Rate of return

Equity Omnibus

Draft working paper

July 2021

AUSTRALIAN ENERGY REGULATOR

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Contents

Shortened forms

Shortened form	Extended form
2018 Instrument	The rate of return instrument published on 17 December 2018
2022 Instrument	The rate of return instrument to be published in December 2022
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
Brattle	The Brattle Group
CAPM	Capital asset pricing model (Sharpe-Lintner CAPM)
CEPA	Cambridge Economic Policy Associates
CGS	Commonwealth government securities
CPI	Consumer Price Index
DGM	Dividend growth model
FERC	Federal Energy Regulatory Commission (a US regulator)
Instrument	Rate of return instrument
MRP	Market risk premium
NEL	National electricity law
NEO	National electricity objective
NGL	National gas law
NGO	National gas objective
NPV=0	Net present value neutrality
NZCC	New Zealand Commerce Commission
Ofgem	Office of Gas and Electricity Markets (a UK regulator)
Ofwat	The Water Services Regulation Authority (a UK regulator)
PTRM	Post-tax revenue model
RORI	Rate of return instrument
SL-CAPM	Sharpe-Lintner capital asset pricing model (or just CAPM)
WACC	Weighted average cost of capital

1 Overview

This working paper is part of a series that we have produced, and will produce, as part of our pathway to the 2022 Rate of Return Instrument (2022 Instrument). The outcomes from these working papers will feed in to our 2022 Instrument review process.

This information will assist us to develop a 2022 Instrument that sets a rate of return that contributes to the achievement of the National Gas Objective (NEO) and National Electricity Objective (NGO).[1] These objectives focus on the long term interests of consumers.[2]

In advancing consumers' interests we aim to promote efficient investment in and operation of regulated energy businesses.

1.1 What do we want to achieve through our working papers?

The aim of this working paper series is to explore the key issues relating to the rate of return, and identify new theoretical and empirical evidence since the previous review. They are also a focal point for stakeholder consultation. From these working papers, we establish positions on issues and lay a foundation for the development of the 2022 Instrument.

This working paper explores topics that affect the overall return on equity. These are:

- Estimating a forward looking market risk premium (MRP).
- The relationship between the risk free rate and market risk premium.
- The comparator set and estimation period of equity beta.
- The use of cross checks at the overall return on equity level.
- The equity beta for electricity vs gas networks.
- Averaging period — nomination window for equity.

The draft working paper proposes preliminary positions on these topics, having considered a range of evidence including previous academic work, previous expert reports, other regulators' practices and previous stakeholder submissions.

1 NGL, s. 23; NEL, s. 7.

2 The NGO is to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas. The NEO is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interest of consumers of electricity with respect to: price, quality, safety and reliability, and security of supply of electricity; and the reliability, safety and security of the national electricity system.

1.2 Why does the rate of return matter?

Investors in any business expect to receive an additional return above their initial investment (or capital). We use the phrase 'rate of return on capital'—or just 'rate of return'—to refer to this additional amount when expressed as a percentage of the initial investment.

We estimate the rate of return for regulated energy businesses by combining the returns of two sources of funds for investment: equity and debt. The rate of return provides the business funds to service the interest on its loans and give a return to shareholders.

In our view, the best possible estimate of the expected rate of return—neither upwardly biased nor downwardly biased—will promote efficient investment in, and efficient operation and use of, energy network services. While the capital market transaction is between investors and networks/pipelines, the ultimate effects will flow through to consumers.

If the rate of return is upwardly biased:

- Investors will be over compensated for the risk involved in supplying capital to networks, so will show increased willingness to invest in regulatory assets in comparison with other investments in the economy.
- Networks will have an incentive to over-invest in regulated assets over the longer term, increasing the regulatory asset base above the efficient level.
- Energy consumers will pay inefficiently higher prices, which will distort energy consumption decisions, and downstream investment decisions. This will result in efficiency losses where consumers use less energy network services than otherwise and non-monetary impacts such as disconnection of vulnerable consumers.

If the rate of return is downwardly biased:

- Investors will be under compensated for the risk involved in supplying capital to networks, so will show reduced willingness to invest in regulatory assets in comparison with other investments in the economy.
- Networks will not be able to attract sufficient funds to be able to make the required investments in the network. Over the longer term there will be declines in quality, reliability, safety and/or security of supply of electricity or gas.
- Consumers of energy will pay lower prices, at least in the short term; but will wear the risk of adverse outcomes for quality, reliability, safety and/or security of supply of energy services. Lower prices will also distort energy consumption and downstream investment decisions (though in the opposite direction to the previous case). This new level of downstream investment will be inefficient for the Australian economy.

Hence, an unbiased estimate of the expected efficient return, consistent with the relevant risks involved in providing regulated network services, is necessary to

promote efficient prices in the long term interests of consumers.[3] We consider that the NEO, NGO and the long term interests of consumers are best served through this guiding principle.

1.3 Why this paper?

This paper, and the other omnibus papers, will progress the work and positions of the more focused working papers, such as the *CAPM and alternative return on equity models* and *International regulatory approaches to rate of return* papers, which have been published in the last 12 months. Work and findings from these papers are considered here in the larger context of estimating the cost of equity in a manner that fits the National Electricity Law (NEL) and National Gas Law (NGL).

The paper will lay out our previous positions, work we have covered since the 2018 Instrument and our current thinking on the topics. By doing so, stakeholders will be able to submit their opinions and relevant evidence in full knowledge of what we have considered so far.

This paper should be read alongside our draft working paper on the *Overall Rate of Return* which sets out the high level context and shows how all the pieces of our review fit together.[4]

It is important to note that we will not finalise our in-depth working papers (*Term of the rate of return* and *Rate of return and cashflows in a low interest rate environment*) prior to receiving submissions on this equity omnibus working paper. We acknowledge that with multiple working papers being developed concurrently, there is inevitably some overlap in the issues being considered. Where it is necessary to engage further on any specific issue put forward in submissions, we will set up workshops to discuss and develop positions put to us.

1.4 Decision-making framework

Our draft working paper on the *Overall Rate of Return* published in parallel with this equity omnibus working paper sets out the decision-making framework which we have adopted for the development of the 2022 rate of return instrument.[5]

The NEO and NGO establish the ultimate objective of the AER's decision-making.[6] In each case, the objective is to promote efficient investment in, and efficient operation and use of, the relevant electricity or gas services, for the long term interests of consumers with respect to the price, quality, safety, reliability and security of supply.[7]

The *Overall Rate of Return* paper also set out the factors we consider when exercising our judgement about the analytical techniques and evidence to use to make an estimate that is commensurate with efficient financing costs.

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3 AER, *Rate of return and assessing the long term interests of consumers,* May 2021, pg. 1.

4 AER, *Overall Rate of Return*, *Draft working paper*, July 2021, section 3.

5 AER, *Overall Rate of Return*, *Draft working paper*, July 2021, section 4.

6 NEL, s. 7; NGL, s. 23.

7 The NEO contains an additional objective of the reliability, safety and security of network system: see NEL s.7.

The *Overall Rate of Return* paper include a set of detailed criteria that we use to inform our exercise of judgment. Where change is under consideration, based on new evidence before us, we are of the view that these criteria provide a lens through which we can assess alternative estimation methods, financial models, market data and other evidence to which we must have regard in our decision-making. They also improve the transparency and predictability of our review process. These criteria:

- set out desirable qualities against which new evidence should be assessed, and
- place the long-term interests of consumers, as reflected in the energy market objectives, at the heart of any decision to change from historical practice.[8]

Appendix A to this equity omnibus paper has the assessment criteria that is set out in the *Overall Rate of Return* paper

1.5 Possible options and preliminary views for 2022

In preparing this draft working paper, we have considered a range of evidence including previous academic work, previous expert reports, other regulators' practices and previous stakeholder submissions.

Estimating a forward looking market risk premium

Our preliminary view is to continue to consider the historical excess return, both the arithmetic and geometric mean MRP, and MRP surveys. We consider this set of information is able to inform selection of a forward looking MRP.

However, we are interested in stakeholders' feedback on whether our estimate of the MRP could be improved by employing dividend growth models. We have not formed a view on this topic and would like to hear how and if the dividend growth model can be made suitable for our MRP estimation. In particular, whether it can be used to inform the relationship between the MRP and risk-free rate. It is important that submissions that propose a change to our current approach should clearly specify the proposed change and the reasons why it would deliver superior results to our current approach.

The relationship between the risk free rate and market risk premium

Under our current approach, our return on equity has tracked lower as interest rates have declined. We are considering whether this approach remains appropriate but have not landed at a position in this draft working paper and are continuing to assess evidence of a potential relationship. To assist us in this consideration we have commissioned a report by Cambridge Economic Policy Associates (CEPA), which is released along with this draft working paper.

We are cognisant that any approach we adopt must be capable of being implemented in a manner that is sufficiently robust, transparent and evidence based to be suitable for regulatory purposes.

We also note that, for the purposes of regulatory use, the relationship that we are most interested in would have to exist between the parameters in an ex-ante sense. That is, we set an ex-ante return on equity and therefore, the ex-ante risk free rate would need

[8] AER, *Overall Rate of Return*, *Draft working paper*, July 2021, section 4.

to have a robust, transparent and evidence based relationship to the ex-ante market risk premium for it to be implemented.

We welcome stakeholder views on the potential for a relationship and an appropriate implementation that would be consistent with these aims. In particular, we note that if we were to change our methodology to estimate MRP, for example, employing dividend growth models in our estimation of the MRP, this could change the resulting relationship with the risk free rate and the used market risk premium. Again, it is important that submissions that propose a change to our current approach should clearly specify the proposed change and the reasons why it would deliver superior results to our current approach.

Comparator set and the estimation period of equity beta

Our preliminary view is to maintain the use of our current comparator set of nine Australian firms to estimate equity beta. This is because the existing comparator firms reflect firms that are most comparable to an efficient service provider supplying Australian regulated energy services. Further, we are not inclined to include international firms into our comparator set, because we have a different regulatory framework, and it will be problematic to establish equity beta estimates that are sufficiently comparable.

In terms of the length of the estimation period, we propose to give most weight to estimates from the longest estimation period to inform equity beta. This provides for the most robust and statistically reliable estimates.

We would like to hear stakeholder's views on whether we need to change our equity beta methodology if we shifted to a five year single period CAPM.

The use of cross checks at the overall return on equity level

Our preliminary view is to use these cross checks to sense check our overall return on equity point estimates. At this point of time, we propose to maintain and apply the cross checks in line with the approach we adopted in the 2018 Instrument. There are significant issues with each of the potential cross checks such that we do not see how they could be used more directly.

The equity beta for electricity vs gas networks

Our preliminary view is to adopt single benchmark across electricity and gas businesses as the regulatory framework for electricity and gas service providers are similar because both face limited systematic risk by virtue of being regulated natural monopolies. At this point of time, we have not received new evidence to suggest a change to our approach of applying a consistent equity beta across both sectors.

Nomination window and averaging period specifications for equity

Our preliminary view is to shift the allowed nomination window forward in time by one month to lessen timing issues. This would mean the averaging periods must start no earlier and finish no later than 8 and 4 months, respectively prior to the commencement of the next regulatory control or access arrangement period. Our experience is that the current timing which allows for a month between the end of the averaging period and final decisions on services providers regulatory proposals creates practical difficulties. We depend on external parties to publish the data which in turn feed into our decision making processes. The extra month will assist in removing timing pressures that arise particularly when holidays intervene and third party data availability is impacted.

We also propose to maintain our approach of providing flexibility to networks to nominate averaging periods. This approach will allow service providers flexibility in how they mitigate their exposure to volatility in the risk free rate. As networks are required to nominate the period in advance, this will reduce the possibility of bias in the risk free rate.

1.6 Next steps

We invite stakeholder submissions in response to this working paper by 27 August 2021.

Our past practice was to hold a public forum in person during the consultation period, where stakeholders can ask questions of the AER and interact directly to hear each other's perspectives. However, our experience during the COVID-19 pandemic has demonstrated the practicality and value of online forums. Therefore, our current intent is to hold an online event during the consultation period. The online forum will be held on 11 August 2021 from 2.30–5.00pm.

The forum will allow stakeholders to present to the AER and other stakeholders on what they consider to be most relevant to discussion and highlighting their points of view. We will engage stakeholder groups who have been involved in previous forums and welcome interest from other groups who wish to present.

Those interested in presenting should contact us at rateofreturn@aer.gov.au

After consideration of submissions, we expect to conclude this working paper topic with the release of a final working paper.

1.7 Making a submission

Written submissions should be emailed to the AER at RateOfReturn@aer.gov.au, by close of business, 27 August 2021.

Alternatively, submissions can be sent to:

Mr Warwick Anderson
General Manager, Network Pricing
Australian Energy Regulator
GPO Box 3131
Canberra ACT 2601

We prefer that all submissions be sent in an electronic format in Microsoft Word or other text-readable document form and publicly available, to facilitate an informed, transparent and robust consultation process.

Submissions will be treated as public documents and posted on the AER's website unless prior arrangements are made with the AER to treat the submission, or portions of it, as confidential. Those wishing to submit confidential information are requested to:

- clearly identify the information that is the subject of the confidentiality claim; and
- provide a non-confidential version of the submission in a form suitable for publication.

All non-confidential submissions will be placed on the AER's website at www.aer.gov.au. For further information regarding the AER's use and disclosure of information provided to it, see the ACCC/AER Information Policy, June 2014 available on the AER's website.

Enquiries about this paper, or about lodging submissions, should be directed to the Network Pricing branch of the AER on (03) 9290 1800.

2 Process background

2.1 What is the rate of return instrument?

The rate of return instrument sets out how we determine the allowed rate of return on capital in regulatory determinations for energy networks. It specifies the mathematical formulae we will use to calculate the rate of return, and how we will obtain inputs for those formulae. It defines some inputs (fixed for the duration of the instrument) and for others states the process by which we will measure market data and use it as an input at the time of a decision.

The current rate of return instrument was published on 17 December 2018 (the 2018 Instrument). In December 2022 we will publish the next rate of return instrument (the 2022 Instrument). This binding instrument will determine the allowed rate of return on capital for the following four-year period.

We estimate the returns required by investors in view of the risks associated with regulated energy network companies compared to their other investment opportunities. We make this judgement by examining a broad range of evidence including financial market data, models of financial returns, the latest investment knowledge and the views of all stakeholders.

2.2 What is our 'Pathway to 2022'?

We use the term 'Pathway to 2022' to describe the process by which we will develop the 2022 Instrument. Our draft working paper on the *Overall Rate of Return* discusses the process in detail and the major elements are illustrated in Appendix C.[9]

The *Overall Rate of Return* paper also sets out a high level overview of our rate of return framework and working paper series, including how all these papers come together and potential methodological changes that may raise (or lower) the rate of return.[10]

This omnibus paper is to provide coverage of all equity issues. It will combine positions taken in the 2018 RORI and in the focused working papers, in particular the *CAPM and alternative return on equity models* and *International regulatory approaches to rate of return* working paper, allowing stakeholders to view all of these matters together.

Specifically, the equity omnibus working paper:

- Introduces our methodology for estimating the return on equity set out in the 2018 RORI.
- Identifies key issues for discussion, related to the return on equity.
- Highlights work done since 2018 by the AER in relevant areas.
- Identifies our current position on the issues, highlighting why changes are being proposed and the relevant evidence supporting the changes.

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[9] AER, *Overall Rate of Return*, *Draft working paper*, July 2021, section 2

[10] AER, *Overall Rate of Return*, *Draft working paper*, July 2021, section 3 and 4

3 Overall return on equity

The critical allowance for an equity investor in an efficient firm in the supply of Australian regulated energy network services is the allowed equity risk premium over and above the estimated risk free rate at a given time. Under the standard application of the Sharpe-Lintner CAPM, this equals the market risk premium multiplied by the equity beta.

3.1 Foundation model approach

We propose to use the foundation model approach framework to consider systematically all relevant estimation methods, financial models, market data and other evidence.

The six step process provides a framework for systematically considering relevant information and then exercising our judgement on the appropriate regulated return on equity. It does not require information to be used if it did not satisfy our assessment criteria.

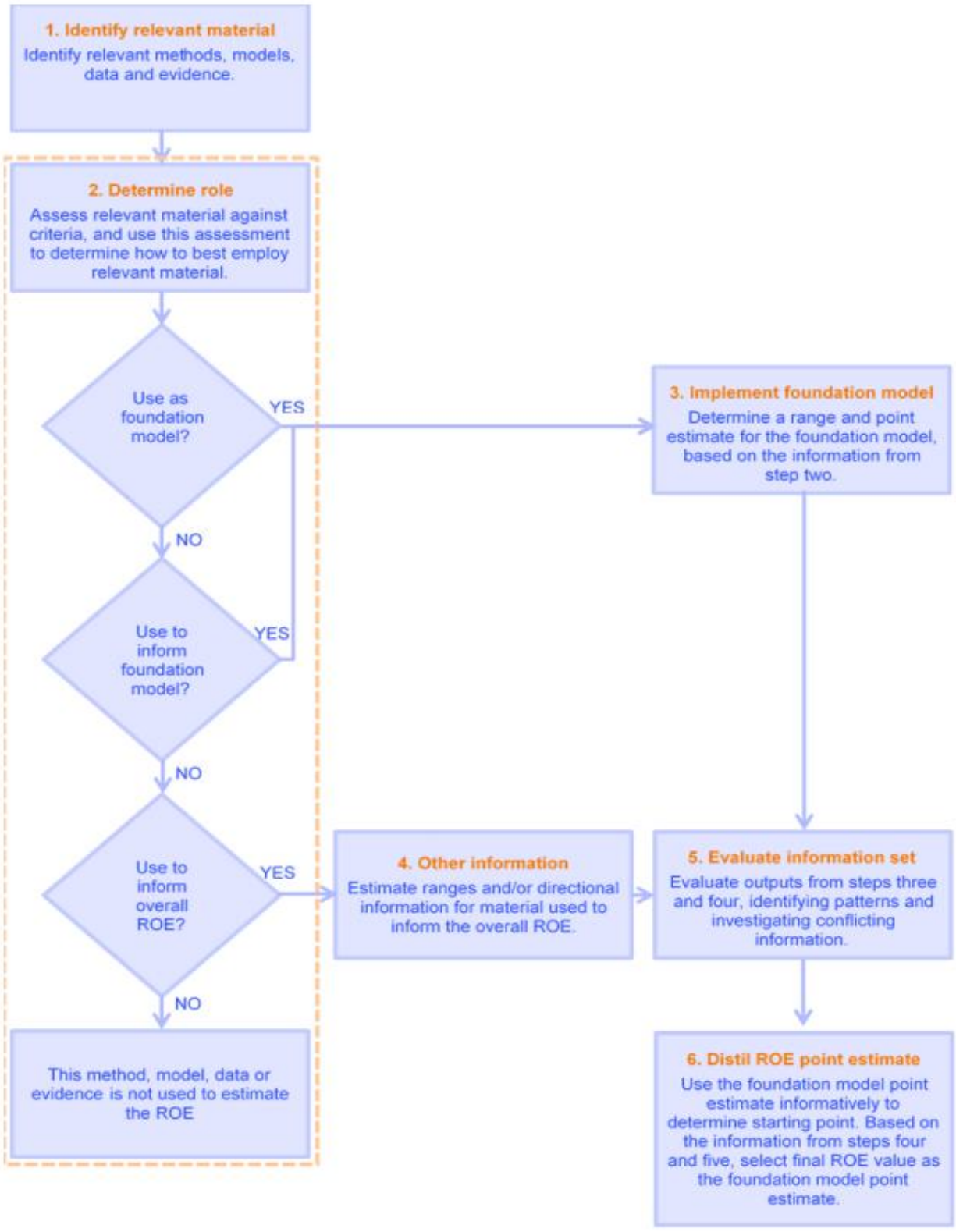
Therefore our approach is to assess all information and employ it according to its merits.

We consider our six step process:

- provides opportunity to evaluate the merits of relevant evidence
- applies appropriate weight to the relevant evidence at the most suitable point in the assessment
- uses a well-established forward looking asset pricing model to compensate for systematic risk populated with parameter value estimates that:
    - are consistent with good finance theory
    - are based on market data and developed using robust empirical methods
    - recognise and allow for the inherent uncertainties in the data

Figure 1 presents the six steps process adopted in the 2018 process.

Figure 1 Foundation model approach flowchart



We identify the relevant material and the roles assigned to each piece of material under step 1 and 2 of our foundation model approach. This is summarised in Table 1.

Table 1 Relevant material and role.

Material (Step 1)	Role in 2018 and relevant merit (Step 2)	Proposed approach for the 2022 Instrument
Sharpe-Lintner Capital Asset Pricing Model (SL-CAPM)	Foundation model.	Foundation model We have considered this model in the *CAPM and alternative return on equity models working paper*.[11]
Black CAPM	Related to the overall return on equity. However at the time of the finalising the 2018 instrument we had diminished confidence in the robustness of the Black CAPM. We were not persuaded to adjust the Sharpe-Lintner CAPM estimate for the theory of the Black CAPM.	Not considered in this paper. No role.
Dividend growth models (DGMs)	Can be used to inform the market risk premium. However at the time of the finalising the 2018 instrument we had diminished confidence in the robustness of the DGMs. We were not persuaded to select a market risk premium toward the top of the observed empirical estimates of historical excess returns.	We are open to considering the use of the dividend growth model to inform foundation model parameter estimates (see section 4 and 5).
Fama-French three factor model	No role.	Not considered in this paper. No role.
Wright approach	We have diminished confidence in the robustness of the Wright approach leading us to place no reliance on it.	The relationship between the risk free rate and MRP is being considered in this process (section 5).
Commonwealth government securities	Inform foundation model parameter estimates (risk free rate).	Inform foundation model parameter estimates (risk free rate). Not considered in this paper.

[11] AER, *CAPM and alternative return on equity models,* December 2020.

Material (Step 1)	Role in 2018 and relevant merit (Step 2)	Proposed approach for the 2022 Instrument
Observed equity beta estimates	Inform foundation model parameter estimates (equity beta).	Inform foundation model parameter estimates (equity beta) This paper only considers the comparator set and length of the estimation period (see section 6).
Historical excess returns	Inform foundation model parameter estimates (MRP).	Inform foundation model parameter estimates (MRP - see section 4).
Survey evidence of the MRP	Inform foundation model parameter estimates (MRP).	Inform foundation model parameter estimates (MRP - see section 4).
Implied volatility	Inform foundation model parameter estimates (MRP).	Inform foundation model parameter estimates (MRP - see section 4).
Other regulators' MRP estimates	Inform foundation model parameter estimates (MRP).	Inform foundation model parameter estimates (MRP - see section 4).
Debt spreads	Inform foundation model parameter estimates (MRP).	Inform foundation model parameter estimates (MRP - see section 4).
Dividend yields	Inform foundation model parameter estimates (MRP).	Inform foundation model parameter estimates (MRP - see section 4).
Takeover/valuation reports	Inform the overall return on equity.	Inform the overall return on equity (see section 7).
Brokers' return on equity estimates	Inform the overall return on equity.	Inform the overall return on equity (see section 7).
Inform the overall return on equity	Inform the overall return on equity.	Inform the overall return on equity (see section 7).
Comparison with return on debt	Inform the overall return on equity.	Inform the overall return on equity (see section 7).

Source: AER, *Rate of return instrument, Explanatory Statement*, December 2018, pp. 82–83.

In our *CAPM and alternative return on equity models* working paper, we considered the Sharpe-Lintner CAPM is the preeminent model; it has a strong theoretical basis, and is widely used by market practitioners. This is reflected in its use by all international regulators reviewed—and for most, it is the only model used.

It is the most appropriate model to reflect the systematic risk. Therefore we proposed to maintain the use the Sharpe-Lintner CAPM as the foundation model.

4 A forward looking market risk premium

4.1 Overview

Under our current regulatory framework, we use the Sharpe-Lintner CAPM to determine the return on equity. As part of this, we have to estimate a forward looking market risk premium that compensates an investor for the systematic risk of investing in the Australian market portfolio. The forward looking MRP is the difference between the expected return on the market portfolio and the return on the risk free asset.

The expected MRP is not directly observable. As a result, a number of different methods have been put forward to estimate the expected MRP. This includes using dividend growth models (DGMs), analyst forecasts, surveys, the Wright approach, and historical excess returns (HER).

For the purpose of a regulatory determination, we are after an MRP estimation method that:

- Will result in an appropriate forward looking MRP estimate.
- Is easily replicable and transparent.
- Is widely used in both regulation and by market practitioners.

We currently adopt a forward looking MRP of 6.1 per cent that is fixed for the life of the rate of return instrument. To come to this point estimate we considered: historical excess returns (using both arithmetic and geometric means), MRP surveys, conditioning variables and other evidence.[12]

The rest of this chapter considers setting the market risk premium for the 2022 Instrument. This excludes the potential for a relationship between the risk free rate and the market risk premium. This is considered in Chapter 5.

4.2 What is the issue under discussion?

In the *CAPM and alternative return on equity models* working paper process, we received submissions on our estimation of the MRP.

Networks and investors raised concerns over our approach to estimating the market risk premium and proposed that a more forward looking approach such as the dividend growth model should be considered.[13] However, consumer groups submitted that our

[12] AER, *Rate of return instrument explanatory statement*, December 2018, pp. 220-275.

[13] ENA, *Best practice framework for setting the allowed return on equity,* 9 October 2020, pp. 35, 43; APGA, *Submission to the AER, Draft working papers on return on equity models and international approaches to the rate of return*, 9 October 2020, p. 9; NSG, *Response to the 2022 Rate of return instrument working paper on return on equity*, 9 October 2020, pp. 3–5; QTC, *Pathway to the 2022 rate of return instrument*, 12 October 2020, pp. 2–9; APA, *APA submission on CAPM and alternative return on equity models*, 12 October 2020, p. 4.

current approach to MRP estimation remained appropriate.[14] Similarly, the retailer reference group suggested that we consider surveys and historical excess returns.[15]

We have engaged a number of consultants for expert advice on this issue. These consultants were:

- The Brattle Group as part of *International regulatory approaches to rate of ret*urn working paper.
- Partington and Satchell as part of the *CAPM and alternative return on equity models* working paper.
- CEPA as part of this working paper.

In particular, they offered contrasting views on the role of the DGM in the estimation of the MRP.

The Brattle report recommended the use of the DGM to estimate a 'forward-looking' market risk premium as this was done by some international regulators.

Similarly, CEPA report considered the DGM provides a good indication of the changes in the forward-looking returns expected by investors at the time.[16] However, CEPA did not consider that the cost of equity estimates that they have constructed using the DGM would provide reliable estimates suitable for use in a determination.[17]

In contrast, the Partington and Satchell report did not recommend any use of the DGM, primarily because of implementation problems.[18] Their assessment of the DGM being unreliable would also apply to the Bank of England's use of the model.

We revisit the role of the dividend growth model in the MRP estimation as part of this chapter. We also explore whether conditioning variables might be used to set the MRP in our 2022 rate of return instrument.

4.3 The 2018 Rate of Return Instrument

In the 2018 rate of return instrument, we used the SL-CAPM as a foundation model to set our return on equity allowance.[19] As such, we were required to estimate an expected MRP which is not directly observable. [20]

We considered a number of different evidence sources and methods in our MRP estimation because there is no one perfect method or evidence source to estimate the expected MRP. In determining the role each different evidence/methods may play, we exercised our regulatory judgement. There are two potential roles the evidence

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[14] CRG, *Submission to AER, Return on equity*, 9 October 2020, p. 39–45; EUAA, *Submission, CAPM and alternative return on equity models*, 9 October 2020, p. 2.

[15] AEC, *Presentation, AER Retailer reference group, International approaches and equity models*, 16 September 2020, p. 3.

[16] CEPA, *Relationship between RFR and MRP*, 16 June 2021, p. 36.

[17] CEPA, *Relationship between RFR and MRP*, 16 June 2021, p. 6.

[18] Partington and Satchell, *Report to the AER: Alternative Asset Pricing Models*, 30 June 2020, p. 23.

[19] AER, *Draft Rate of Return Guideline — explanatory statement*, July 2018, p. 199.

[20] AER, *Draft Rate of Return Guideline — explanatory statement*, July 2018, p. 199.

sources and methods may play based on their strengths, weaknesses and suitability for our regulatory task:

- Primary role: Used to estimate a range of MRP estimates.
- Secondary role: Used to help us inform a MRP point estimate from within the MRP range estimates.

In the 2018 Instrument, the historical excess return method played a primary role in our MRP estimation. Our annual historical excess returns can be algebraically expressed as:

> *Annual historical excess returns = Return on market – 10 year CGS (December average)*

These annual excess returns on the market are then averaged over varying time periods to give a range of MRP estimates.

We gave this method greater weight because historical excess returns are directly observable, easily replicable and transparent.[21] Historical excess return data is also widely used in both regulation and by market practitioners to inform their estimates of the market risk premium within a forward-looking rate of return.[22] Furthermore, we expected required risk premiums to change relatively slowly through time.[23]

The expected MRP in the SL-CAPM is expressed as an annualised return. There are two averaging methods which can be used to derive an annualised return — arithmetic and geometric average. In the 2018 Instrument, both the arithmetic and geometric historical excess return averages played a role in our MRP estimation.[24]

We considered using both averaging methods together is more likely to lead to an unbiased estimate of the MRP than exclusive use of either method. This is consistent with the:

- Expert advice we received from Partington and Satchell. [25]
- Previous consideration in the Australian Competition Tribunal which concluded it was appropriate to rely on both sets of estimates.[26]

Survey evidence played a secondary role in our MRP estimation.[27] We considered survey evidence because it informed us about investors' and market practitioners' expectations and/or what they apply in practice.[28] However, we recognised that surveys have limitations and are not at a level of reliability as to give it weight as a direct estimation method of the MRP.[29] These surveys take on different forms and can

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21 AER, *Draft Rate of Return Guideline — explanatory statement*, July 2018, p. 209.
22 AER, *Draft Rate of Return Guideline — explanatory statement*, July 2018, p. 209.
23 AER, *Rate of return instrument — explanatory statement*, December 2018, p. 221.
24 AER, *Draft Rate of Return Guideline — explanatory statement*, July 2018, p. 212.
25 AER, *Rate of return instrument — explanatory statement*, December 2018, p. 253.
26 Australian Competition Tribunal, *Application by Envestra Ltd (No 2) [2012] ACompT4*, 11 January 2012, paragraph 157
27 AER, *Rate of return instrument — explanatory statement*, December 2018, p. 236.
28 AER, *Draft Rate of Return Guideline — explanatory statement*, July 2018, p. 223.
29 AER, *Draft Rate of Return Guideline — explanatory statement*, July 2018, p. 224.

vary in different ways, including questions asked, type of participants and number of participants. [30]

Conditioning variables also played a secondary role in our MRP estimation. [31] We considered conditioning variables because they provided an indication of changes in market conditions.[32] However, we were cautious on how we use this evidence because conditioning variables do not provide reliable estimates on their own.[33]

Compared to the 2013 Guideline, we gave less weight to dividend growth models in 2018 because we had diminished confidence in the estimates from dividend growth models.[34] We received considerable expert advice between 2014 and 2018 that expressed significant concerns with MRP estimates from DGMs as to their reliability and accuracy.[35] Overall, we were not persuaded to rely upon other DGM evidence that was submitted to us during the review process to move the point estimate derived from HER.[36]

Our draft 2018 Instrument set an MRP of 6.0 per cent. This was lower than the MRP of 6.5 per cent estimated during the 2013 Guidelines process. One of the reasons for this was the lower weight we placed on estimates from dividend growth models.[37] In our 2018 Instrument, the MRP was revised to 6.1 per cent per year due to a change in theta — a component of imputation credits. Furthermore, we considered that our MRP estimate of 6.1 per cent was not inconsistent with other regulators' decisions.[38]

Among the stakeholders, there were two contrasting views on the estimation of the MRP. On one hand, the service providers and the Network Shareholder Group (NSG) stated that more weight should be given to estimates from DGMs and to the Wright Approach. They also submitted less or no weight should be given to geometric averages of historical excess returns. In contrast, consumer groups submitted that in estimating the MRP more weight should be given to geometric averages of historical excess returns, and no weight should be given to estimates from DGMs, and the Wright Approach.

4.4 Development since 2018

Since the 2018 Instrument, we first reviewed our approach to our MRP estimation in the *CAPM and alternative return on equity models* working paper.

In that working paper, we proposed to continue to use historical excess returns data to inform our market risk premium, and intended to further consider measures to use

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30 AER, *Rate of return instrument — explanatory statement*, December 2018, p. 236.

31 AER, *Rate of return instrument — explanatory statement*, December 2018, p. 91.

32 AER, *Rate of return instrument — explanatory statement*, December 2018, p. 91.

33 AER, *Rate of return instrument — explanatory statement*, December 2018, p. 239.

34 AER, *Draft Rate of Return Guideline — explanatory statement*, July 2018, p. 200 & p. 216.

35 Partington and Satchell, *Report to the AER: Allowed rate of return 2018 Guideline review*, 21 May 2018, p.33; Partington and Satchell, *Report to the AER: Cost of Equity Issues 2016 Electricity and Gas Determinations* , April 2016, pp.27-33; McKenzie & Partington, *Report to the AER: Part A, Return on Equity, October 2014*, pp.26-41.

36 AER, *Draft Rate of Return Guideline — explanatory statement*, July 2018, p.203

37 AER, *Rate of return instrument — explanatory statement*, December 2018, p. 83.

38 AER, *Rate of return instrument — explanatory statement*, December 2018, p. 223.

alongside this method. We also considered that we set a forward looking MRP because we:

- Had regard to several other forward-looking methods to estimate the market risk premium, including surveys of market participants' expectations.
- Included in our consideration market data on dividend yields, volatility and credit spreads, which were 'conditioning variables' used to provide directional information around changing market conditions and the forward-looking market risk premium.

As part of this draft working paper, we engaged CEPA for expert advice on the relationship between the risk free rate and the MRP. We discuss some of CEPA's findings in Chapter 5.

4.5 Proposed approach for the 2022 Instrument

We continue to maintain the views expressed in the *CAPM and alternative return on equity models* working paper (see Section 4.4)

Currently, we are open to proposals on how the dividend growth model might be used to inform us of the relationship between the MRP and risk free rate. However, we are aware of, and are concerned about a number of limitations with the dividend growth model.

We also consider the impact on the MRP estimate if we change the term of equity from 10 years to a term that matches the regulatory period (typically five years).

In the rest of this section we detail preliminary thinking on:

- The use of historical excess returns for estimating MRP.
- How a change in term in return on equity from 10 years to match the regulatory period may influence our estimate for MRP.
- How to use geometric and arithmetic averages in MRP estimation.
- How and whether to use dividend growth models in MRP estimation.
- The use of surveys in MRP estimation.
- The use of conditioning variables in MRP estimation.

This section does not discuss the use of the Wright approach or how MRP estimates might vary with the risk free rate. These are discussed in Chapter 5.

4.5.1 Historical excess returns

We propose to maintain our previous position on using historical excess returns to inform our estimate of the MRP. That is, the historical excess returns will continue to play a primary role in our MRP estimation.

We consider the historical excess returns method to have a number of desirable characteristics for estimating the MRP in a regulatory setting. The method is observable, easily replicable, and transparent.

Using historical excess returns does not mean our MRP estimate is backward-looking. Historical excess return data is commonly used in both regulation, and by market practitioners to inform their estimates of the market risk premium within a forward-looking rate of return. This is a view shared by consumer groups.[39]

Below is a table taken from our 2020 annual update showing the annual historical excess returns (calculated using our formula outlined in section 4.3) over time. The table shows that the estimates of the historical excess returns are relatively stable over time.

Table 2 : Historical Excess Returns Estimates

Sampling Period	Arithmetic average	Geometric average
1883-2019	6.3	4.9
1937-2019	6.0	4.2
1958-2019	6.5	4.2
1980-2019	6.4	4.3
1988-2019	6.0	4.5

Notes: Calculated using an assumed imputation utilisation value (or theta value) of 0.65.

Source: Handley, *An estimate of the historical equity risk premium for the period 1883 to 2011*, April 2012, p. 6; AER update for 2012–2020 market data.

In a recent Discussion Paper by Thomas Mathews (and reported in the RBA's June 2019 Bulletin), evidence was presented to show that historical returns on Australian equity — and therefore the historical excess returns— were lower than previously estimated by Lamberton. We currently use a downwardly *adjusted* Lamberton approach to estimated returns before 1980, which are used to estimate the historical excess returns.

The *unadjusted* Lamberton approach tends to overstate the actual dividends shareholders would have received because it used a simple average, and excluded firms not paying dividends.[40] The RBA's new series used in the discussion paper for estimated returns before 1980, could be argued to be more consistent with the post 1980s historical returns data series that we use. Unlike the Lamberton approach, this approach weighted dividends by market capitalisation, and included firms not paying dividends.[41] We invite stakeholders to consider the new series and its appropriateness for updating the HER data used by us in estimating the MRP.

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39 AER, *CAPM and alternative return on equity models working paper*, 16 December 2020, pp.18-19

40 RBA, *Bulletin,* June *2019*, p. 171.

41 RBA, *Bulletin,* June 2019, p. 171.

4.5.2 What will happen to the MRP estimate if we change the term of equity?

In the *Term of the rate of return* working paper, we detailed how we are considering changing the term of the return on equity from 10 years to a term that matches the regulatory period. To do so, our current view is that this would require the use of a 5 year forward estimate of the MRP (to match the average length of the regulatory period of the regulated firms).

As a result, it could be argued that we should use a 5 year risk free rate rather than a 10 year risk free rate to calculate the historical excess returns (see equation in section 4.3). This could result in a different MRP estimate as the 5 year risk free rate is likely to be different to the 10 year risk free rate. The size of the difference between the 5 year and 10 year MRP depends on the relative size of:

- The term structure for return on equity: How investors' expectations of equity returns change over the forecast horizon.
- The term structure of the risk free rate: How investors' expectations of CGS returns change over the forecast horizon.

Below are some scenarios of the potential impact on the MRP estimate provided all else remains constant:

- The return on equity term structure is flat and the risk free rate term structure is increasing: This means investors' expectations of future equity returns do not change over the forecast horizon, while they expect a higher return for CGS with a longer term to maturity. In this scenario, the MRP is likely to be higher under a 5 year estimate than a 10 year estimate.
- Both term structures are identical: In this scenario, the MRPs for both 5 years and 10 years are identical.

It is worth noting that the difference between a 5 year and 10 year estimate of MRP is likely to vary depending on the evidence used to inform the estimate the MRP.

As an example, we have placed below an estimate of the effect on the historical excess returns method based on current market data (the method discussed above).

Example for historical excess returns

Annual historical excess returns are calculated by deducting the return on the market by the estimate of the risk free rate. If we were to change to using a 5 year risk free rate rather than a 10 year risk free rate for the historical excess return calculation, this would result in a higher estimate of MRP at present (see Table 3 below). This is because the term structure of CGS is on average upward sloping in the periods and a flat term structure for return on equity is effectively employed (see the equation in 4.3).

Table 3 HER – Example differences between 5 and 10 year estimates

Time period	MRP (Geometric) 10 year	MRP (Arithmetic) 10 year	MRP (Geometric) 5 year	MRP (Arithmetic) 5 year	Difference (Geometric 5 year – 10 year)	Difference (Arithmetic 5 year – 10 year)
1972-2020	4.1%	6.5%	4.3%	6.7%	0.2%	0.2%
1980-2020	4.5%	6.6%	4.8%	6.9%	0.3%	0.3%
1988-2020	4.8%	6.3%	5.1%	6.6%	0.3%	0.3%

Sources: RBA, ATO, S&P Dow Jones

4.5.3 Arithmetic vs Geometric Averages

Since the 2018 rate of return instrument review, we have not received submissions on the averaging method used to estimate MRP (using either an arithmetic or geometric average). Therefore, we maintain our position expressed in the 2018 review. That is, we will continue to use the arithmetic and geometric annual averages in estimating the MRP.

We remain of the view that geometric averages have value, and should be considered because:[42]

- There remains uncertainty over whether an arithmetic or geometric average (or some combination of the two) provides a better estimate of the expected excess returns due to the variability of returns from year to year.
- There are studies and academic examples showing there are periods the geometric average is the best estimator. Others show that the arithmetic could be superior.
- Over periods of changing volatility the arithmetic average can be upwardly biased whereas the geometric average is not impacted as much by volatility changes over time in a long series.

4.5.4 Dividend Growth Models

We are interested in stakeholders' proposals on whether and how our estimate of the MRP could be improved by employing dividend growth models. We have not formed a view on this topic and would like to hear specific proposals on whether the dividend growth model can be made suitable for our MRP estimation.

[42] Example, AER, *Attachment 3 – Rate of return – SA Power Networks determination* 2015–20, pp. 371-375.

Dividend Growth Models can use analyst forecasts of current dividends combined with estimates of dividend growth and the current price to estimate an implied MRP. A basic constant growth dividend growth model is algebraically expressed as follows:

$$P = \frac{D_1}{(r - g)}$$

Where:

- *P* is the share price
- D_1 is the expected dividend in the next period
- *r* in this case is the cost of equity if we are using the market portfolio
- *g* is expected dividend growth rate.

The DGM can be expressed in many forms, but all require a number of subjective assumptions to be made. We have considered previously that the use of the DGM in our MRP estimation process is inherently tied to the reliability of the inputs it requires.[43]

In the *International regulatory approaches to rate of return* working paper, we have received expert advice from the Brattle Group that the dividend growth model could be used to estimate a more forward looking MRP.[44] Brattle's report also identified other regulators that used the dividend growth models to estimate the MRP.[45]

Most network service providers agreed with Brattle's recommendation that the dividend growth model evidence was relevant and could usefully inform an estimate of the forward-looking market risk premium. The ENA submitted that there are different ways of specifying, and implementing the dividend growth model, and consideration could be given to:[46]

- Using a range of well-accepted approaches to the dividend growth such that no one specification has a determinative impact.[47]
- Using specifications of the dividend growth model that produce estimates of the market risk premium that equate to the excess returns estimate on average.
- At a minimum, having regard to evidence about whether the prevailing market risk premium is above or below its long-run average.

We acknowledge that the Dividend Growth Models can be used to inform the MRP, but we are aware of, and are concerned about the limitations of using this model. In the 2018 rate of return review, we have identified precision, accuracy and bias issues that detract from its potential use in a regulatory setting.[48]

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43 AER, *Rate of return instrument — explanatory statement*, December 2018, p. 254.

44 Brattle, *A review of international approaches to regulated rates of return,* June 2020, pp. 58–59.

45 Brattle, *A review of international approaches to regulated rates of return,* June 2020, p. 44.

46 ENA, *Best practice framework for setting the allowed return on equity,* 9 October 2020, p. 43.

47 ENA noted that IPART adopts such an approach.

48 AER, *Rate of return instrument — explanatory statement*, December 2018, pp. 263-267.

A significant issue surrounding DGMs is that they are highly sensitive to input assumptions regarding short and long-term dividend growth rates. There are a wide range of potential dividend growth rates deemed appropriate for use in the DGM, which provide an equally wide range of results.

We have also previously noted that the DGMs could be upwardly biased because of:[49]

- Upward bias in analyst forecasts
- Slow changing or 'sticky' dividends
- The current low risk free rate.[50]

4.5.5 Survey Evidence

Our preliminary position is to continue to place the same weighting on survey evidence as we did in the 2018 rate of return review. We disagree with ENA and APGA's view that no weight be given to survey evidence.[51]

We note survey evidence comes from market practitioners who are asked what they expect the MRP to be in the Australian market. When considering survey results we do not give weight to any single survey over others as surveys take on different forms and can vary in different ways, including the questions asked, type of participants and number of participants.

Furthermore, while surveys have limitations and are not at a level of reliability to be used in the direct estimation of the MRP, it can be used to inform us of investor expectations. This view is supported by CEPA, and Partington and Satchell in their recent expert advice to us.[52]

Overall, stakeholders have not presented the evidence to persuade us not use surveys to inform our MRP estimate.

4.5.6 Conditioning Variables

In a recent speech by Brad Jones from the RBA, he explored how uncertainty and risk aversion may have impacted key parts of the global economy, and financial markets post GFC. Jones defined uncertainty as how people perceive the likelihood of bad outcomes, and risk aversion as to how people act in the face of uncertainty.[53] Uncertainty and risk aversion are important because it may affect the risk premium, investors demand for investing in risky assets.

In this working paper series and 2022 rate of return Instrument process, we propose to further explore whether we can capture changing market conditions (change in the

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49 AER, *Rate of return instrument — explanatory statement*, December 2018, pp. 263-265.

50 Lally, *The Dividend Growth Model*, 4 March 2013, pp.5-9.

51 ENA, *Best practice framework for setting the allowed return on equity,* 9 October 2020, p. 44; APGA, *Submission to the AER, Draft working papers on return on equity models and international approaches to the rate of return*, 9 October 2020, p. 9.

52 CEPA, *Relationship between RFR and MRP*, 16 June 2021, p.15; Partington and Satchell, Report to the AER: Alternative Asset Pricing Models, p.23.

53 RBA, *Uncertainty and risk aversion — Before and after the pandemic*, 2 June 2021, p.1

level of uncertainty and risk aversion) using conditioning variables. Previously, we have defined conditioning variables as market data and indicators that provide information on the potential risk in the market.[54]

In the 2018 rate of return Instrument review, we used conditioning variables to assess the directional change of the MRP as they provide an indication of changes in market conditions.[55] We did not directly use the conditioning variables in estimating the MRP as they do not provide a reliable estimate on their own.

We currently only use conditioning variables to inform our MRP point estimate during the rate of return instrument reviews. However, if we could formulate a reliable and robust approach to use conditioning variables in estimating our MRP, then it may be possible to update our MRP estimate for each regulatory reset. This could be desirable because our MRP estimates would be more responsive to market conditions.

We considered doing this during previous reviews, but encountered a number of implementation problems. The expert advice we received from Gibbard was that:[56]

- It would be difficult to select and implement a model that could use conditioning variables to directly estimate the MRP. There are a number of different, and complex models that could be used.
- Even if we could specify the parameters in the model, the relationship between the historical excess returns and conditioning variables changes over time.
- Any significant relationships between the conditioning variable and the historical excess returns could be a result of data-mining.

While we were aware of the limitations and cautious in using this evidence, we considered that conditioning variables provided useful evidence of investors' perceptions of risks when applying our regulatory judgement at the Instrument review stage. We were also careful to use these conditioning variables symmetrically through time in order to avoid the introduction of bias.

For the 2022 Instrument process we want to further engage stakeholders on the following matters:

- Should we continue to use conditioning variables to inform our MRP estimate?
- If so, what other conditioning variables should we consider, and how can we use them to inform our MRP estimate?
- Should the conditioning variables be only used when selecting a point estimate when finalising the 2022 Instrument or should they also be included in a method set out in the 2022 Instrument (MRP changes with each Determination/Reset)?

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54 AER, *Rate of return instrument — explanatory statement*, December 2018, p. 238.

55 AER, *Draft Rate of Return Guideline — explanatory statement*, July 2018, p. 227.

56 Peter Gibbard, ACCC/AER Working Paper Series, *Working Paper no.9 — Conditional versus unconditional estimates*, 9 September 2013, p. 7.

5 Relationship between risk free rate and the market risk premium

5.1 Overview

Under our current regulatory framework, we use the Sharpe-Lintner CAPM to determine the return on equity. As part of this, we estimate a market risk premium that compensates an investor for the systematic risk of investing in the Australian market portfolio.

Our current approach sets a constant market risk premium for the duration of the 2018 rate of return Instrument. That is, the allowed return on equity changes when the expected return for the risk free rate changes. Some other international regulators use the Wright approach, which in effect assumes that the total market return is stable and that the MRP is expected to move inversely with the risk free rate.

5.2 What is the issue under discussion?

As part of making the 2022 rate of return Instrument we are considering the relationship between the risk free rate (either nominal or real) and the market risk premium. Under our current approach, our return on equity has tracked lower as interest rates have declined. We want to consider whether this approach remains appropriate or whether there is new evidence which would point to a different approach.

The types of issues we want to explore include:

- Whether any relationship might exist in real or nominal terms;
- The validity, stability, or direction, of any relationship; and
- The regulatory suitability or practicality of implementing a relationship in the 2022 rate of return Instrument.

Such a discussion has been encouraged by a number of our network stakeholders in submissions to our working paper series.[57] Some stakeholders submitted that the one-for-one relationship between the risk-free rate and return on equity is questionable. The network businesses stated that we should investigate a suitable methodology to estimate the relationship between the risk free rate and market risk premium in the context of a long-term asset-based regulated business.

5.3 The 2018 Rate of Return Instrument

We previously considered if a relationship between the market risk premium and the risk free rate should be recognised when we made the first rate of return Instrument in

[57] AER, *CAPM and alternative return on equity models*, 16 December 2020.

2018. This was not the first time we considered such a relationship, as we had submissions on this during regulatory processes prior to the 2018 Instrument.[58]

At the time of making the 2018 Instrument we decided our best reading of the evidence supported our current approach.[59] However, we did note that the information available to inform our return on equity decision was imprecise, incomplete and, to some extent, conflicting.[60]

As part of the process we received a diverse range of views through submissions from stakeholders. APA put forward a specification of the CAPM, which was a version of the Wright CAPM, as the correct way to estimate the MRP.[61] Other network stakeholders or their consultants suggested that there was a negative correlation between the risk free rate and the MRP.[62] Others suggested that zero weight should be placed on the Wright approach.[63]

To complement the submission process, we received advice from consultants Graham Partington and Stephen Satchell on return on equity. Their advice suggested that there was no evidence to support the application of the Wright approach in an Australian context.[64]

- We also considered evidence from a number of academic reports on the potential for a relationship between the variables. Some of which suggested there can be a positive relationship between the risk free rate and the MRP.[65] We also considered academic work that expanded upon the general theory of the equity risk premium, in particular whether correlations between MRP and the risk free rate are also causal. The work stated that the risk free rate and the MRP are both jointly determined, rather than there being a necessary causal link between them.[66]
- Evidence from financial practice was also considered. Our review of broker reports and valuation reports did not indicate the use of the Wright CAPM in practice.[67]

5.4 Work done since 2018

Since the 2018 Instrument, stakeholder engagement and work on the risk free rate and the relationship with the MRP has continued and forms part of our decision making for

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58 See for example, Alan Gregory, *The AER Approach to Establishing the Cost of Equity - Analysis of the Method Used to Establish the Risk Free Rate and the Market Risk Premium*, 2012, available here; and Stephen Wright, *Review of the Risk Free Rate and Cost of Equity Estimates: A Comparison of UK Approaches with the AER*, 2012 available here.

59 AER, *Rate of return instrument Explanatory statement*, December 2018, p. 232.

60 AER, *Rate of Return Instrument, Explanatory Statement*, December 2018, pp. 74-75.

61 APA, *APA submission responding to AER issues paper*, 12 December 2017, pp.7-9, 11-12.

62 HustonKemp, *The Cost of Equity, Response to the AER's Draft Decisions for the Victorian Electricity Distributors,* January 2016. Frontier, *The Relationship between government bond yields and the market risk premium*, January 2016, p.12.

63 CRG, *Response to ROR draft decision*, 25 September 2018, p. 26;

64 Partington and Satchell, *Report to the AER: Discussion of Estimates of the Return on Equity*, April 2017, p. 28.

65 AER, *Discussion paper Market Risk Premium, risk free rate averaging period and automatic application of the rate of return*, March 2018.

66 Abel A., *Equity Premia with Benchmark Levels of Consumption: Closed-Form Results*, 2006.

67 AER, *Rate of return instrument Explanatory Statement*, December 2018, p. 86.

the 2022 rate of return Instrument. In this section we provide a summary of work completed in two of our working papers and in two consultant reports.

5.4.1 CAPM and alternative return on equity models working paper

As part of our CAPM and alternative return on equity models working paper (released in 2020) we received a number of submissions on the potential for a relationship between the risk free rate and market risk premium. Stakeholders' views differed.

Consumer groups

The CRG considered the assumption of a one-for-one inverse relationship between the risk free rate and market risk premium was not supported in any consistent way by the empirical data and would lead to market risk premium results that did not make sense from either a practical or theoretical perspective.[68] The CRG also stated that the AER's historical excess returns analysis proved to be stable over many sampling periods, suggesting the claimed inverse relationship of the market risk premium with the risk-free rate does not exist in practice.

Other consumer groups did not support the use of the Wright approach. The EUAA agreed with the AER's view on the limitations of the Wright approach and therefore did not support its use.[69]

Network representatives

The ENA did not consider that there was a perfect negative correlation between the market risk premium and the risk-free rate, however, the Wright approach provided relevant information that should be used to inform the market risk premium at a point in time.[70] ENA considered that it would be unbalanced to eliminate the Wright approach on the basis of the implausibility of its assumption about the relationship between the market risk premium and risk-free rate, while not subjecting the historical excess returns approach to the same test. This is particularly so in light of the acceptance of the Wright approach in other regulatory jurisdictions.

The ENA submission was endorsed by Ausgrid, Endeavour Energy, Energy Queensland, SAPN and TransGrid.[71]

The APGA also considered the Wright approach provided useful information about how the Sharpe-Lintner CAPM should be applied. Whilst the APGA agreed that it was unlikely that there was a negative and perfect correlation between the risk free rate and market risk premium, it did provide insight as to why it was inappropriate to assume

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68 CRG, *Submission to AER, Return on equity*, 9 October 2020.

69 EUAA, *Submission, CAPM and alternative return on equity models*, 9 October 2020, p. 2

70 ENA, *Best practice framework for setting the allowed return on equity*, 9 October 2020.

71 Ausgrid, *Submission, International regulatory approaches to rate of return and CAPM*, 9 October 2020, p. 1; Endeavour Energy, *Draft working papers, Return on equity*, 9 October 2020, p. 1; Energy Queensland, *Pathway to rate of return 2022 instrument, Return on equity*, 9 October 2020, p. 1; SA Power Networks, *Submission on AER draft working paper, Rate of return CAPM and alternative return on equity models*, 7 October 2020, p. 1; TransGrid, *AER's pathway to 2022 rate of return instrument, Draft return on equity working papers*, 12 October 2020, p. 1.

that the difference between the expected return on the market and the risk-free rate was fixed.[72]

Other groups

Investor groups such as the NSG and QTC provided support for the use of the Wright approach, along with other approaches, as it provided relevant information that should be used to inform the market risk premium at a point in time.[73]

The Retailer Reference group on the other hand stated that, based on Partington and Satchell's consultant report, the Wright approach needed no further consideration.[74]

5.4.2 Partington and Satchell's 2020 report for the AER

We engaged Partington and Satchell to provide expert advice on return on equity models specifically as part of the Sharpe-Lintner CAPM and alternative return on equity models working paper.[75] These experts have advised the AER in previous rate of return determinations and in the development of both the 2013 Guidelines and 2018 Instrument.

The Partington and Satchell report commented on the Wright approach, a model that assumes a stable total market return and perfect negative correlation between the risk free rate and the market risk premium. Partington and Satchell stated that they found this implausible—for example, where the risk free rate was above the historical average return (as has been the case) it would lead to a negative market risk premium.[76]

5.4.3 Rate of return and cashflows in a low interest rate environment draft working paper

As part of the draft working paper released in May 2021, we detailed that we wanted to consider the relationship between Commonwealth Government Securities and the expected return on equity as part of the 2022 Instrument process.

We noted that there continue to be differing views on return on equity and whether it moves with interest rates (and that these can be considered in real and nominal terms). At the current time when interest rates have declined significantly, we considered it important to review the available material on this relationship again.

The draft working paper provided some initial considerations of the potential for a relationship between the risk free rate and MRP, including descriptions of findings from select academic literature. These have been placed in Appendix B for stakeholders' convenience.

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72 APGA, *Submission to the AER, Draft working papers on return on equity models and international approaches to the rate of return*, 9 October 2020, p. 10–13

73 NSG, *Response to the 2022 Rate of return instrument working paper on return on equity*, 9 October 2020. QTC, *Pathway to the 2022 rate of return instrument*, 12 October 2020.

74 AEC, *Presentation, AER Retailer reference group, International approaches and equity models*, 16 September 2020, p. 3.

75 Partington and Satchell, *Report to the AER: Alternative Asset Pricing Models*, June 2020.

76 Partington and Satchell, *Report to the AER: Alternative Asset Pricing Models*, June 2020, p. 23.

As at releasing that draft working paper, we remained at a preliminary stage in our assessment of whether return on equity moves with interest rates as part of the 2022 rate of return Instrument process. However, we laid a foundation for further consideration. We requested stakeholders to provide their submission relating to the issue whether return on equity moves with interest rates in response to this Equity omnibus draft working paper.

Shortly before publishing this equity draft working paper, we received submissions by stakeholders on our *Rate of return and cashflows in a low interest rate environment* draft working paper. We will consider the parts of the submissions that relate to the risk free rate and market risk premium as part of the final equity paper.

5.4.4 CEPA's 2021 report for the AER

In CEPA's report evidence on the relationship behind the MRP and risk free rate was examined. This included approaches used by financial practitioners, approaches used by other regulators, and some preliminary econometric analysis. We provide a preliminary consideration of some of the evidence sources considered in the CEPA report later in this sub-section.

After considering these, CEPA stated:

> Our assessment is that (i) there is acceptance that MRP is not stable and (ii) it is possible that there is an inverse relationship between the forward looking MRP and the RfR, and (iii) there is no good evidence that the MRP should be assumed to be independent of the RfR, the current implicit assumption of the AER's approach, and (iv) there is no conclusive theoretical basis for an assumption of independence or dependence.
>
> In judging evidence on MRP using historic data, the AER can choose whether to use:
>
> - An assumption that the MRP is fixed (current approach)
> - An assumption that the TRMR is stable ("Wright approach")
> - An approach that has regard to both measures. This could be for example a weighted average of the two measures that assumes that the MRP is related to the RfR, but the relationship is not one to one.[77]

CEPA also suggested that the consideration of these options, and the evidence gathering that would be necessary to decide between them, is undertaken as part of the 2022 RORI process. [78]

Financial practice

Financial practitioners appeared to use a relatively more stable MRP estimate rather than a stable total return estimate in surveys and independent expert reports:

> Although there are limitations to survey data. The Fernandez, KPMG, and Institute of Actuaries surveys suggest that the MRP reported by academics and

[77] CEPA, *Relationship between RFR and MRP*, 11 June 2021, pp. 6-7.

[78] CEPA, *Relationship between RFR and MRP*, 11 June 2021, p 7.

> practitioners stays relativity constant at least over the time period examined. This suggests the assumed relationship is that total market return would decreases as risk-free rates decrease.[79]

This, however, was not the case across all survey measures. CEPA examined a survey by Horizon in the US and found:

> The Horizon Survey suggests that although there has been a slight drop in investor expectations over recent years, relative to changes in the RfR, expected equity returns in the USA have remained stable.[80]

CEPA note that there are limitations to these surveys and estimates, and they do not regard the evidence as conclusive.[81]

Regulatory practice

CEPA states that the international regulators that they examined do not rely on an estimate of the MRP that is wholly or even substantially based on the historic average of the realised MRP.[82]

We note that the relationship between the risk free rate and the MRP is provided different weight by each of these regulators. The New Zealand Commerce Commission provides a mixed approach, giving weight to multiple methods with differing assumed relationships. On the other hand, OFGEM applies more substantial weight to the Wright approach.

CEPA states in its report that the fact that each approach has been adopted in some respect by other regulators indicates that they are sufficiently simple to be accepted by stakeholders.[83] We also note that our stakeholders generally value certainty and predictability and expect a high threshold to be met before change.

Preliminary econometric analysis

As part of CEPA's report, it considers the potential for a relationship between the MRP and the risk free rate using some preliminary empirical evidence.[84] To do so CEPA constructed time series of two different measures of the MRP. One uses the implied premium from a simple DGM. The other uses a measure of earnings yield.

As part of this finding, CEPA made the following observations:

- Over the entire period of our estimation of the MRP, from 1936, there is a weak, negative relationship between the implied MRP and the RfR.
- In the period since 1993, we consider there is a strong and convincing negative relationship between the implied MRP and the RfR.

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79 CEPA, *Relationship between RFR and MRP*, 11 June 2021, p 17.
80 CEPA, *Relationship between RFR and MRP*, 11 June 2021, p 17.
81 CEPA, *Relationship between RFR and MRP*, 11 June 2021, p. 5.
82 CEPA, *Relationship between RFR and MRP*, 11 June 2021, p. 5.
83 CEPA, *Relationship between RFR and MRP*, 11 June 2021, p. 44.
84 CEPA, *Relationship between RFR and MRP*, 11 June 2021, p. 6.

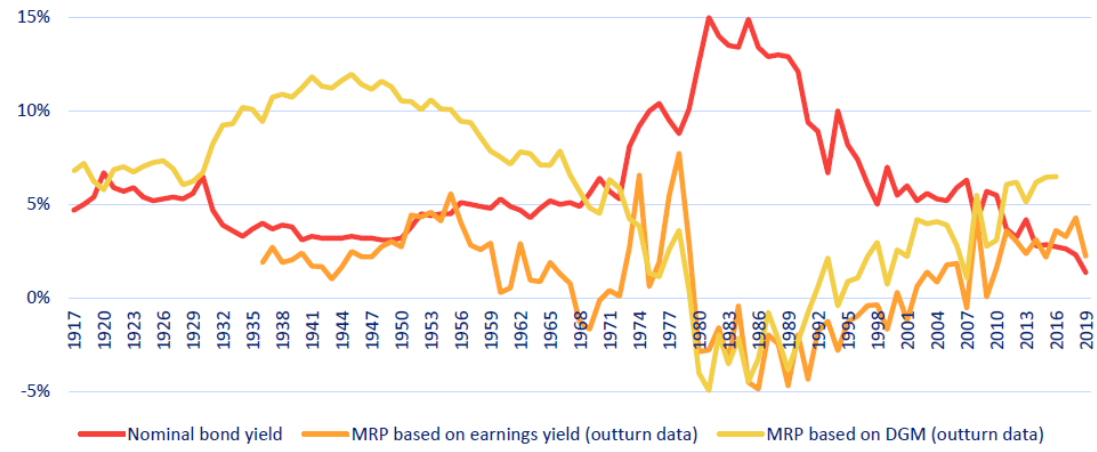
- The relationship that we find for Australia is consistent with the data from the US published by Damodaran.[85]

At this stage, we interpret the findings of the simple econometric analysis with caution. As part of the regressions, CEPA first developed estimates of the MRP. It then tested whether there is a relationship between the bond rate and the estimates of MRP.

It is worth noting that an estimate of the MRP could be different from the actual MRP and behave differently. Hence, a regression analysis on the relationship between an estimate of the MRP and the risk-free rate is a test of the assumptions used to construct the MRP as well as the relationship between the risk-free rate and the MRP.

The assumptions used to construct the estimate can be questioned. For example, the dividend growth and earnings yield models require assumptions about the future growth of dividends and earnings. These assumptions may result in the MRP estimate having some unattractive features, for example a negative estimated MRP for both the DGM and earning yield measures in some periods (see Figure 2). In its report, CEPA stated that while the level of the MRP might be inappropriate for direct regulatory use, the change in estimated MRP may provide a useful indicator of direction. This supposes, however, that any error is unchanging through time. At this stage, we remain to be convinced that this is likely.

Figure 2 Nominal bond yield compared to select MRP estimates



Source: CEPA analysis of data sourced from RBA and Thomson Reuters Eikon

We also note that the regression relationship holds in some periods but not in others. At current, it is not clear why this might be so. CEPA points to the possibility for the change in relationship to be due to more disciplined monetary policy from the 1990s, but also it has not yet identified a conclusive theoretical reason for why the direction of the relationship changed in the way it did.[86]

In its report CEPA stated that further empirical work could lead to a more robust assessment of the evidence.[87] We agree with this assessment and welcome

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85 CEPA, *Relationship between RFR and MRP*, 11 June 2021, p. 6.

86 CEPA, *Relationship between RFR and MRP*, 11 June 2021, pp. 43-44.

87 CEPA, *Relationship between RFR and MRP*, 11 June 2021, p. 44.

stakeholder input on how this might be best carried out. We also note that the inputs used in any such analysis should be appropriate and robust. For example, some DGMs have been found to be overly stable, which in effect assume a negative relationship between the MRP and risk free rate. This would therefore tend to identify a negative relationship by default.[88]

5.5 Proposed approach for the 2022 Instrument

We have not landed at a position in this draft working paper and we continue to assess evidence of a potential relationship.

The CEPA report adds additional evidence to this consideration in the form of summaries of academic work, financial practice, regulatory use and some preliminary econometric analysis. We invite stakeholder comments on this evidence.

In this paper, we also provide *previous* exploration on the potential of a relationship between the risk free rate and MRP in Appendix B from the *Rate of return and cashflows in a low interest rate environment* draft working paper for stakeholder consideration.

We remain of the view that any approach we adopt must be capable of being implemented in a manner that is sufficiently robust, transparent and evidence based to be suitable for regulatory purposes.

We also note that, for the purposes of regulatory use, the relationship we are most interested in would have to exist between the parameters in an ex-ante sense for both the parameters. That is, we set an ex-ante return on equity. Therefore, the ex-ante risk free rate would need to have a robust, transparent and evidence based relationship to the ex-ante equity risk premium for it to be implemented.

We welcome stakeholder views on the potential for a relationship and proposals for an appropriate implementation that would be consistent with these aims.

[88] Lally, *Review of the AER's methodology*, March 2013, pp. 8-12.

Box A – Other Regulators' MRP estimates and the relationship between the risk free rate

Other monopoly infrastructure regulators also estimate values of MRP. Methods to estimate MRP can vary between regulators across countries and for different regulators within each country (for example, for different types of infrastructure assets). This box provides a brief overview of the methodologies used by other regulators and the resulting relationship to the risk free rate.

Methodologies for MRP estimation

Since the 2018 rate of return Instrument review, we have commissioned work by Brattle and CEPA to research what other regulators do internationally when estimating MRP for regulating energy networks.

As part of their report, Brattle examined eight regulators in six countries.[89] They found that three of the eight regulators used HER, three used the Wright approach, FERC used DGMs and NZCC used a combination of approaches.

CEPA similarly detail in their report how Ofgem, FERC and NZCC each use different methodologies, including the Wright approach, DGMs and historical excess returns.[90] They note that these three regulators do not primarily rely on the historical excess returns approach. Similar to Brattle, CEPA found that NZCC use a number of different estimation methods to determine the MRP estimate.

MRP estimation choice effect on relationship to risk free rate

The methodology chosen has an impact on the assumed relationship between the MRP and the risk free rate:

- The ***historical excess returns*** approach tends to result in a stable MRP estimate over time.
- The ***Wright approach*** on the other hand assumes a stable real total market return. In this way the MRP and risk free rate are strongly inversely related.
- The implied relationship using ***Dividend growth models*** appears to vary depending on the time period analysed[91] and may vary depending on the specifications used. Dr Lally has commented in his previous work, some DGMs imply a strong inverse relationship between the risk free rate and the MRP by their construction.[92]

As described above, some regulators use a mixture of approaches to set their MRP. As a result, the assumed interrelationship between the MRP and the risk free rate depends on the amount of weight applied to each methodology.

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89 Brattle, *A review of international approaches to regulated rates of return*, June 2020, p. 43–44

90 CEPA, *Relationship between RFR and MRP*, 11 June 2021.

91 Damodaran, *Equity Risk Premiums (ERP): Determinants, Estimation, and Implications – The 2021 Edition*, 23 March 2021, pp. 106-108.

92 Lally, *Review of the AER's proposed dividend growth model*, 16 December 2013.

6 Equity beta

6.1 Overview

Risk is the degree of uncertainty about an event—such as the uncertainty around the expectation of the return on an investment. It is strictly a forward-looking concept, as no event is uncertain after it has occurred. The risk-return trade-off in finance theory provides that a risk averse investor will want a higher expected return when faced with a higher risk.

There are two distinct types of risk—systematic risk (market risk or non-diversifiable risk) and non-systematic risk (firm-specific risk or diversifiable risk).

Investors are generally assumed to be able to diversify away non-systematic risk (firm-specific risk or diversifiable risk), therefore they do not require compensation for this specific risk.[93]

For example, the risk of asset stranding due to technological changes, breakdown in the supply chain, labour strikes, and liquidity issues can be mitigated as investors would be able to diversify away such risks by investing in other industries. Furthermore, if these risks are material, adjustments can be made to the expected cash flows.

In contrast, systematic risk is inherent to the entire market and cannot be mitigated through diversification. It incorporates interest rate changes, real GDP growth, inflation, recession and wars among other major changes. Shifts in these domains can affect the entire market and cannot be mitigated by changing positions within a portfolio of public equities.

Therefore, under the assumption that investors hold fully diversified 'efficient' market portfolios, only an investment's systematic risk is relevant in estimating the expected return on equity.

The equity beta parameter in the Sharpe-Lintner CAPM compensate investors for bearing systematic risk. It measures the 'riskiness' of a firm's returns compared with that of the market. Specifically, the equity beta measures the standardised correlation between the returns on an individual risky asset or firm with that of the overall market.[94]

A firm's sensitivity or exposure to systematic risk will depend on its business activities and its level of financial leverage.[95] For firms we regulate, this reflects the risk in providing Australian regulated energy network services.[96]

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93 G. Pierson, R. Brown, S. Easton and P. Howard, *Business Finance*, 8th Edition, p. 214.

94 R. Brealey, S. Myers, G. Partington and D. Robinson, *Principles of corporate finance*, McGraw–Hill: First Australian edition, 2000, pp. 186–188 (Brealey et al, Principles of corporate finance, 2000).

95 M. McKenzie and G. Partington, *Report to the AER: Estimation of the equity beta (conceptual and econometric issues) for a gas regulatory process in 2012*, 3 April 2012, p. 5 (McKenzie and Partington, *Estimation of equity beta*, April 2012).

96 NER 6.5.2(c), 6A.6.2(c) and NGR 87(3)

6.2 What is the issue under discussion?

In response to our draft working papers in 2020:[97]

- Networks supported shorter time frames for estimating equity beta as older data may not reflect prevailing market conditions and considered that international evidence was relevant and should be used to inform the AER's estimate of beta. [98]
- Investor groups also considered that the AER's method for estimating equity beta did not enable changes in risk to influence equity beta estimates as it relied on long and obsolete data points. They recommended a much shorter time frame to estimate beta to give greater weight to current financial conditions, such as three years.[99]
- However, consumer groups supported the use of longer time frames for the collection of beta data and had significant concerns with the use of international data to support the AER's estimation of equity beta.[100]

Therefore, in response to stakeholder submissions, we propose to open this topic up for discussion.

6.3 The 2018 Rate of Return Instrument

In 2018 our approach to the estimation of equity beta was to select a beta point estimate from a range giving most weight to relevant Australian energy network businesses in our comparator set and placing the greatest weight on estimates from the longest estimation period.

There were nine Australian firms in our comparator set used to estimate the equity beta. We did not include international firms in the comparator set because we could not reliably quantify and adjust for differences with a firm in the supply of Australian regulated energy network services.

Table 4 Firms in the AER's comparator set

Firm (ASX ticker)	Time / trading period	Sectors
AGL Energy Limited (AGK)	January 1990 – October 2006	Electricity, Gas
Alinta (AAN)	October 2000 – August 2007	Gas
APA Group (APA)	June 2000 – present	Gas, Minority interest in other energy infrastructure
DUET Group (DUE)	August 2004 – April/May 2017	Electricity, Gas

97 AER, *CAPM and alternative return on equity models,* December 2020.

98 APA, *APA submission on CAPM and alternative return on equity models*, 12 October 2020, pp. 4–5; ENA, *Best practice framework for setting the allowed return on equity,* 9 October 2020

99 NSG, *Response to the 2022 Rate of return instrument working paper on return on equity*, October 2020, p. 5.

100 CRG, *Submission to AER, Return on equity*, 9 October 2020

Firm (ASX ticker)	Time / trading period	Sectors
Envestra Ltd. (ENV)	August 1997 – October 2014	Gas
GasNet (GAS)	December 2001 – November 2006	Gas
Hastings Diversified Utilities Fund (HDF)	December 2004– November 2012	Gas
Spark Infrastructure Group (SKI)	March 2007 – present	Electricity, Gas
AusNet Services (AST), formerly SP AusNet (SPN)	December 2005 – present	Electricity, Gas

Source: AER analysis

6.4 Development since 2018

There has been no technical work to review or extend the consideration of the methodology adopted to estimate the equity beta since the 2018 Instrument.

6.5 Expert report

To assist with our review of equity beta, we commissioned Economic Insights to provide an expert report:

- *Methodological issues in estimating the equity beta for Australian network energy businesses*[101] .

6.5.1 The Economic Insights report to the AER

The report focusses on three matters in relation to determining a relevant equity beta suitable for inclusion in the standard Sharpe-Lintner CAPM in the economic regulation of network energy businesses in Australia.

The matters addressed are:

- The relevant period for estimating the equity beta and implications of recent developments including: impacts in relation to inflation, the risk free rate and the impact of COVID and similar events that may justify excluding certain periods;
- The proxy firm comparator set including inter alia: characteristics, relevance of overseas firms, sample size, impact of regulation, and weights for comparators; and
- Where relevant comment on anything related to the equity beta the consultant considers important having regard to the overarching objective.

The report provides key considerations including advantages and disadvantages of different methodology choices.

[101] The report is available at https://www.aer.gov.au/publications/guidelines-schemes-models/rate-of-return-instrument-2022

6.5.1.1 Choice of Estimation Period

Assessments for the estimation period

In terms of the estimation period, Economic Insights report stated that:

- Provided there is no strong statistical evidence of beta instability the longest time period would provide the most reliable estimates for beta.
- The exclusion of data is not necessary and would produce less statistically reliable estimates of beta if there is no clear statistical evidence of beta instability. Robust regression methods may be used to diminish the effects of atypical observations that would otherwise have an undue effect on the estimated beta.
- The use of a shorter recent time period will produce less statistically precise estimates of beta, and it is not necessary to exclude earlier data if there is no clear statistical evidence of beta instability. With weekly data there may be sufficient precision with a five-year period. If the average beta is stable over a longer period, then greater precision of the beta estimate can be obtained.
- If there is reasonable evidence of beta instability then more weight should be considered for the recent evidence but longer term estimates are still relevant for the information set given the empirical evidence on beta stability that has been presented to date.
- The reduction in regulatory ex ante returns in recent years is unlikely to have a material impact on systematic risk which is a relative measure of risk.
- The reduction in the risk free rate or the inflation rate embedded in regulatory decisions for the CAPM is unlikely to have a material impact on systematic risk but there may be an impact on the market risk premium. This assessment reflects the high protection to the regulated entities for their cash flows, including regulatory protection against general changes in inflation, which is also captured in the risk free rate in the CAPM and the indexing of the RAB.

6.5.1.2 Choice of comparator set

Assessments for the comparator set

In term of the comparator set, Economic Insights considered the characteristics of good or acceptable comparators in broad terms and assessed five options for consideration. The options are summarised below.

- **Option 1** – retain the existing comparator set.
- **Option 2** – remove four firms in the existing comparator set given the time since their delisting.
- **Option 3** – option 2 plus two toll companies listed in Australia and Chorus, a regulated telecommunications infrastructure provider operating in New Zealand but listed in both Australia and New Zealand.
- **Option 4** – include overseas regulated energy network businesses with adjustments if required.
- **Option 5** – include unlisted firms with betas estimated using accounting information.

6.6 Proposed approach for the 2022 Instrument

Comparator set

Our preliminary view is to retain the use of our current comparator set of nine Australian firms to estimate equity beta. We note that the Economic Insights report presented alternative options that depart from our proposed approach. However, in our view the existing comparator firms used to estimate equity beta, reflect firms that are most comparable to an efficient service provider supplying Australian regulated energy services. We propose to use market data for domestic businesses that are considered to be reasonable comparators of domestic energy network firms.

We also maintain our view that de-listed firms carry useful and (historically) reliable information. They provide information on the systematic risk of firms that are most comparable to the firms we regulate. We are also aware that the systematic risk for firms supplying Australian regulated energy networks services are relatively stable and change slowly.[102] This provides additional support for the relevance and inclusion of de-listed firms in the comparator set.

However, we are open to exploring the option of removing firms that have been de-listed for a significant period of time. We would like to hear stakeholder's views on pursuing this option.

We note the concerns around our current comparator set, however, a small set of comparators does not necessarily justify expanding the comparator set for the sake of increasing the sample size. For instance, international regulators, such as the Water Services Regulation Authority (Ofwat) and the Office of Gas and Electricity Markets (Ofgem) measure raw beta based on two and five domestic listed entities respectively.[103]

In our view, the inclusion of additional firms can bias estimates, if they do not carry a similar degree of risk or cannot be appropriately adjusted to be comparable to an efficient service provider supplying Australian regulated energy services. For instance, the addition of the toll firms listed in Australia and Chorus, as suggested by the Economic Insights reports, would not be consistent with the 'pure play' benchmark defined by the AER.[104]

Further, we are not inclined to include international firms into our comparator set, because we have a different regulatory framework, and it will be problematic to establish equity beta estimates that are sufficiently comparable. While increased statistical reliability is desirable, it would not be preferable if it substantially reduces the relevance of data.

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[102] AER, Transcript of proceedings Australian Energy Regulator Office: *Review of rate of return guidelines concurrent expert evidence session 2*, 5 April 2018, p. 47; Cambridge Economic Policy Associates, *Expert Joint Report*, April 2018, p. 51.

[103] The Brattle Group, *A review of international approaches to regulated rates of return, Prepared for the Australian Energy Regulator*, 30 June 2020, pp. 123, 131.

[104] Note: Australian infrastructure firms are different from an efficient service provider supplying Australian regulated energy services

We note several difficulties with including international firms in our comparator set:[105]

- International firms do not operate within Australia, and differences in regulatory framework, the domestic economy, geography, business cycles and other factors are likely to drive different equity beta estimates for (potentially) similar businesses between countries.[106] It is difficult to quantify the impact of these qualitative factors.
- International firms may not have the same structure as an efficient firm supplying Australian regulated energy network services. For example, a number of US comparator businesses are vertically integrated.[107] They engage in energy generation, wholesale and retail supply of energy, as well as other activities distinct from energy distribution and transmission. Some of the firms even engage in telecommunications, real estate development and manufacturing activities.[108] These activities are very different from an efficient firm in the supply of regulated energy services (operating within Australia).
- We employ equity beta estimates in the context of our foundation model, the Sharpe-Lintner CAPM.[109] This approach provides a strong rationale for estimating the equity beta using Australian data. If we included international energy firms in our comparator set, it may be more appropriate to use an international or global CAPM.[110]
- Equity beta estimates from international comparators are measured with respect to the market portfolio of their home market.[111] That is, the equity beta estimates from international comparators do not measure the firm's systematic risk relative to the Australian domestic market portfolio.[112]

Given these factors, we cannot (reliably) quantify and adjust international estimates to make them comparable to domestic estimates which are the most suitable comparators.

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105 AER, *Draft rate of return guidelines explanatory statement*, July 2018, p. 277; AER, *Better Regulation Explanatory Statement Rate of Return Guideline*, December 2013, p. 85.

106 This is supported by Partington and Satchell. See Partington and Satchell, *Report to the AER: Cost of equity issues 2016 electricity and gas determinations*, April 2016, p. 11. They stated, 'Considerable caution in reaching conclusions about beta needs to be exercised when the comparators are drawn from overseas countries. This is because of differences in industry structure, technology, the nature of competition, the economic environment and regulatory and tax systems'.

107 CEG describes vertically integrated US energy utility firms as 'common among [its] sample'. See: CEG*, Information on equity beta from US companies*, June 2013, p. 20.

108 CEG, *Information on equity beta from US companies*, June 2013, pp. 47–68.

109 We implement the Sharpe-Lintner CAPM under the assumption of a domestic market, but with a presence of foreign investors. This allows us to recognise that foreign investors cannot utilise imputation credits. However, a service provider in the provision of regulated energy services operates in the Australian market by definition, and we estimate the MRP in the context of the Australian market portfolio.

110 See Handley, *Advice on the return on equity*, October 2014, p. 24; Partington and Satchell, *Report to the AER: Cost of equity issues 2016 electricity and gas determinations*, April 2016, p. 16.

111 This is the case unless the equity betas are estimated using an international CAPM framework.

112 This is supported by Handley and Partington and Satchell. See Handley, *Advice on the return on equity*, October 2014, pp. 23–24; Partington and Satchell, *Report to the AER: Cost of equity issues 2016 electricity and gas determinations, April 2016*, p. 16. In his May 2015 report, Handley concluded that he does not consider it necessary to change any of the findings in his earlier (2014) report. See: Handley, *Advice on the rate of return for the 2015 AER energy network determination for Jemena Gas Networks*, 20 May 2015, p. 28.

However, international firms could be used as a cross check for our empirical estimates to inform whether the equity beta for an efficient firm in the supply of Australian regulated energy services would likely be above or below that of the market.

Estimation period

Our preliminary view is to construct our empirical range based upon estimates from two estimation periods:

- the longest period available
- the last five years of available data

Generally, there is a trade–off in the length of the estimation period. Longer term estimates might be considered less reflective of current systematic risk assessments (which would suggest a shorter period). However, to obtain a robust and statistically reliable equity beta estimate we need sufficient observations (which would suggest a longer period).

Recognising this trade-off we form our range from these two estimation periods to reflect longer term and shorter term estimates of equity beta.

We propose to give most weight to estimates from the longest estimation period to inform equity beta for several reasons:

- A more robust and statistically reliable equity beta estimate requires sufficient observations (which would suggest a longer period).
- We observe cyclicality in short-term beta estimates. Long-term estimates better account for the cyclicality in factors affecting empirical equity beta estimates.
- Shorter estimates may be influenced by factors such as one-off events (for example, the GFC), shocks and interest rate movements. These factors can (temporarily) obscure the systematic risk of a firm supplying Australian regulated energy services whose exposure is mitigated by regulation and monopoly nature of the service it provides. For example, one-off events and shocks can temporarily 'increase' or 'decrease' empirical equity beta estimates. Similarly, interest rate movements tend to be cyclical, and a short term estimate may risk capturing only a part of the cycle.
- We set the forward looking rate of return for relatively long-lived assets. Therefore the investment horizon (and risks) needs to be compatible with these assets (which is better met by estimates from the longest estimation period).

However, we are open to hearing stakeholder's views and welcome submissions that justify a change from the methodology adopted to estimate the equity beta since the 2018 Instrument.

We would also like to note that we recently published a working paper related to the *Term of the rate of return*,[113] where we raised the possibility of changing the term from ten to five years. This implies changing our current approach from a ten year single

[113] AER, *Term of the rate of return draft working paper,* May 2021.

period CAPM to a five year model, whilst recognising the need to set an unbiased estimate of the expected efficient return, consistent with the relevant risks involved in providing regulated network services.

We would like to hear stakeholder's views on whether we need to change our equity beta methodology if we shift to a five year single period for the CAPM.

7 Overall return on equity cross checks

7.1 Overview

Cross checks involve comparing estimates against other relevant information sources. It may provide assurance that the calculated estimates are reasonable and consistent with other sources of information.

We can apply cross checks at the overall rate of return level and at the return on equity level. This section will focus on possible cross checks which assess the overall return on equity estimate to other information sources. These checks do not relate to individual parameters of our return on equity.

Overall rate of return cross checks compares the overall rate of return estimate to other information sources. These cross checks will be examined in the overall rate of return working paper.

7.2 What is the issue under discussion?

In response to our draft working papers in 2020:[114]

- Networks highlighted the importance of cross checks and suggested:
    - Identifying a set of potential cross checks
    - Establishing a clear framework for how cross checks will apply and the consequences if one was breached
- The CRG recommended identifying useful cross checks for assessing rate of return decisions.
- The Network Shareholders' Group indicated the need to undertake and respond to independent cross checks to ensure a reasonable allowed rate of return.

Therefore, in response to stakeholder submissions, we propose to open this topic up for discussion.

7.3 The 2018 Rate of Return Instrument

In 2018, under step 4 of our foundation model approach,[115] we set out cross checks (also known as other information) that inform our overall return on equity point estimates and the form of that information. These cross checks are not binding but provides a sense check for the AER's decision.

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[114] APGA, *Submission on return on equity models and international approaches to the rate of return*, October 2020, p. 24- 25; Ausgrid, *Submission International regulatory approaches to rate of return and CAPM*, 9 October 2020, p. 4; ENA, *Best-practice framework for setting the allowed return on equity*, October 2020, pp. 4, 42; CRG, *Submission to AER, Return on equity*, 9 October 2020, p. 10; NSG, *Response to the 2022 Rate of return instrument working paper on return on equity*, 9 October 2020, p. 2.

[115] AER, *Rate of return instrument, Explanatory Statement*, December 2018, p. 102.

Table 5 sets out the relevant material, the roles assigned to the cross checks used and the form of the information, under step 4 of our foundation model approach.

Table 5 Other relevant information

Material (Step 1)	Role in 2018 and relevant merit (Step 2)	Form of information
Takeover/Valuation reports	Inform the overall return on equity	Can inform point in time estimates if they are sufficiently comparable
Broker's return on equity estimates	Inform the overall return on equity	Point in time and directional
Other regulators return on equity estimates	Inform the overall return on equity	Directional
Comparison with return on debt	Inform the overall return on equity	Relative

Source: AER analysis

Under step 5 of our foundation model approach, we evaluate the outputs from step 3 and 4.

We evaluate the strengths and weaknesses of the relative merits of the cross checks (also known as other information — selected at step 2 of our approach) in forming a view as to whether, overall, they persuade us to adjust our equity risk premium (from step 3).

In undertaking this evaluation, we has regard to:

- patterns shown in these cross checks
- the strengths and limitations of the cross checks
- the magnitude by which the cross checks suggests that the foundation model point estimate under or over estimates the expected return on equity (if at all).[116]

In conclusion, having evaluated the strengths and weaknesses of these cross checks, we did not see a case for adjusting the equity risk premium via an adjustment to our Sharpe-Lintner CAPM output.

[116] AER, *Better Regulation, Rate of Return Guideline*, December 2013, p.16

7.4 Proposed approach for the 2022 Instrument

Our preliminary view is to use these cross checks to sense check our overall return on equity point estimates. They will not be applied mechanistically to estimate the overall return on equity, but rather provide a sense check for our decision.

We consider the crosschecks are useful because:[117]

- Comparison of return on equity estimates from various sources is supported by economic theory and finance principles.
- Analysis involves a simple comparison with minimal adjustments to data.
- The simple comparison is transparent and replicable.
- Some crosschecks such as broker reports are released regularly.
- Other regulators' decisions are generally well supported by clearly sourced material.

However, these strengths are counterbalanced by the following weaknesses:

- Broker reports are typically not provided with supporting explanation and valuation reports have mixed results.
- May not be in line with the economic and finance principles relevant to a regulatory objective.
- Valuation and broker reports are released regularly, but only infrequently for reports containing a discounted cash flow analysis for businesses comparable to our benchmark entity. Other regulators' decisions are also relatively infrequent.
- Other regulators' decisions can have limited comparability due to different regulatory frameworks and regulated businesses.

We therefore need to consider the strengths and limitations of the information and give weight to the relative merit rather than mechanistically calculating an outcome based on whether the estimates are higher or lower than our ERP.

At this point of time, we propose to maintain and apply the cross checks in line with the approach we adopted in the 2018 Instrument (refer Table 5). There are significant issues with each of the potential cross checks, such that we do not see how they could be used more directly.

We note that stakeholders suggested that cross checks should not be used only at the start of the 2022 Instrument, but also should be set up in a way that can be applied at each reset determination.[118]

This in our view is challenging as we have to apply the Instrument at each reset determination, without the exercise of discretion. The role that the cross checks will play in essence is a sense check about reasonableness of the point estimate

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[117] AER, *SAPN Final decision 2015–20 – Attachment 3 – rate of return*, October 2015, p. 102.

[118] APGA, *Submission on return on equity models and international approaches to the rate of return*, October 2020, pp. 24–25; ENA, *Best-practice framework for setting the allowed return on equity*, October 2020, p. 4.

We welcome submissions on improvements or changes that can be made to the application of these cross checks at the point of making our 2022 Instrument. We also welcome proposals on how specific cross-checks can be applied thought the term of the 2022 Instrument, recognising the need for a mechanical application.

8 Equity beta – electricity vs gas

8.1 Overview

The Equity Beta parameter is required for implementing the Sharpe-Lintner CAPM. It measures the 'riskiness' of a firm's returns compared with that of the market. Specifically, the equity beta measures the standardised correlation between the returns on an individual risky asset or firm with that of the overall market.

Our approach in the past was to adopt single benchmark across electricity and gas businesses, because they are regulated natural monopolies with similar regulatory frameworks which limit systematic risk exposure.

8.2 What is the issue under discussion?

In a recent submission to the AER, the Australian Pipelines and Gas Association (APGA) submitted that gas pipelines face significant uncertainty due to their unclear role in renewable energy whereas electricity networks do not face the same risks.

APGA recommended setting a rate of return for gas pipelines which reflected the higher risk in the sector compared to electricity networks. The Brattle Group also noted that in some cases overseas regulators apply different approaches to the two sectors.

Therefore, in response to stakeholder submissions, we propose to open this topic up for discussion.

8.3 The 2018 Rate of Return Instrument

In the 2018 Instrument, we implemented a consistent equity beta across both sectors after carefully considering the case for different beta estimates.

Our analysis found that equity beta for regulated gas and electricity firms was likely to be similar because they are regulated natural monopolies with similar regulatory frameworks which limit systematic risk exposure.[119]

International information did not provide persuasive evidence that separate betas are warranted due to differences in regulatory frameworks, environments and risk characteristics.

8.4 Development since 2018

There has been no technical work to review or extend the consideration of the impact of the different sectors on equity beta set out in the 2018 Instrument in the years since.

8.5 Proposed approach for the 2022 Instrument

Our preliminary view is to adopt single benchmark across electricity and gas businesses.

We have reached this view for the following reasons:

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[119] AER, *Rate of return instrument – Explanatory statement*, December 2018, p. 175.

- The regulatory framework for electricity and gas service providers are similar because both face limited systematic risk by virtue of being regulated natural monopolies. They effectively face very limited increase in risk due to competition.
- While electricity transmission service providers are required to use a revenue cap, there is a range of controls available for electricity distribution and gas service providers to propose. These controls (revenue and price setting mechanisms) can mitigate demand risk.
- In relation to gas pipelines, there may be risks of extreme changes in demand which present the potential for asset stranding. However, we do not consider these risks likely to be systematic in nature. Therefore, we do not consider they should be accounted for in the equity beta or the regulated rate of return. Nevertheless, if these risks are sufficiently material to require a regulatory response, adjustments can be made to the way regulated cash flows are set (for example, providing prudent discounts or accelerated depreciation provisions).
- Our Australian empirical analysis is based on a comparator set which includes gas service providers. Therefore, if there are differences in the systematic risks of electricity and gas service providers, this may be captured in our Australian empirical estimates of equity beta. See Table 4 for a list of firms in our comparator set.

At this point of time, we have not received any new evidence to suggest a change to our approach of applying a consistent equity beta across both sectors. However, we are interested in stakeholder's views on this topic and if there are reasons to depart from our prior approach.

9 Averaging period - nomination window

9.1 Overview

Regulated electricity network businesses must periodically apply to the AER to assess their revenue requirements (typically, every five years). Regulated gas networks are also required to periodically submit access arrangements to the AER for approval (also typically every five years).

When applying to have their revenue requirements assessed, the regulated networks must propose averaging periods within a nomination window. Averaging periods are used when calculating their return on equity (risk free rate component) and return on debt. The AER will consider the proposed averaging periods and will use them if they meet the required conditions as set out in the Instrument.

The nomination window set out in the Instrument is the period of time from which a regulated business can propose their specific averaging period.

9.1 What is the issue under discussion?

Nomination window

Since establishing the averaging period criteria in 2018, we have found that the nomination window for the risk free rate averaging period ending 3 months before the start of the next regulatory control period creates practical difficulties for finalising regulatory determinations which are required to be finalised 2 months prior to the next regulatory control period. We have found that a period of one month between the end of the averaging period and making our final decision creates practical difficulties. As a result we are opening up discussion of potentially changing the set nomination window to lessen the current timing pressures.

Averaging period flexibility

A further issue under discussion is the flexibility provided to networks to nominate their specific risk free rate averaging periods. Different averaging periods result in different risk free rates often resulting in differing allowed returns on equity across regulatory determinations made at the same time for businesses with the same regulatory control period.

Previously we have raised this issue in 2018 where stakeholders submitted that the flexibility provided to networks to nominate their specific averaging period in combination with a short averaging period can result in a "lottery-type" effect for rate of return and therefore drive a similar outcome for customer bills over time.[120] As a result, we are re-raising this issue and opening it up for discussion.

[120] Jemena, *Submission on the rate of return issues paper*, 12 December 2017, pg. 3

9.2 The 2018 Rate of Return Instrument

In 2018, our final decision was to allow regulated businesses to have the flexibility to choose an averaging period:

- between 20 and 60 consecutive business days
- From a window running from 3 and 7 months before the commencement of the regulatory control period

The 20 to 60 day length option provided some flexibility while ensuring the estimates were are not unduly biased by short-term volatility in the CGS yields. The business could choose a longer averaging period which reduced the volatility in the estimate but also reduced the relevance to current rates in the market. Conversely a shorter averaging period is more relevant but also more volatile.[121]

The permitted use of a nomination window of between 3 and 7 months prior to the commencement of the regulatory control period:

- protected the confidentiality of the nominated averaging periods and
- provided some flexibility while not being a significant departure from the ideal of the window ending as close as practical to the commencement of the regulatory control period.[122]

9.3 Development since 2018

There has been no work to review the nominated averaging periods set out in the 2018 Instrument in the years since.

9.4 Proposed approach for the 2022 Instrument

Nomination window

Our preliminary view is to shift the allowed nomination window forward in time by one month to lessen timing issues. This would mean the averaging periods must start no earlier and finish no later than 8 and 4 months, respectively prior to the commencement of the next regulatory control or access arrangement period. This would provide an additional month between the end of the averaging period and the date by which we should release our final decisions on service providers' regulatory proposals.

We depend on external parties to publish the data which in turn feed into our decision making processes. The extra month will assist in removing timing pressures that arise particularly when holidays intervene and third party data availability is impacted.

Averaging period flexibility

Our preliminary view is to maintain our approach of providing flexibility to networks to nominate averaging periods. This approach will allow service providers flexibility in how

[121] AER, *Rate of return instrument – Explanatory statement*, December 2018, p. 131.
[122] AER, *Rate of return instrument – Explanatory statement*, December 2018, p. 134.

they mitigate their exposure to volatility in the risk free rate. As networks are required to nominate the period in advance, this will reduce the possibility of bias in the risk free rate.

However we are interested in understanding stakeholder views on if network averaging periods for equity should be aligned and if there are reasons to depart from our prior approach.

A Assessment Criteria[123]

Information criteria

In the 2013 Guidelines, we developed a set of transparent criteria to inform our regulatory judgement on rate of return matters when evaluating material put before us.[124]

At that time, we considered that decisions on the rate of return were more likely to achieve the allowed rate of return objective if they used estimation methods, financial models, market data and other evidence that were:

1. where applicable, reflective of economic and finance principles and market information
    (a) estimation methods and financial models are consistent with well-accepted economic and finance principles, and informed by sound empirical analysis and robust data
2. fit for purpose
    (a) the use of estimation methods, financial models, market data and other evidence should be consistent with the original purpose for which it was compiled and have regard to the limitations of that purpose
    (b) promote simple over complex approaches where appropriate
3. implemented in accordance with good practice
    (a) supported by robust, transparent and replicable analysis that is derived from available credible datasets
4. where models of the return on equity and debt are used these are
    (a) based on quantitative modelling that is sufficiently robust as to not be unduly sensitive to errors in inputs estimation
    (b) based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale
5. where market data and other information is used, this information is
    (a) credible and verifiable
    (b) comparable and timely
    (c) clearly sourced
6. sufficiently flexible as to allow changing market conditions and new information to be reflected in regulatory outcomes, as appropriate.[125]

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123 AER, *Overall Rate of Return, Draft working paper*, July 2021, section 5.

124 AER, *Better regulation Explanatory Statement Rate of Return Guideline*, December 2013, p. 23.

125 AER, *Better regulation Explanatory Statement Rate of Return Guideline*, December 2013, pp. 23-4.

These criteria were subordinate to the law, the rules and the allowed rate of return objective.[126] They provided a framework through which we were able to exercise our regulatory judgment in respect of evidence before us, while allowing sufficient flexibility to make decisions in changing market circumstances.

In developing the 2018 instrument, stakeholders indicated that they valued certainty and predictability.[127] Accordingly, we adopted the same criteria in our assessment of information when making the 2018 Instrument.[128]

In the interests of maintaining continuity and stability, we will again adopt this suite of criteria to assess the merits of new evidence that has become available since 2018.

However, in assessing possible changes for the 2022 review, we will also have regard to:

- the materiality of any proposed change, and
- the longevity or sustainability of new arrangements.

These additional criteria ensure that change is not to be adopted lightly in the absence of compelling evidence. Importantly, any case for change must demonstrate there to be a clear improvement or a benefit to be realised.

In the long-term interest of consumers

We consider that enhancing the long-term interests of consumers should be an overarching objective of any change to the rate of return framework. Accordingly, having successfully met the threshold criteria for making a change, its impact needs to be considered in this context.

Having consulted with CRG and Energy Networks Australia (ENA) during 2021, we resolved not to make a decision with a conscious bias toward a higher or lower expected rate of return. Rather, we undertook to aim for the best possible estimate in an environment of uncertainty, given the best available information.

To this end, in our position paper *Rate of return and assessing the long-term interests of consumers,*[129] we established a guiding principle that we would seek to determine an unbiased estimate of the expected efficient return, consistent with the relevant risks involved in providing regulated network services.

On the basis that this principle best serves the long-term interests of end users, any change to the 2018 Instrument will need to pass this final test.

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126 AER, *Better regulation Explanatory Statement Rate of Return Guideline*, December 2013, p. 23.

127 AER, *Draft rate of return guidelines explanatory statement*, July 2018, p. 25.

128 See for example AER, *Draft rate of return guidelines explanatory statement*, July 2018, pp. 216, 282.

129 AER, *Rate of return and the long term interest of consumers*, Position paper, May 2021.

B Low interest rate environment draft paper - Select risk free rate and MRP considerations

This section details some of our initial explorations on the possible relationship between the MRP and the risk free rate in the *Rate of return and cashflows in a low interest rate environment* draft working paper. These were preliminary and will be taken forward in our final working paper on return on equity.

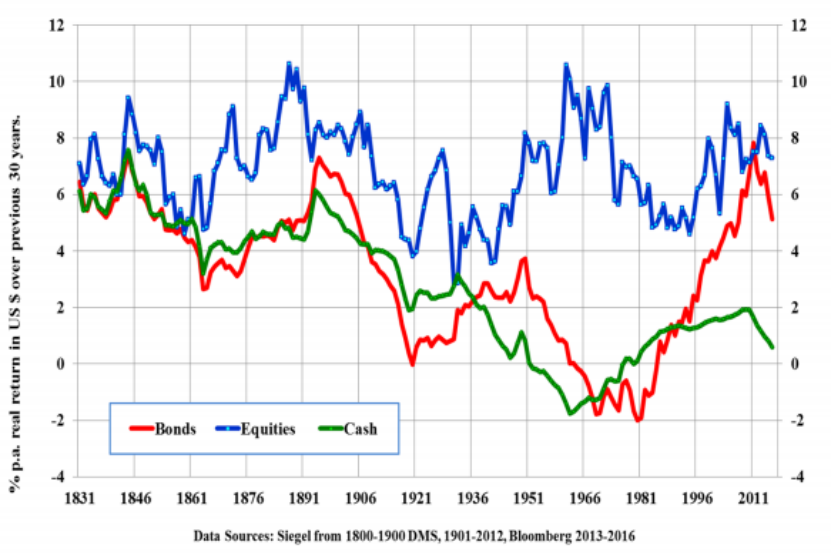
Prior to the publication of this draft working paper we received submissions from some stakeholders on this topic. These submissions are not addressed below or in this paper. They will be formally considered in the final working paper on return on equity.

Considerations pointing to a negative relationship between MRP and the risk free rate

A key argument put forward to support a stable expected real total return on equity in the United Kingdom (or a negative relationship between the real risk free rate and the market risk premium) is that realised real stock returns appear to have been relatively more stable than the return on risk free assets over historical periods.[130]

Figure 3 is a graphical representation from Wright et al. (2018) of what has been previously coined as "Siegel's Constant". It describes a relatively stable geometric mean for the real stock return in the US which is compared to the ex-post real return on bonds.

Figure 3 Thirty year geometric ex-post real returns on Stocks, Bonds and Cash Since 1830 in the United States



[130] Mason, Miles and Wright, Smithers and Co, *A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K.*, 2003, p. 42.

We are aware of the implementation of a relationship between the real risk free rate and market risk premium by regulators in the United Kingdom (UK) and Ireland.[131] The UK regulators appear to have effectively recognised a perfectly inverse relationship between the real risk free rate and the market risk premium for nearly 20 years, via the hypothesis that the total real return on the market is stable through time. The initial consulting work supporting this approach was the 2003 work by Mason, Miles and Wright. This was reconsidered by Wright and Smithers in 2013 and then again by Wright, Stephen, Burn, Mason and Pickford in 2018.[132]

From a theoretical perspective, it is possible that investors require a higher equity risk premium to compensate for the extreme risk of losses in low risk free rate environments in times of increased market volatility.[133] This would be consistent with the approach of the UK regulators and could imply a counter-cyclical movement in the equity risk premium.

The US Federal Energy Regulation Commission, on the other hand, make no assumptions about the stability or otherwise of the market risk premium. They estimate the market risk premium by deducting the 6-month average yield on 30-year treasury bonds from their estimate of the expected return on the market. The expected return on the market is calculated via a dividend growth model.[134]

As part of our work on this topic we will consider the approach of the United Kingdom regulators and the rationale for their findings. This will include considering:

- The initial 2003 work of Smithers and Company that proposed that the real market cost of capital should be assumed constant on the basis of UK data from long-term historic averages of realised stock returns.[135]
- The 2013 and 2018 consulting work that concluded that the approach of assuming the total market return is relatively constant that had been adopted by the UK regulators remained appropriate.
- The decisions of Ofgem and other regulators where they determined to apply a constant total market return approach.[136]

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131 See for example, Ofgem, *Electricity Distribution Price Control Review - Final Proposals*, November 2004, pp. 105-106; Commission for Aviation Regulation, *Determination on the Maximum Level of Airport Charges at Dublin Airport 2020-24*, 24 October 2019, p. 93. Summaries of cost of capital decisions by UK regulators are available on the UK Regulators Network website. The *2020 Cost of Capital - Annual Update Report* is available here: https://www.ukrn.org.uk/wp-content/uploads/2020/12/2020-UKRN-Annual-Cost-of-Capital-Report-Final-1.pdf

132 Smithers, A., & Wright, S., *The Cost of Equity Capital for Regulated Companies: A Review or Ofgem*, 2013; Wright, S., Burns, P., Mason, R., & Pickford, D., *Estimating the cost of capital for implementation of price controls by UK Regulators - An update on Mason*, Miles and Wright (2003), 2018.

133 Swiss Economics, *Dublin Airport Cost of Capital for 2019 Determination Final Report*, 30 Sept 2019, p. 31.

134 The Brattle Group, *A Review of International Approaches to Regulated Rates of Return*, p. 92.

135 Mason, Miles and Wright, Smithers and Co, *A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K.*, 2003.

136 In practice UK regulators, such as Ofgem, also consider other factors such as forward looking returns, regulatory precedent and investor studies, "The weight attached to each approach has varied to some extent across sectors. The table shows a notable decrease in the TMR used in decisions post December 2017. This reflects estimates derived using all three approaches that suggest lower TMRs than those used in previous regulatory publications." UKRN, *Cost of Capital - Annual Update Report 2020*, p.18.

- Whether we consider any relationship found in the United Kingdom is likely to apply in Australia and could be determined with sufficient validity and stability to warrant Australian regulatory use.

Considerations pointing to a non-existent or positive relationship between MRP and the risk free rate

Arguments to support a relatively more stable market risk premium, or even a positive relationship between the real risk free rate and the market risk premium include:

- There are a number of academic reports which have suggested a positive relationship between the risk free rate and the MRP. Li[137], Kim and Lee[138] and Damodoran[139] each have proposed that there can be a positive relationship between interest rates and equity risk premiums.
- Graham Partington and Stephen Satchell, expert finance consultants for the AER, indicated they were not aware of any substantive evidence in support of the Wright Approach in the Australian market. They considered it implausible that there is a one for one inverse relationship between the MRP and risk free rate. They also pointed to evidence that there could be either a negative or positive relationship at different points in time.[140]
- Asset prices, including equity prices, appear to have reacted positively to reductions in government bond yields. This implies expected returns on equity may have decreased with decreases in the risk free rate.
- Reductions in corporate bond yields with risk free rates arguably support similar reductions in expected returns on equity because:
    - A dollar of capital can be provided as either debt or equity.
    - To the extent debt became materially cheaper than equity you might expect firms to issue more debt at the margin.

The average capital structure of Australian firms has remained relatively stable despite material changes in the risk free rate that have impacted the cost of corporate debt. This may imply debt has not become materially cheaper than equity and the cost of equity is moving similarly to debt with the risk free rate. We do, however, note that this relationship may not necessarily be stable through time.

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137 Li, *Time-varying risk aversion and asset prices*, Journal of Banking and Finance, 2007.

138 Kim & Lee, *Stock returns, asymmetric volatility, risk aversion and business cycle: Some new evidence*, July 2007.

139 Damodoran, *Equity Risk Premiums (ERP): Determinants, Estimation and Implications* – the 2012 Edition.

140 Partington G., & Satchell S., *Report to the AER: Allowed Rate of Return 2018 guideline review*, 25 May 2018, pp. 34-35.

C Elements of the pathway to 2022