nominal rates. As noted in

a recent IMF blog post on the topic ‘There have been negative real rates in a number of countries over time; it is negative nominal rates that are new.’ (Vinals, Gray and Eckold 2016).

The US Federal Funds rate has been close to zero for most of this period, and consistently below the rate of consumer price inflation. A number of central banks have adopted negative short term rates.

Yields on 10-year government bonds for AAA rated sovereign borrowers such as Germany are also below the rate of inflation. The US rate, which incorporates a risk premium reflected in the loss of the country’s AAA rating in 2011, is slightly above the current rate of inflation.

(All data from FRED Economic Database, Federal Reserve Bank of St Louis).

Australia has maintained somewhat higher interest rates than the rest of the world. Nevertheless, Australia has not been immune to the general decline in real and nominal rates of return. The last time the RBA cash rate was increased was in 2010, when the rate was set at 4.75 per cent. Since then the rate has been reduced to a historic low of 1.5 per cent, below the target inflation range.

Several explanations may be advanced for the occurrence of low or negative real interest rates:

(a) Unanticipated inflation. This explanation is not relevant in the current low-inflation environment

(b) The ‘risk free rate puzzle’ literature (Weil 1989). This is a counterpart to the ‘equity premium puzzle’ observed by Mehra and Prescott (1989). The puzzle itself is simply a restatement of the observation that, on average, real bond rates are lower than would be expected on the basis of simple general equilibrium models. However, the formulation of the risk-free rate and equity premium puzzles has generated a large literature, offering many candidate explanations. Popular types of explanation include: non-standard preferences, market incompleteness and problems with equities as financial instruments. Grant and Quiggin (2006) provide a survey.

(c) Secular stagnation: Arguments based on 'secular stagnation' are centred on the idea that there are, at present, inadequate opportunities for investment to generate positive returns after allowing for a risk premium. It follows that the real rate of return for risk-free investments must be negative. Gordon (1999, 2016) presents the case for secular stagnation, arguing that the long period of economy-wide innovation that began in the late 19th century has ended, and that innovations in information technology are insufficient to replace it.

Summing up, there is nothing unusual about negative real interest rates, and there are good reasons to believe that negative real interest rates will predominate in coming years. So, the fact that the regulatory inflation rate proposed in this paper implies a negative real rate of interest should not be regarded as problematic.

Conclusion

The current design of the National Electricity Market has harmed electricity consumers in various ways, most notably with substantial increases in prices. Within the constraints of the current overall policy construct, it is important that the interests of electricity consumers should be given substantial weight in the detailed formulation of regulatory policy. The ACCC/AER analysis of the determination of regulatory estimates of inflation does not do this.

Given that the regulatory system provides asset owners with a guaranteed rate of return, while providing no guarantees to consumers of stable real prices, it is important that consumers should not be exposed, in addition, to upside inflation risk. This can be prevented by setting the regulatory rate of inflation at the upper end of the RBA target range.

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