Estimating the cost of equity

Response to AER's Pathway to 2022 Rate of Return Instrument: Draft Equity Omnibus Working Paper

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Energy Networks Australia

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1 Overview

Key messages

- **Advancing the process**

  The expert reports commissioned by the AER have identified a number of problems that the current AER will need to address if the 2022 RoRI is to be more robust to the financial market conditions that might eventuate while it is in effect.

  ENA has provided concrete proposals in this submission in response to AER requests.

  It is important that the AER's December Information Paper provides firm guidance on the small number of unsettled issues and clarity about the AER's preliminary position on them.

- **Overall return on equity**

  ENA agrees that the Sharpe-Lintner CAPM framework will be used to determine the allowed return on equity and that it is important to ensure that all relevant estimation methods, financial models, market data and other evidence is considered when estimating the CAPM parameters.

- **The relationship between the risk-free rate and the MRP**

  ENA agrees with the findings and recommendations of the CEPA report that:

  - The relationship between the risk-free rate and the MRP is a question that can only be addressed by empirical estimation and not determined via assumption.
  - The empirical analysis indicates that there has been a strong and significant negative relationship between the risk-free rate and the MRP since the 1990s.
  - There is a lack of evidence supporting the 2018 approach which assumed no relationship exists.

  ENA considers this to be important evidence, relevant to the estimation of the MRP.

- **Estimating the MRP for the 2022 RoRI**

  ENA recommends that:

  - Material weight should be applied to the forward-looking DGM evidence.

    The 'calibrated' DGM approach developed in this submission has the dual benefits of reflecting forward-looking evidence and of addressing the concerns expressed by the 2018 AER.

  - The historical evidence should be assessed with reference to the hybrid approach identified in the recommendations of the CEPA report.

    This approach applies weight to both the fixed MRP and fixed TMR approaches. When implementing this approach, the fixed TMR approach should receive at least as much weight as the fixed MRP assumption – in light of the evidence of a strong negative relationship between the risk-free rate and the MRP.

ENA recommends that the next steps of the consultation process should focus on how these three estimation methods should be best combined into a single point estimate that best reflects the forward-looking MRP at the time of the RoRI.

» **Potential adjustments to the allowed MRP during the term of the RoRI**

ENA recommends that the guiding principle should be one of consistency – the nature of any mechanistic updating of the MRP must be consistent with the approach that was adopted when setting the 'starting point' MRP in the RoRI. Thus, the focus is first on determining how the 'starting point' MRP will be set and then the updating method would be determined in a consistent manner.

» **Equity beta**

ENA recommends that:

- No weight should be placed on the 'dead' comparators. That evidence is too dated, variable and inconsistent to have any real value.
- For the three remaining domestic comparators, ENA recommends that the trade-off between sample size (statistical precision) and recency (relevance) might be best achieved by considering estimates computed over a 10-year period rather than periods of 2-5 years.
- It is unsafe to rely exclusively, or primarily, on such a small set of comparator firms.
- Material weight should be applied to the estimates adopted by other comparable regulators. ENA considers that this is important evidence in assessing the confidence that can reasonably be placed in the 2018 approach of setting the equity beta based on its assessment of the available domestic comparators.
- Material weight should be applied to the estimates from international comparators and consideration should also be given to other domestic network service providers. ENA considers that this is important evidence in assessing the confidence that can reasonably be placed in the 2018 approach of setting the equity beta based on its assessment of the available domestic comparators.
- Asset betas should be re-levered to ensure that the resulting equity beta is consistent with the AER's gearing parameter.

ENA proposes that the next steps of the consultation process should focus on how these three sources of evidence should be best combined into a single point estimate the best reflects the true systematic risk of the benchmark network.

» **Return on equity cross-checks**

ENA considers that the focus of cross-checks should be on the allowed return on equity. Checks could be performed on the bases of the total required return on equity (both nominal and real) and on the equity risk premium (both nominal and real), as performed in the Brattle report.

Cross-checks are not designed to replace the CAPM, but rather to examine whether the AER's exercise of judgment in implementing the CAPM might produce results that are out of line with others who are performing the same task.

Cross-checks would only be performed at the time of the 2022 RoRI. They would have no role during the period of the RoRI under a binding Instrument.

The cross-checks would be a tool to assist the AER in the application of its judgment to a difficult estimation exercise. There would be no mechanical formula that would replace the AER's proposed

estimate with a figure drawn from the cross-check information – either at the time of making the RoRI or during the operation of the RoRI. However, the draft and final decisions should explain how the exercise of judgment has been informed by the cross-check information.

When performing cross-check comparisons, it is crucial that care is taken to ensure like-with-like comparisons are made.

1.1 Early consideration of an important issue

Energy Networks Australia (ENA) strongly endorses the Australian Energy Regulator's (AER) approach in commencing consultation on the 2022 Rate of Return Instrument (2022 RoRI) at this early stage. This approach provides an opportunity for thorough stakeholder engagement and proper analysis of approaches and evidence. ENA welcomes the opportunities provided to engage with the AER and other stakeholders, including through interactive forums, throughout this process.

1.2 Evaluation framework is the long-term interests of consumers

ENA notes that the NEO and NGO are centred around the long-term interests of consumers. Our companion submission on *Allowed Returns in a Low Rate Environment* explains why we consider that the long-term interests of consumers are best promoted by setting the regulatory allowance for the return on capital equal to the best possible estimate of the market cost of capital.[1]

That is, the long-term interests of consumers are best served by setting the regulatory allowance to reflect the efficient cost of debt and equity finance required by real-world investors. This approach creates the proper incentives for efficient investment in, and efficient utilisation of, network assets.

In our view, best reflecting the market cost of capital should be the guiding principle when setting the allowed return on capital.

Throughout this submission we consider which approach best reflects the market cost of capital – the rate of return that real-world investors actually require. Our view is that this approach best promotes the long-term interests of consumers.

Setting the allowed return to the best unbiased estimate of the market cost of capital also creates the correct incentives for the efficient utilisation of the network and for consumer investments in devices that produce, store and consume energy. Matching the regulatory allowance to the market cost of capital is the minimum cost that ensures long-term network sustainability.

1.3 The context for this review

The review process thus far has identified that there are some fundamental problems with the way the 2018 RoRI has operated in the financial market conditions that have developed over the last three years.

The current AER is considering the process for estimating the required return on equity during an unusual time. Government bond yields have fallen to historical lows, real rates are negative, the central bank is intervening to push rates below the market-determined level and there is heightened uncertainty in global capital markets.

[1] See particularly Section 2 of that submission.

The AER has recognised that its decisions must be robust to the sorts of events that have occurred since the 2018 RoRI and has developed new criteria of longevity and sustainability. ENA considers it to be very important that the 2022 RoRI is developed in such a way that stakeholders can have confidence that it will produce reasonable outcomes across the range of future scenarios that might eventuate.

This will require some significant changes to the approach adopted in the 2018 RoRI. The expert reports commissioned by the AER have identified a number of problems that the current AER will need to address if the 2022 RoRI is to be more robust to the financial market conditions that might eventuate while it is in effect. Brattle has advised that the AER's 2018 approach is not as effective as that of other regulators and CEPA has advised that there is no good evidence for a key part of the 2018 approach to setting the allowed return on equity. The number of domestic comparator firms is rapidly approaching zero. There are some real challenges for the current AER to address. In these circumstances, 'turning the handle' on the 2018 approach would not seem to be a viable option.

In this context, ENA has identified a small number of issues for careful and balanced consideration through the remainder of the 2022 review process. The following section notes that the preliminary position papers presented thus far have identified many areas of broad agreement. However, there are some important areas where more work needs to be done, particularly in relation to the allowed return on equity.

1.4 Broad agreement, with a focus on remaining issues

The publication of the AER's preliminary positions on key issues is a significant improvement on the 2018 RoRI process, and is strongly supported, and appreciated, by ENA members.

There is already very broad agreement between ENA and the AER on the vast majority of issues that have been identified:

- ENA broadly agrees with the AER's preliminary position on 32 of the 40 issues that have so far been raised in the Draft Working Papers.
- On 3 issues, the AER is proposing, or at least considering, a new approach, but ENA considers that the current approach should be maintained.
- There are 5 issues on which ENA and the AER currently have different or unsettled views.

ENA considers that the consultation process to date has been useful in identifying the small number of remaining issues that require more work over the remainder of the 2022 RoRI process. These are the issues that will benefit from additional work from stakeholders and from consideration in the expert roundtable process and by the Independent Panel.

1.5 Progressing work on the remaining issues

In the current round of submissions, ENA has sought to prepare practical and specific approaches in response to the AER's request for options. To that end, this submission sets out some indicative figures to demonstrate how the relevant evidence might be distilled into a single point estimate. This is designed to illustrate the process, and should not be interpreted as ENA's final submission on a particular parameter value. ENA accepts that more work will be required to refine and update data sets over the remainder of the RoRI process.

ENA submits that it is important that the AER's December Information Paper provides firm guidance on the small number of unsettled issues and clarity about the AER's preliminary position on them. There is

great value in the 2022 expert process considering some concrete preliminary positions proposed by the AER. An expert process that simply documents the alternatives that the AER might consider would be of little value. The available alternatives are already known.

This does not suggest that the AER needs to set out settled positions in its December paper. For example, the AER might indicate that it is seriously considering two or three different approaches for estimating beta or Market Risk Premium (MRP), explaining why other approaches have been dismissed. This would focus the engagement and consultation over the remainder of the process.

1.6 Summary of ENA positions

Overall return on equity

ENA agrees that the Sharpe-Lintner CAPM framework will be used to determine the allowed return on equity and that it is important to ensure that all relevant estimation methods, financial models, market data and other evidence is considered when estimating the CAPM parameters.

ENA proposes that there are a number of important considerations to make when implementing the CAPM:

- It is important to have regard to all relevant estimation methods, financial models, market data and other evidence.
- It is important to consider how the CAPM is utilised in practice – by others performing a similar task.
- It is important to 'sense check' the outputs. ENA proposes that cross-checks, including information about the allowances of comparable regulators, have a key role to play.
- It is important to recognise that, whatever the merits of the model may be, actual estimation involves considerable ranges of uncertainty because of data limitations. Within these ranges, a regulator must exercise judgement to determine a point estimate as the final outcome. Even where the AER is not proposing to test the foundation model or CAPM per se, uncertainty and data limitations mean it should test its exercise of judgment when it populates the CAPM inputs.

The relationship between the risk-free rate and the MRP

ENA's October 2020 *Best Practice* submission provides evidence that:

- Real-world investors do not reduce required returns to the full extent of any fall in government bond yields;
- A negative relationship between the risk-free rate and MRP was consistent with commercial estimates; and
- A number of regulators specifically recognise a negative relationship between the risk-free rate and the MRP.

ENA's May 2021 Low Rates submission highlights that:

- Brattle has advised that it when interest rate levels are relatively high, equity risk premiums narrow, and when interest rates are relatively low, equity risk premiums widen;[2] and

[2] Brattle Group, June 2020, *A review of international approaches to regulated rates of return*, p. 93, emphasis added.

- Independent expert valuation practitioners have recognised that the total required return on equity has not fallen in line with the recent falls in government bond yields.

ENA considers that the key conclusions and recommendations from the CEPA report are that:

- The approach adopted by the AER in 2018 was to *assume* that there is no relationship between the risk-free rate and the MRP. [3]
- There is no good evidence to support that assumption.[4]
- There is as strong a theoretical basis for the assumption of a fixed Total Market Return (TMR) as there is for a fixed MRP. [5]
- CEPA recommends that, to the extent that historical data is to be relied upon when setting the allowed MRP, the fixed TMR assumption or a hybrid approach (having regard to the fixed TMR and fixed MRP assumptions) should be considered.[6]
- The relationship between the risk-free rate and the MRP is a question that can only be addressed by empirical estimation and not determined via assumption.
- The empirical analysis indicates that there has been a strong and significant negative relationship between the risk-free rate and the MRP since central banks began utilising monetary policy to target inflation outcomes in the 1990s.

ENA considers that:

- The evidence documents a strong negative relationship between the risk-free rate and the MRP, at least since the turn of the century;
- The theoretical explanations for the observed relationship are grounded in two reinforcing phenomena:
  - A rise in the relative wealth of more risk-averse investors; and
  - A change in the relationship between inflation and consumption growth coinciding with changes in central bank monetary policy.

  Both of these effects tend to increase the demand for government bonds, and to increase the premium required on risky assets in 'bad' states of the world; and
- The most important implication from the theoretical literature is that the negative relationship exists. The literature accepts that the negative relationship has been well established and has turned towards identifying the reasons for it.

Estimating the MRP for the 2022 RoRI

The expert reports commissioned by the AER have identified three main approaches for estimating the MRP:

- Fixed MRP / Historical excess returns;
- Fixed TMR; and
- Dividend Growth Model (DGM).

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[3] CEPA, June 2021, *Relationship between RFR and MRP*, p. 4.
[4] CEPA, June 2021, *Relationship between RFR and MRP*, pp. 6-7.
[5] CEPA, June 2021, *Relationship between RFR and MRP*, p. 6.
[6] CEPA, June 2021, *Relationship between RFR and MRP*, pp. 6-7, emphasis added.

ENA recommends that:

- **Material weight should be applied to the forward-looking DGM evidence.**

  ENA agrees that there is real merit in including greater forward-looking evidence to inform the estimate of the MRP. The 'calibrated' DGM approach developed in this submission has the dual benefits of reflecting forward-looking evidence and of addressing the concerns expressed by the AER in 2018.

- **The historical evidence should be assessed with reference to the hybrid approach identified in the recommendations of the CEPA report.**

  This approach applies weight to both the fixed MRP and fixed TMR approaches. The rationale for this method is that both of those approaches are based on unrealistic assumptions and the true relationship between the risk-free rate and the MRP is likely to lie somewhere between the two. When implementing this approach, the fixed TMR approach should receive at least as much weight as the fixed MRP assumption – in light of the evidence of a strong negative relationship between the risk-free rate and the MRP.

ENA recommends that the next steps of the consultation process should focus on how these three estimation methods should be best combined into a single point estimate that best reflects the forward-looking MRP at the time of the RoRI.

Potential adjustments to the allowed MRP during the term of the RoRI

When considering the possibility of updating the MRP during the RoRI period, ENA considers that the guiding principle is one of consistency. The nature of any mechanistic updating of the MRP must be consistent with the approach that was adopted when setting the 'starting point' MRP in the RoRI.

For example, if the 2022 RoRI 'starting point' is set on the basis that the MRP is largely fixed, the updating method should be set on the same basis.

By contrast, if the 'starting point' is set on the basis that the risk-free rate and MRP vary inversely, the updating method should be set on the same basis.

Thus, the focus is first on determining how the 'starting point' MRP will be set and then the updating method would be determined in a consistent manner.

Equity beta

ENA recommends that:

- No weight should be placed on the 'dead' comparators. That evidence is too dated, variable and inconsistent to have any real value.
- For the three remaining domestic comparators, ENA recommends that the trade-off between sample size (statistical precision) and recency (relevance) might be best achieved by considering estimates computed over a 10-year period rather than periods of 2-5 years.
- It is unsafe to rely exclusively, or primarily, on such a small set of comparator firms. For example, we demonstrate below that the Spark Infrastructure beta estimate could double or halve depending on whether the takeover announcement happened to be made in a week when the broad market was up or when it was down.

- Material weight should be applied to the estimates adopted by other comparable regulators. ENA considers that this is important evidence in assessing the confidence that can reasonably be placed in the 2018 approach of setting the equity beta based on its assessment of the available domestic comparators.
- Material weight should be applied to the estimates from international comparators and consideration should also be given to other domestic network service providers. ENA considers that this is important evidence in assessing the confidence that can reasonably be placed in the 2018 approach of setting the equity beta based on its assessment of the available domestic comparators.
- Asset betas should be re-levered to ensure that the resulting equity beta is consistent with the AER's gearing parameter.

ENA proposes that the next steps of the consultation process should focus on how these three sources of evidence should be best combined into a single point estimate the best reflects the true systematic risk of the benchmark network.

ENA identifies low beta bias as an issue that would be usefully informed by expert opinion in the next stages of the consultation process. The Economic Insights report commissioned by the AER considers the empirical evidence of low-beta bias and notes that market practice and academic research supports adjustments to statistical beta estimates that are consistent with a reflection of low-beta bias.[7]

ENA also notes that the 2018 RoRI has no regard to low-beta bias on the basis that the historical data may not reflect investor expectations – that the evidence of low-beta bias might arise as a result of market outcomes that differ from what investors were expecting. But it cannot simultaneously be the case that historical stock returns *do* reflect investor expectations when using the historical excess returns approach to estimate the MRP, but that the same historical stock returns *do not* reflect investor expectations when estimating beta. Historical stock returns are either informative about investor expectations or they are not.

Return on equity cross-checks

ENA considers that the focus of cross-checks should be on the allowed return on equity. Checks could be performed on the bases of the total required return on equity (both nominal and real) and on the equity risk premium (both nominal and real), as performed in the Brattle report.

The literature has identified several approaches that provide information about the required return on equity. This includes approaches that involve consideration of other models (that recognise that equity returns are not well-described by the single-factor CAPM), information implicit in the prices of traded options and other derivative securities, approaches that consider the relativity between the required returns on equity and other securities (such as debt in the same firm), and estimates of the required return on equity for network firms compiled by other regulatory agencies and market professionals.

ENA notes that the estimation of models other than the single-factor CAPM is beyond the scope of the 2022 RoRI review and that data on traded options and other derivative securities is unavailable for the domestic listed network firms. Moreover, estimates of the required return on equity for energy network service providers that are produced by other entities are the most direct type of cross-check evidence. These are direct estimates of the same quantity (required return on equity) for the same types of firm

[7] Economic Insights, June 2021, *Methodological issues in estimating the equity beta for Australian network energy businesses*, pp. 27-28.

(energy transmission and distribution networks) produced for the same purpose (discounting future expected cash flows) as the AER's task.

Consequently, ENA submits that the most valuable cross-checks involve a direct, like-with-like comparison of the AER's proposed allowance, with the comparable figure adopted by another entity. Examples of other estimates of the return on equity and ERP for network firms produced elsewhere in market practice include:

- Allowances adopted by other regulators of comparable firms in comparable jurisdictions;
- Estimates included for comparable firms in independent expert valuation reports; and
- Rates of return required for the purposes of establishing the economic viability of network projects under the RIT-T evaluation framework.

ENA considers that a key return on equity cross-check involves comparisons with allowances from other regulators engaged in a similar task. In particular, ENA considers that the AER's estimation process might be informed by information about:

- The types of data that other regulators consider;
- The statistical and other methods that other regulators use to estimate parameters; and
- The way in which other regulators exercise their regulatory judgment.

The cross-checks would be a tool to assist the AER in the application of its judgment to a difficult estimation exercise. There would be no mechanical formula that would replace the AER's proposed estimate with a figure drawn from the cross-check information. However, the draft and final decisions should explain how the exercise of judgment has been informed by the cross-check information.

When performing cross-check comparisons, it is crucial that care is taken to ensure like-with-like comparisons are made.

2 Overall return on equity

Key messages

- ENA agrees that the Sharpe-Lintner CAPM framework will be used to determine the allowed return on equity and that it is important to ensure that all relevant estimation methods, financial models, market data and other evidence is considered when estimating the CAPM parameters
- ENA proposes that there are a number of important considerations to make when implementing the CAPM:
  - It is important to have regard to all relevant estimation methods, financial models, market data and other evidence. In particular, ENA considers that, when estimating each parameter, it is important to have regard to all relevant evidence that might inform the estimation of that parameter.
  - It is important to consider how the CAPM is utilised in practice – by others performing a similar task. For example, Economic Insights have advised the AER that, in practice, the CAPM is not implemented in a mechanistic fashion, but after adjusting parameter estimates to reflect the judgment of the practitioner. That is, omissions and biases and weaknesses in the CAPM are corrected by the application of judgment when implementing the model. [8]
  - It is important to 'sense check' the outputs. ENA proposes that cross-checks have a key role to play. We suggest a series of potential cross-checks below, including how we believe they should be used.

2.1 Sharpe-Lintner CAPM to be used

The Equity Omnibus paper proposes that the Sharpe-Lintner CAPM will be used to determine the allowed return on equity within the AER's '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.* [9]

Under this approach, the return on equity is determined by parameterising the Sharpe-Lintner CAPM formula:

$$r_e = r_f + \beta_e\left(E[r_m] - r_f\right)$$

where the CAPM parameters are informed by all relevant estimation methods, financial models, market data and other evidence.

[8] Economic Insights, June 2021, *Methodological issues in estimating the equity beta for Australian network energy businesses*, pp. 27-28.
[9] AER, July 2021, *Equity Omnibus*, p. 28.

ENA agrees that the Sharpe-Lintner CAPM framework will be used to determine the allowed return on equity and that it is important to ensure that all relevant estimation methods, financial models, market data and other evidence is considered when estimating the CAPM parameters.

It is also important to consider how the CAPM is applied and implemented in practice. The Economic Insights report commissioned by the AER advises that, in practice, the CAPM is not implemented in a mechanistic fashion, but after adjusting parameter estimates to reflect the judgment of the practitioner. That is, omissions, biases, and weaknesses in the CAPM are corrected by the application of judgment when implementing the model:

> *Finally, and this is perhaps the most significant reason for the CAPM's continued popularity with industry practitioners, relative to multi-factor models, the CAPM more readily facilitates the application of expert judgment in estimating required expected return.*
>
> ***Industry practitioners typically do not apply the CAPM in a mechanistic way** but use expert judgement to **vary the values of its estimated parameters to take into account aspects of risk not captured by the model** but relevant to stakeholders. All models require the application of judgement in estimating parameter values. The parsimony of the CAPM means there are fewer parameter variables that require the use of expert judgement. Having to apply judgement to estimate the values of multiple parameters without well-grounded theoretical guidance about their relative importance is difficult. In essence, having to focus on turning just one dial is easier than turning on many dials without understanding their relative importance.* [10]

ENA agrees that the Sharpe-Lintner CAPM framework will be used to determine the allowed return on equity, but submits that consideration should be given to the way the CAPM is implemented in practice. That is, it would be inconsistent to adopt the CAPM on the basis that it is the model most commonly used in practice, but then to implement the CAPM in a way that is not adopted in practice.

2.2 Considerations when implementing the CAPM

ENA proposes that there are a number of important considerations to make when implementing the CAPM.

Have regard to all relevant evidence

It is important to have regard to all relevant estimation methods, financial models, market data and other evidence. The 2018 RoRI parameterised the CAPM with three pieces of evidence:

- The risk-free rate was determined by the prevailing yield on 10-year government bonds;
- The market risk premium was set equal to the mean of historical excess returns, particularly over the period from 1988-2017; and
- The equity beta was determined by a small set of domestic comparators, with particular focus placed on AusNet Services and Spark Infrastructure.

No other relevant evidence had any impact on point estimates of CAPM parameters or on the allowed return on equity.

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[10] Economic Insights, June 2021, *Methodological issues in estimating the equity beta for Australian network energy businesses*, p. 28, emphasis added.

ENA submits that the consideration of a broader range of relevant evidence would amount to a significant improvement on the 2018 process. For example, the Brattle and CEPA reports commissioned by the AER conclude that the AER should have regard to a wider range of relevant evidence when estimating the MRP.[11]

Have regard to how the CAPM is implemented in practice

It is important to consider how the CAPM is implemented in practice. ENA notes that other regulators and market participants do not implement the CAPM in the way it was implemented in the 2018 RoRI. For example:

- Brattle has demonstrated that the AER's 2018 allowed return on equity (real and nominal) is below the allowances of other comparable regulators and concluded that the AER's 2018 approach is not as effective as other regulators.[12]
- Whereas a number of market participants use historical excess returns information to inform their estimate of MRP, those estimates tend to be paired with a risk-free rate that exceeds the prevailing government bond yield.
- It is common for market practitioners to add an uplift of some sort to offset the effects of very low interest rates.
- It is common in practice for CAPM parameters to be informed by a range of evidence. The AER's 2018 approach of using a single type of evidence to inform each parameter was unusual.

Market professionals and other regulators do not implement the CAPM in a mechanistic fashion based on a particular statistical estimate of each parameter. The Economic Insights report commissioned by the AER[13] notes that:

> *the CAPM more readily facilitates the application of expert judgment in estimating required expected return. Industry practitioners typically do not apply the CAPM in a mechanistic way but use expert judgement to vary the values of its estimated parameters to take into account aspects of risk not captured by the model but relevant to stakeholders.* [14]

ENA submits that there is important information in observing how market professionals and other regulators exercise judgment in their implementation of the CAPM. For example, it is not standard practice to implement the CAPM by pairing a long-run average estimate of the MRP with very low prevailing government bond yields.

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[11] Brattle, June 2020, *A review of international approaches to regulated rates of return*; CEPA, June 2021, *Relationship between RFR and MRP*.
[12] Brattle, June 2020, *A review of international approaches to regulated rates of return*.
[13] Economic Insights, June 2021, *Methodological issues in estimating the equity beta for Australian network energy businesses*, p. 28, emphasis added.
[14] Economic Insights, June 2021, *Methodological issues in estimating the equity beta for Australian network energy businesses*, p. 28, emphasis added.

Have regard to documented weaknesses and biases in the CAPM

It is also important to consider the known weaknesses of the CAPM. This is not to suggest that the CAPM should be replaced, but rather that consideration is given to how the CAPM is implemented in practice so as to address known weaknesses and biases in the model.

For example, the Economic Insights report presents the example of low-beta bias in this regard. That report notes the well-documented evidence that actual returns on low-beta stocks are persistently higher than a mechanistic implementation of the CAPM would suggest, and observes that expert judgment is required in response:

> *An understanding that **mechanistic application of the CAPM must be supplemented by expert judgement** casts a different light on the academic literature showing a flat relationship between beta and expected return. Academic studies using large samples are constrained to rely on estimates of beta based on historical data. The significant methodological issues in identifying, obtaining and using historical data to estimate beta lower the likelihood of finding an empirical association between beta estimated from historical data and future return. **Expert judgement is needed to ameliorate the issues**. That is, estimates of beta obtained from regression analysis are a starting point, not the end point, for estimating beta.* [15]

That is, where there is a documented issue in relation to any model, that issue should be considered when applying judgment to the implementation of that model.

Sense check the outputs

It is important to 'sense check' the outputs. The estimation of CAPM parameters inevitably involves judgment. It is possible that estimates from within the reasonable range for each parameter, when combined, produce an output that is unreasonable in the circumstances. ENA proposes that cross-checks have a key role to play in this regard.

[15] Economic Insights, June 2021, *Methodological issues in estimating the equity beta for Australian network energy businesses*, p. 28, emphasis added.

3 The relationship between the risk-free rate and the market risk premium

Key messages

- ENA's October 2020 *Best Practice* submission establishes that:
  - Real-world investors do not reduce required returns to the full extent of any fall in government bond yields;
  - A negative relationship between the risk-free rate and MRP was consistent with commercial estimates; and
  - A number of regulators specifically recognise a negative relationship between the risk-free rate and the MRP.
- ENA's May 2021 *Low Rates* submission documents that:
  - Brattle has advised that it when interest rate levels are relatively high, equity risk premiums narrow, and when interest rates are relatively low, equity risk premiums widen;[16] and
  - Independent expert valuation practitioners have recognised that the total required return on equity has not fallen in line with the recent falls in government bond yields.
- ENA considers that the key conclusions and recommendations from the CEPA report are that:
  - The approach adopted by the AER in 2018 was to *assume* that there is no relationship between the risk-free rate and the MRP. [17]
  - There is no good evidence to support that assumption. [18]
  - There is as strong a theoretical basis for the assumption of a fixed TMR as there is for a fixed MRP. [19]
  - CEPA recommends that, to the extent that historical data is to be relied upon when setting the allowed MRP, the fixed TMR assumption or a hybrid approach (having regard to the fixed TMR and fixed MRP assumptions) should be considered.[20]
  - The relationship between the risk-free rate and the MRP is a question that can only be addressed by empirical estimation and not determined via assumption.
  - The empirical analysis indicates that there has been a strong and significant negative relationship between the risk-free rate and the MRP since central banks began utilising monetary policy to target inflation outcomes in the 1990s.

ENA considers that:

- The evidence documents a strong negative relationship between the risk-free rate and the MRP, at least since the turn of the century;

[16] Brattle Group, June 2020, *A review of international approaches to regulated rates of return*, p. 93, emphasis added.
[17] CEPA, June 2021, *Relationship between RFR and MRP*, p. 4.
[18] CEPA, June 2021, *Relationship between RFR and MRP*, pp. 6-7.

- The theoretical explanations for the observed relationship are grounded in two reinforcing phenomena:
  - A rise in the relative wealth of more risk-averse investors; and
  - A change in the relationship between inflation and consumption growth coinciding with changes is central bank monetary policy.

  Both of these effects tend to increase the demand for government bonds, and to increase the premium required on risky assets in 'bad' states of the world; and
- The most important implication from the theoretical literature is that it exists. The literature accepts that the negative relationship has been well established and has turned towards identifying the reasons for it.

3.1 The context for this review

The AER's *Equity Omnibus* paper states that:

> *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.*[21]

The question of whether the current approach remains appropriate is informed by consideration of the extent to which the allowed return on equity has tracked lower and the reason why that has occurred.

In 2018, the AER adopted an approach to the allowed return on equity that is based on the assumption that the best estimate of the MRP is independent of the conditions in financial markets. In particular, the historical excess returns approach produces the same estimate of the MRP regardless of the prevailing conditions in the market – it is based on historical observations without any regard to the prevailing market conditions.

On this point, CEPA (2021) has advised the AER that the 2018 approach was based on an assumption that the MRP is stable over time[22] and that there is "no good evidence" for such an assumption.[23] ENA considers that the CEPA report, and substantial other evidence, does indeed point to a different approach for the 2022 AER.

The *Equity Omnibus* paper identifies a number of issues for consultation at this stage of the process:

> *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*

[19] CEPA, June 2021, *Relationship between RFR and MRP*, p. 6.
[20] CEPA, June 2021, *Relationship between RFR and MRP*, pp. 6-7, emphasis added.
[21] AER, July 2021, *Equity Omnibus*, p. 28.
[22] CEPA, June 2021, *Relationship between RFR and MRP*, p. 4.
[23] CEPA, June 2021, *Relationship between RFR and MRP*, pp. 6-7.

- *The regulatory suitability or practicality of implementing a relationship in the 2022 rate of return Instrument.* [24]

ENA's response to these questions is set out as follows:

» This section considers the evidence for a relationship between the risk-free rate and the MRP. We conclude that there is strong empirical evidence, with a theoretical basis, for a consistent negative relationship between these two variables for at least the last two decades;

» The subsequent section sets out ENA's recommendations for how the MRP allowance should be determined in the 2022 RoRI; and

» The following section sets out ENA's recommendations for how the MRP allowance might be mechanically adjusted during the term of the RoRI, under the requirements of the Binding Guideline legislation.

3.2 Recent ENA submissions on the relationship between the risk-free rate and the MRP

ENA has provided two previous submissions that relate to the relationship between the risk-free rate and the MRP – in previous stages of the 2022 RoRI consultation process. Those submissions are identified and briefly summarised below.[25]

ENA *Best Practice Framework* submission, October 2020

The ENA *Best Practice Framework* submission of October 2020[26] contains a number of observations on the relationship between the risk-free rate and the MRP. That submission noted that:

> *During the recent stakeholder forum, the AER was provided with evidence that real-world investors do not reduce required returns in line with changes in government bond yields. Rather, the return on equity that real-world investors require is relatively more stable than government bond yields. ENA suggests that this evidence is particularly relevant to the design of an approach to setting the allowed return on equity that is robust to changes in government bond yields.*
>
> *The relevant evidence presented at the Stakeholder Forum included:*
>
> - *Evidence from the Investor Reference Group (IRG) presentation that Australian firms have not reduced their required return on equity in line with recent falls in government bond yields. Evidence was presented from the RBA, TabCorp, EnergyAustralia, Stockland, Challenger, KPMG and Leadenhall; and*
> - *Evidence from the Morgan Stanley presentation that the approach that some practitioners adopt is to set the risk-free rate as a blend of the prevailing spot rate and the long-run average government bond yield. This results in the estimate of the*

[24] AER, July 2021, *Equity Omnibus*, p. 28.
[25] ENA considers the entirety of those submissions to be relevant to the questions posed by the AER as part of this stage of the consultation process. We endorse all of those previous submissions, but do not repeat them in full in this submission.
[26] ENA, October 2020, *Best practice framework for setting the allowed return on equity*.

required return on equity being partially 'immunised' against changes in government bond yields. [27]

The ENA *Best Practice Framework* submission (pp. 36-38) also noted that independent expert valuation reports tend to:

- Adopt a risk-free rate above the prevailing government bond yield to at least partially offset the effect of any fall in government bond yields; and
- Apply ad hoc upward adjustments to their CAPM-WACC estimates that also have the effect of at least partially offsetting the effect of any fall in government bond yields.

The ENA *Best Practice Framework* submission (p. 39) also noted that a negative relationship between the risk-free rate and MRP was consistent with commercial estimates. For example, Brattle (2020) has observed that:

> *Bloomberg's analyses of the forward-looking MRP shows that the MRP increases as the risk-free rate declines, so that the resulting market return moves less than the risk-free rate.* [28]

Brattle has also observed that a number of regulators specifically recognise a negative relationship between the risk-free rate and the MRP:

> *The FERC has recognized that there is a statistically significant relationship between historical movements in interest rates and equity risk premiums (defined as the authorised return on equity for electric transmission utilities over and above utility bond rates). When interest rate levels are relatively high, equity risk premiums narrow, and when interest rates are relatively low, equity risk premiums widen.* [29]

ENA *Low Rates* submission, May 2021

The ENA *Low Rates* submission of May 2021[30] contains a number of observations on the relationship between the risk-free rate and the MRP.

ENA noted (p. 35) that Brattle (June 2020) has advised the AER that:

> *We do not think that the overall rate of return changes one-for-one with the change in risk-free rate.* [31]

and (p. 36) that:

> *the measured MRP commonly increases as the risk-free rate declines and vice versa*[32]

and (p. 36) that:

> *When interest rate levels are relatively high, equity risk premiums narrow, and when interest rates are relatively low, equity risk premiums widen.*[33]

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[27] ENA, October 2020, *Best practice framework for setting the allowed return on equity*, p. 36.
[28] ENA, October 2020, *Best practice framework for setting the allowed return on equity*, p. 39.
[29] ENA, October 2020, *Best practice framework for setting the allowed return on equity*, p. 38.
[30] ENA, July 2021, *Rate of return and cashflows in a low interest rate environment*.
[31] Brattle Group, June 2020, *A review of international approaches to regulated rates of return*, paragraph 3.
[32] Brattle Group, June 2020, *A review of international approaches to regulated rates of return*, p. 60.
[33] Brattle Group, June 2020, *A review of international approaches to regulated rates of return*, p. 93, emphasis added.

ENA also noted that other regulators (pp. 36-37) and independent expert valuation practitioners (p. 37) have recognised that the total required return on equity has not fallen in line with the recent falls in government bond yields. For example, Lonergan Edwards has observed that:

> *Whilst, prima-facie, recent lower interest rates globally have lowered the total equity return required by investors, based on our experience, such investors have* ***not reduced their required rates of return by the full extent of the fall in risk free rates****.*[34]

The ENA *Low Rates* submission of May 2021 also considered (pp. 38-42) three papers that the AER had cited as potential evidence of a *positive* relationship between risk-free rates and the MRP. ENA proposed that the approach of *increasing* the MRP when government bond yields rise and *decreasing* the MRP when government bond yields fall should be ruled out at this stage of the 2022 RoRI process because:

- The suggestion that the market cost of equity capital is set by increasing the MRP when government bonds yields rise and decreasing the MRP when government bond yields fall is inconsistent with the preponderance of evidence considered by the AER over the last two rate of return reviews. The evidence overwhelmingly suggests that the returns required by equity market investors are *more* stable than is implied by adding a constant MRP to the prevailing government bond yield. The AER's forward-looking DGM estimates imply the same thing. Thus, the notion of a positive relationship between the MRP and risk-free rate contradicts the overwhelming empirical evidence.
- ENA is unaware of any regulator or any market professional adopting a positive relationship between the risk-free rate and the MRP. By contrast, there are many examples of regulators and market professionals who adopt a negative relationship.
- The approach of adopting a positive relationship would amplify the volatility in government bond yields leading to more volatility in the allowed return on equity and on customer prices. Our understanding of the views of consumers is that less, not more volatility would be valued.
- The academic reports to which the AER refers do not make a strong case for a positive relationship. In particular, one of those papers—Damodaran (2012)—has been superseded by a 2021 version of the same study[35] that in fact presents strong evidence of a *countercyclical* (rather than procyclical) MRP since the Global Financial Crisis in 2008, and which argues strongly *against* the application of a fixed MRP estimate.[36]

3.3 The CEPA Report

The AER engaged CEPA to conduct analysis and provide advice and recommendations about the relationship between the risk-free rate and the MRP.

CEPA focuses on the three main estimation procedures:

- **The fixed MRP approach**. Under this approach, the MRP is estimated as the mean of excess returns observed over a long historical period. The AER has previously referred to this as the 'historical excess returns (HER) approach';

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[34] Lonergan Edwards, 2019, pp. 46-47, emphasis added.
[35] Damodaran, 2021, *Equity risk premiums (ERP): Determinants, estimation, and implications – The 2021 edition*.
[36] More detail on the papers that have been proposed as suggesting the possibility of a positive relationship are set out in the ENA *Low Rates* submission: ENA, May 2021, *Rate of return and cashflows in a low interest rate environment*, Section 5.5.

- **The fixed total market return (fixed TMR) approach:** Under this approach, the expected return on the market is estimated as the average real return over a long historical period plus current expected inflation; and
- **The dividend growth model (DGM) approach:** Under this approach the expected return on the market is estimated as the discount rate that equates the present value of future dividends with the observed market index.

This section summarises ENA's understanding of the key conclusions and recommendations in the CEPA Report.[37]

Regulatory practice

CEPA performs a review of the approach of other comparable regulators and concludes that:

> *The international regulators that we 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.* [38]

That is, other regulators do not adopt the assumption that the MRP is constant over time or independent of the risk-free rate.

Finance literature

CEPA's review of the relevant finance literature leads them to conclude that:

> *Recent finance academic literature overwhelmingly uses a time-varying MRP.* [39]

That is, the academic literature does not adopt the assumption that the MRP is constant over time, even as the risk-free rate changes.

CEPA concludes that the assumption of a fixed total market return has as much theoretical support as the assumption of a fixed MRP:

> *There also appears to be as strong a theoretical basis for the argument that the RfR and the MRP are perfectively negatively correlated (the "Wright" approach) as there is for the argument that the RfR and total equity market returns are perfectly positively correlated (the fixed MRP approach).* [40]

Survey responses

CEPA observes that the Australian MRP estimates reported in the Fernandez and KPMG surveys "stays relatively constant at least over the time period examined" [41] but that the Horizon survey indicated that US total expected equity returns had remained stable even as government bond yields had fallen. [42]

In relation to these survey responses, CEPA warns that:

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[37] CEPA, June 2021, *Relationship between RFR and MRP*.
[38] CEPA, June 2021, *Relationship between RFR and MRP*, p. 5.
[39] CEPA, June 2021, *Relationship between RFR and MRP*, p. 13.
[40] CEPA, June 2021, *Relationship between RFR and MRP*, p. 14.
[41] CEPA, June 2021, *Relationship between RFR and MRP*, p. 17.
[42] CEPA, June 2021, *Relationship between RFR and MRP*, p. 17.

> *There are limitations to these surveys and estimates, and we don't regard the evidence as conclusive.* [43]

The following section of this submission explains why:

- ENA considers that the survey evidence is so scant, dated, non-transparent, and unreliable that it is hard to imagine that any piece of evidence could fail more of the AER's evaluation criteria; and
- If some reliance *is* to be placed on survey responses, it is important to consider the *whole* of the response and not just a part of it. For example, the Fernandez and KPMG surveys indicate that respondents use risk-free rates well in excess of the prevailing yield on government bonds. Thus, it would be unsafe and misleading to pair survey MRP figures with the prevailing yield on government bonds when it is very clear that is *not* how the survey respondents use those MRP figures.

The role of assumption vs. empirical estimation

CEPA makes the point that a forward-looking DGM approach makes no assumption about the relationship between the risk-free rate and MRP. Rather, the relationship is determined by the data and is derived as part of the estimation process. [44]

By contrast, the approaches that use historical data do require an assumption about the relationship between the risk-free rate and MRP:

- The "Ibbotson" or "fixed MRP" approach is based on the assumption that the MRP is constant over time, taking the same value in all financial market conditions; and
- The "Wright" or "fixed TMR" approach is based on the assumption that the real required return on equity is constant over time.

CEPA explains that:

> ***The forward-looking approaches make no assumption*** *about the relationship between the RfR and the MRP, it is derived as part of the estimation.* ***For the historic approaches, an implicit assumption is required****: for the "Ibbotson" [fixed MRP] approach it is an implicit assumption that the MRP is stable, whereas for the "Wright" [fixed TMR] approach it is an implicit assumption that it varies inversely with the RfR. Regulators place weight on historic measures of the MRP in determining the cost of capital, and an assumption – implicit or explicit – is therefore required.* [45]

CEPA further explains that, when considering the historical data, there is "no good evidence" to support the assumption of a constant MRP.[46] This leads CEPA to advise that an approach that has real regard to estimates from the fixed TMR approach (either alone, or in combination with the fixed MRP approach) might provide a better estimate of the MRP:

> *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,***

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[43] CEPA, June 2021, *Relationship between RFR and MRP*, p. 5. Two additional warnings are provided about the limitations of survey data at p. 17.
[44] CEPA, June 2021, *Relationship between RFR and MRP*, p. 4.
[45] CEPA, June 2021, *Relationship between RFR and MRP*, p. 4, emphasis added.
[46] CEPA, June 2021, *Relationship between RFR and MRP*, pp. 6, 44.

> ***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 TMR 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.*
>
> *Our review of international regulators demonstrates that regulatory processes can accommodate any of these approaches. The data to implement these for Australia is available.*
>
> *The evidence indicates that **the second two alternatives cannot be ruled out, and may provide a better estimate of the forward looking MRP consistent with the AER's duty**. We suggest that consideration of these options, and the evidence that would be necessary to decide between them is undertaken as part of the 2022 RORI process.* [47]

ENA agrees that the relationship between the risk-free rate and the MRP is a question that should be addressed by empirical estimation and not determined via assumption – especially if the proposed assumption is inconsistent with the empirical evidence.

Econometric analysis

As the approaches that are based on historical data (the fixed MRP and fixed TMR approaches) require an assumption about the relationship between the risk-free rate and the MRP, they cannot be used to derive or inform the nature of that relationship. That is, approaches that impose an assumption about the relationship obviously cannot be used to test whether the relationship exists or what form it might take.

CEPA notes that the forward-looking DGM approach requires no such assumption. Rather the nature of the relationship is determined as part of the estimation process.

In this regard, CEPA has advised the AER that:

> *As a result, in our judgement a decision on what assumption to make about the MRP should rely on empirical evidence.* [48]

And further that the empirical analysis must be based on forward-looking estimates of the MRP:

> *We consider that a decision on whether there is a relationship between the MRP and the RfR should be determined by empirical evidence. As we note above, the cost of equity and hence the MRP cannot be measured directly, but needs to be inferred. Consistent with commentary from leading finance academics, we take the approach that **the historical data is a measure of the realised MRP, and does not measure forward looking expectations. To***

[47] CEPA, June 2021, *Relationship between RFR and MRP*, pp. 6-7, emphasis added.
[48] CEPA, June 2021, *Relationship between RFR and MRP*, p. 5.

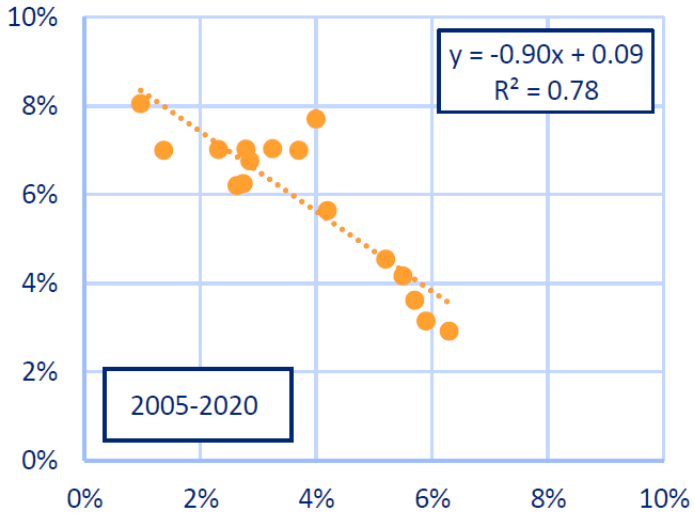
assess whether there is a relationship between the MRP and the RfR, we have to look at forward looking measures. [49]

CEPA has performed an econometric analysis using forward-looking estimates of the MRP and has concluded that:[50]

- There has been a strong and significant negative relationship between the risk-free rate and the MRP since central banks began utilising monetary policy to target inflation outcomes in the 1990s; and
- There is weak evidence of a negative relationship in earlier periods.

For example, CEPA shows that there is a strong negative relationship between ex-ante forward-looking DGM estimates of the MRP and 10-year government bond yields since 2005, as summarised in Figure 1 below.

Figure 1: Relationship between risk-free rate and MRP: CEPA DGM estimates for Australian market

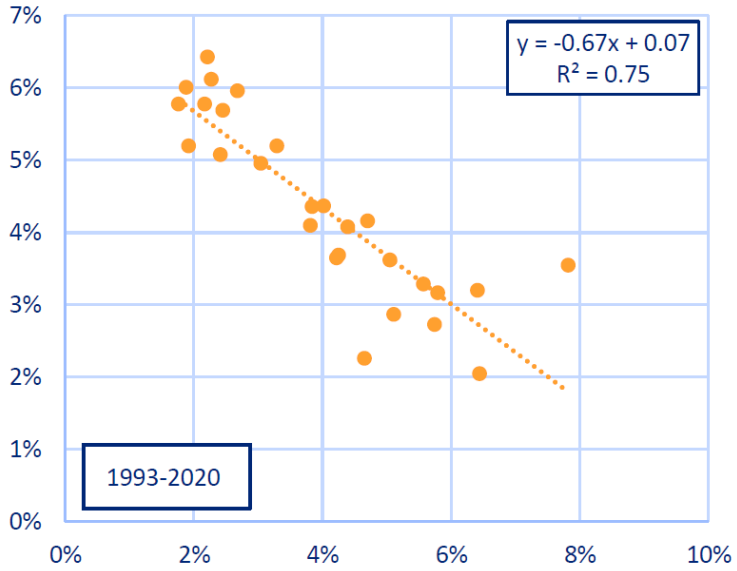


Source: CEPA, June 2021, Figure 5.6, p. 41.

CEPA further notes that a similar relationship has been demonstrated for the US market by Damodaran (2021), [51] as summarised in Figure 2 below.

[49] CEPA, June 2021, *Relationship between RFR and MRP*, p. 6, emphasis added.
[50] CEPA, June 2021, *Relationship between RFR and MRP*, Section 5.
[51] Damodaran, 2021, *Equity risk premiums (ERP): Determinants, estimation, and implications – The 2021 edition*.

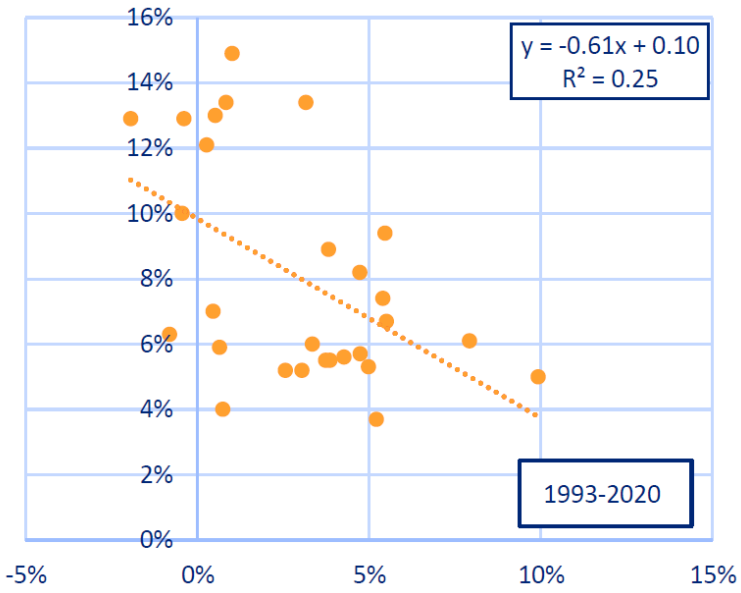
Figure 2: Relationship between risk-free rate and MRP: Damodaran DGM estimates for US market



Source: CEPA, June 2021, Figure 5.9, p. 43.

CEPA also demonstrates that a similar relationship exists between risk-free rates and actual excess returns observed over the subsequent 10 years, as summarised in Figure 3 below.

Figure 3: Relationship between risk-free rate and MRP: CEPA estimates for Australian market using observed excess returns



Source: CEPA, June 2021, Figure 5.8, p. 42.

CEPA concludes that:

- *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.***
- *The relationship that we find for Australia is consistent with the data from the US published by Damodaran.* [52]

CEPA observes that the strong negative relationship between the risk-free rate and MRP that has been documented since the 1990s coincides with the changes in central bank monetary policy actions that occurred at that time:

> *The relationship appears to be stronger in more recent years, from the 1990s and possibly earlier. We have not undertaken econometric testing to detect a statistically significant structural break, but it does appear that the relationship is weaker in the earlier part of the dataset. It is possible that the action of central banks from the 1990s to set monetary policy settings to drive out inflation had a material impact on asset returns and investor expectations. Prior to this period, monetary policy was less disciplined, and less predictable. The move to a more stable relationship between these variables from the 1990s is consistent with this hypothesis.*[53]

In the following section of this report, ENA presents a 'calibrated' DGM approach to estimating the forward-looking MRP. The estimates from that model also indicate a strong negative relationship between the risk-free rate and MRP, consistent with the evidence from CEPA and Damodaran, as shown in Figure 4 below.

[52] CEPA, June 2021, *Relationship between RFR and MRP*, p. 6, emphasis added.
[53] CEPA, June 2021, *Relationship between RFR and MRP*, p. 43.

Figure 4: Relationship between risk-free rate and MRP: ENA 'calibrated' DGM estimates for Australian market

Source: ENA 'calibrated' DGM estimates.

ENA notes that our analysis is very much consistent with that of CEPA – there has been a strong and significant negative relationship between the risk-free rate and the MRP since central banks began utilising monetary policy to target inflation outcomes in the 1990s.

Key conclusions from the CEPA report

ENA considers that the key conclusions and recommendations from the CEPA report are that:

- The approach adopted by the AER in 2018 was to *assume* that there is no relationship between the risk-free rate and the MRP. [54]
- There is no good evidence to support that assumption. [55]
- There is as strong a theoretical basis for the assumption of a fixed TMR as there is for a fixed MRP. [56]
- CEPA recommends that, to the extent that historical data is to be relied upon when setting the allowed MRP, the fixed TMR assumption or a hybrid approach (having regard to the fixed TMR and fixed MRP assumptions) should be considered.[57]
- The relationship between the risk-free rate and the MRP is a question that can only be addressed by empirical estimation and not determined via assumption.

[54] CEPA, June 2021, *Relationship between RFR and MRP*, p. 4.
[55] CEPA, June 2021, *Relationship between RFR and MRP*, pp. 6-7.
[56] CEPA, June 2021, *Relationship between RFR and MRP*, p. 6.
[57] CEPA, June 2021, *Relationship between RFR and MRP*, pp. 6-7, emphasis added.

- The empirical analysis indicates that there has been a strong and significant negative relationship between the risk-free rate and the MRP since central banks began utilising monetary policy to target inflation outcomes in the 1990s.

Empirical evidence and theoretical explanations

The focus of the CEPA report is on empirical documentation of the strong negative relationship between the risk-free rate and the MRP that has existed in developed markets for the last two or more decades. The *Equity Omnibus* paper notes that CEPA does not formally identify a theoretical explanation for the observed relationship:

> *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.*[58]

The remainder of this chapter provides a number of examples of the literature that provides a theoretical explanation for the observation of a strong negative relationship since the turn of the century.

ENA considers that the following points are relevant to an assessment of these theoretical explanations:

- Neither the observed negative relationship nor the theoretical explanations for it, have any relevance to the theory of the CAPM. The CAPM is a one-period model with single numbers for the risk-free rate and the expected return on the market portfolio. There is no sequence of 'periods' and therefore no scope for any consideration of the time series correlation between these variables. Thus, the CAPM provides no guidance on the nature of the observed negative relationship.
- The most important implication from this literature is that this negative relationship exists. The literature accepts that the negative relationship has been well established and has turned towards identifying the reasons for it.
- The theoretical explanations are grounded in two reinforcing phenomena:
  - A rise in the relative wealth of more risk-averse investors; and
  - Changes in central bank monetary policy that have resulted in a change in the relationship between inflation and consumption growth.

  Both of these effects tend to increase the demand for government bonds, and to increase the premium required on risky assets in 'bad' states of the world.

3.4 Daly (2016)

CEPA notes that Daly (2016)[59] has provided a theoretical explanation of the post-1990s negative relationship between the risk-free rate and the MRP.[60] Daly's explanation is centred around the documented increase in savings rates since the turn of the century.

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[58] AER, July 2021, *Equity Omnibus*, p. 34.
[59] Kevin Daly (2016). *A higher global risk premium and the fall in equilibrium real interest rates*. November 18 2016, VoxEU/CEPR. https://voxeu.org/article/higher-global-risk-premium-and-fall-equilibrium-real-interest-rates
[60] CEPA, June 2021, *Relationship between RFR and MRP*, p. 14.

Overview of the Daly representative agent model

Daly identifies two key developments in financial markets since 2000:

- Global saving rates have increased markedly. Because there is relatively more money seeking a home, the effect of increased savings is to drive down yields on assets generally, including (but not limited to) the yields on government bonds; and
- The marginal investor has become relatively more risk averse as a relatively higher proportion of global wealth is now in the hands of retirees and investors from emerging markets. This has the effect of increasing the market price of risk, and consequently, the market risk premium. It increases the spread between the required returns on risky and risk-free assets.

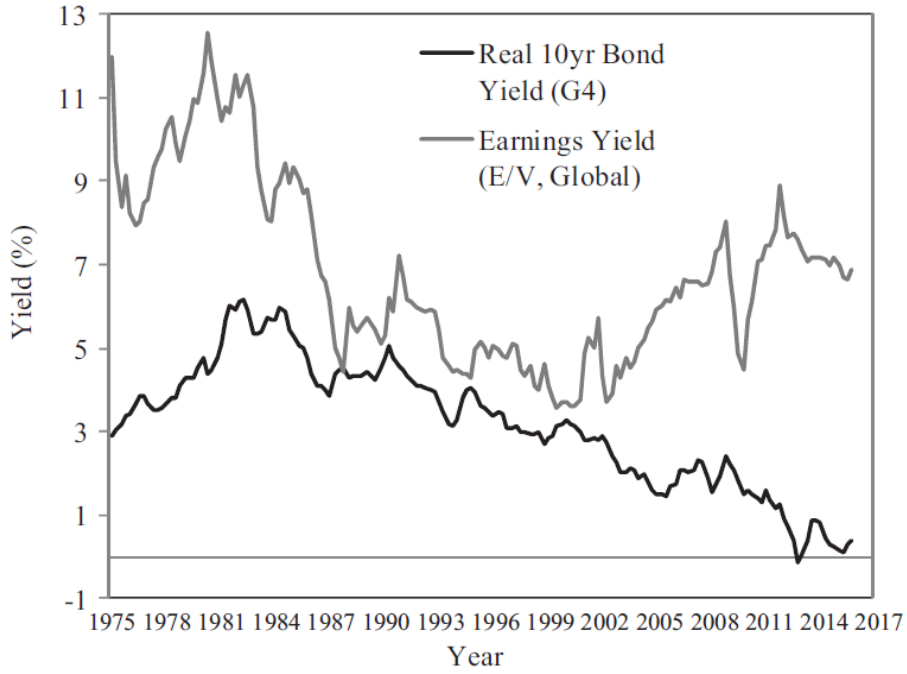
Daly develops a standard Lucas-style representative agent power utility model that incorporates an increased saving rate and increased risk aversion. He shows that these two effects together imply:

- A reduction in the yield on government bonds – caused by both the 'savings shock' and the 'risk premium shock;' and
- An increase in the market risk premium, such that the required return on risky assets falls relatively less than the required return on government bonds.

Consistency between model predictions and observed data

Daly reports that the empirical evidence is consistent with the predictions from his theoretical model. Figure 5 below shows that, since 2000, government bond yields have fallen significantly, but the earnings yield (a proxy for the required return on risky assets) has not.

Figure 5: Earnings yields not falling in line with government bond yields



Source: Daly (2016), Figure 2, p. 181.

Rationale for the increase in saving and risk aversion of the representative agent

Daly explains that, since 2000, the relative wealth of retirees and emerging market investors has increased. Because both of these groups exhibit strong risk aversion in their investment portfolios, the result is an increase in the risk aversion of the representative investor.

In relation to emerging market investment, Daly notes that:

- There has been an increase in the relative wealth of emerging market investors, particularly those in China. This increase occurs as a result of increasing wealth in emerging markets and due to savings rates being relatively higher in emerging markets.
- Emerging market investors exhibit very strong risk aversion in their investment portfolios. Daly notes that:

  In a detailed analysis of the net asset positions of China and India, for example, economists Lane and Schmukler (2006)[61] show that the net investment positions of both are essentially 'short equity, long debt'. Particularly following the 1997 Asian crisis, an increasing share of emerging economies' savings were channelled into foreign exchange reserves held in the form of developed economy government bonds.[62]

- There are two key reasons for the higher level of risk aversion exhibited by emerging market investors:

[61] Lane, P., and S. Schmukler, 2006, *The International Financial Integration of China and India*', IIIS Discussion Paper No. 174, August.
[62] Daly, 2016, p. 196.

- Individuals in emerging markets do not benefit from the same level of 'social protection' as investors in developed markets. They face more risk about future costs related to health, education and retirement, which drives them to save relatively more and to invest those funds in low-risk assets. On this point, Daly states that:

  > *Emerging market investors are genuinely more risk-averse than advanced economy investors. This would not be surprising – in many models of consumer behaviour, a higher propensity to save goes hand in hand with a higher level of risk aversion. Blanchard and Giavazzi (2005) argue that the relatively high household saving rates of emerging economies reflect a high level of individual risk – related to health costs, retirement and the financing of education – that results from low levels of social protection. It is plausible that relatively high levels of income uncertainty also account for why those savings have been invested in a relatively risk-averse manner.*[63]

- Much of the savings in emerging markets are channelled through government entities that are restricted from making equity investments in developed economies. Thus, there is a practical constraint that limits the investment of emerging market savings into risky assets.

In relation to retirees, Daly notes that tax and pension/superannuation arrangements encourage investors to save more and to invest in lower-risk assets:

> *There has been an increased focus on the long-term sustainability of private and public pension provision in advanced economies since the turn of the century, and a common response to these concerns has been to alter the tax treatment of pensions to encourage increased saving for retirement. At the same time, regulations affecting private pensions saving in advanced economies have tended to skew the investment of those savings away from equity and towards fixed income. Two examples of such regulations include the significantly more favourable treatment of bonds versus equities under internationally agreed pension solvency rules and the widespread practice of obliging workers to purchase an annuity upon retirement.* [64]

Daly concludes that the increase in the relative wealth of retirees and emerging market investors, since 2000, has increased the savings rate and risk aversion of the representative investor:

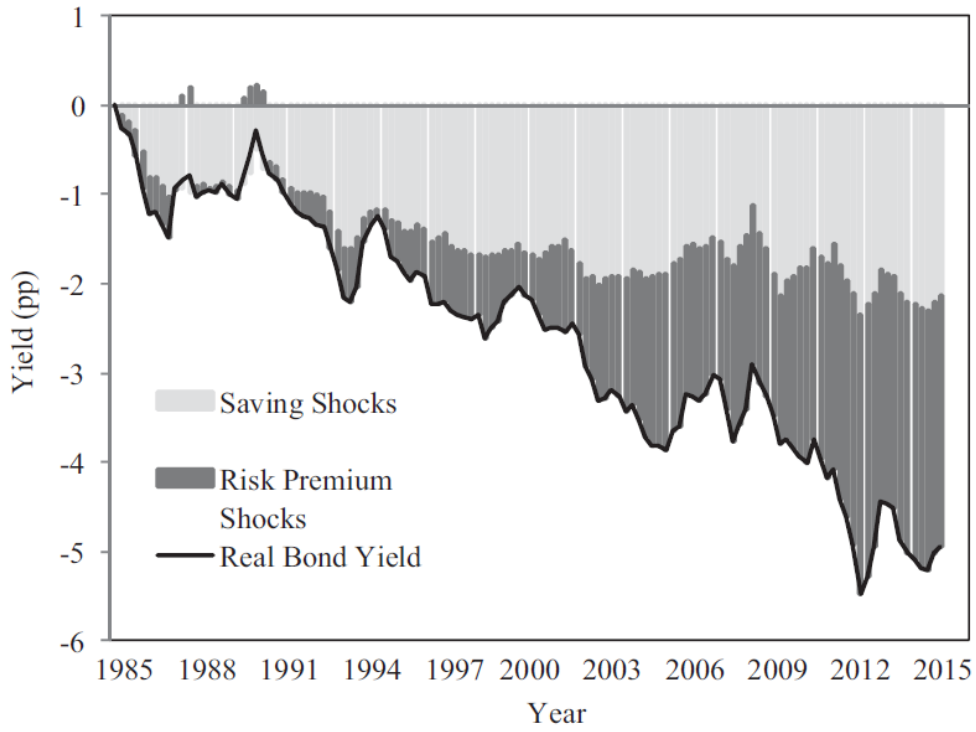
> *In this view, the emergence of China and other large emerging economies had two relevant effects on the global economy. Consistent with the excess savings hypothesis, the increase in desired saving from large emerging economies contributed to lower yields on government bonds and other fixed-income assets. In addition, there was an effective shift in the global aversion to risk that reconciles the rise in yields on risky equity and the decline in risk-free interest rates. In effect, the marginal investor became more risk-averse and the increase in the global propensity to save relative to the propensity to invest went hand in hand with a rise in the ex ante global ERP.* [65]

[63] Daly, 2016, pp. 196-197.
[64] Daly, 2016, p. 197.
[65] Daly, 2016, p. 196.

Decomposition of the 'savings' and 'risk premium' shocks

One of the key contributions of the Daly model is its ability to separately identify the impacts of the 'savings' and 'risk premium' shocks on the decline in government bond yields. The results of that decomposition exercise are summarised in Figure 6 below. That figure shows that, since 2000, the 'savings' shock has had a relatively constant effect and that the continued fall in government bond yields is due to the increase in the risk aversion of the representative investor.

Figure 6: Earnings yields not falling in line with government bond yields



Source: Daly (2016), Figure 10, p. 195.

Conclusions from the Daly model

The conclusions that Daly draws from his analysis are as follows:

> *While complementary to each other in economic terms, the excess saving and rising risk premium narratives have different implications for financial markets. The standard excess saving account suggests that a glut of savings has driven yields and expected future real returns on all assets lower. By contrast, a higher global ERP implies that, while the expected real returns on government bonds are low, the long-run real returns implied by current global equity valuations remain relatively high.* [66]

Daly's representative agent model demonstrates that a negative relationship between the risk-free rate and the MRP can be explained by an increase in the savings rate and the risk aversion of the

[66] Daly, 2016, p. 182.

representative investor, consistent with the increasing wealth share of superannuation and pension assets and emerging market investors.

3.5 Li et al (2020)

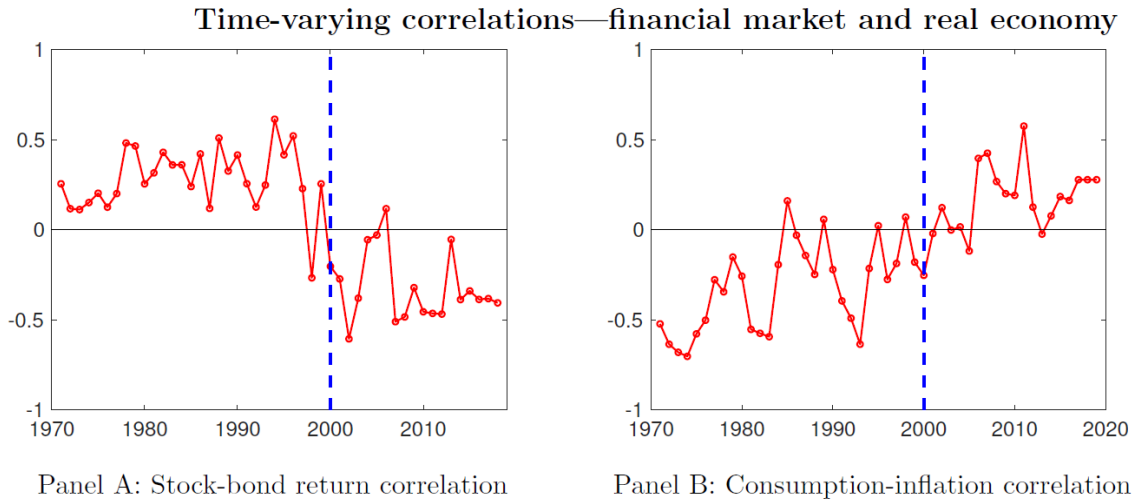
Time variation in key correlation measures

Li et al (2020)[67] make two important contributions that corroborate the findings of Daly (2016). They demonstrate that, since 2000:

- The correlation between consumption growth and inflation has changed from negative to positive; and
- The correlation between equity and bond returns has changed from positive to negative.

This is illustrated in Figure 7 below.

Figure 7: Return correlations over time



Source: Li et al (2020), Figure 1, p. 1.

Consumption-inflation correlation

The right-hand panel of Figure 7 shows that the correlation between consumption growth and inflation has changed from being largely negative prior to 2000 to being largely positive after. That is, since 2000, inflation has tended to be higher than average during periods of positive consumption growth and lower than average during periods of negative (or low) consumption growth. In other words, contrary to the earlier period, low inflation has tended to occur during 'bad' states of the world since 2000.

This means that, since 2000, nominal bonds have tended to perform well during 'bad' states of the world (when consumption growth is low and the marginal utility of consumption is high). Specifically, during 'bad' states, there tends to be low inflation such that the real return on nominal bonds turns out to be higher than expected. Because nominal bonds provide a hedge against inflation risk, the value of this

[67] Li, E., T. Zha, J. Zhang, and H. Zhou, 2020, *Stock-bond return correlation, bond risk premium fundamentals, and fiscal-monetary policy regime*, Federal Reserve Bank of Atlanta, Working paper series.

hedging benefit will be reflected (other things being equal) in higher bond prices and commensurately lower yields. Thus, the increase in correlation between consumption growth and inflation is consistent with a general lowering of bond yields.

Stock-bond return correlation

The left-hand panel of Figure 7 shows the corollary of the right-hand panel. Since 2000, nominal bonds perform well during 'bad' states of the world (because in bad states of the world there now tends to be lower inflation so real returns on bonds turn out to be higher than expected), when equities perform poorly. Thus, we have negative correlation between stock and bond returns in the post-2000 period.

In other words, whereas bonds provide a hedge to growth and inflation shocks (which have tended to occur together since 2000), equities do not.

Consequently, the root cause of the decline in nominal bond yields (because of the value of bonds as a hedge asset) does not also cause a decline in equity returns – equity and bond returns have tended to move in opposite directions since 2000.

Implications

All of the analysis and results of Li et al are consistent with Daly's empirical observations and theoretical model. Li et al explain that required returns on bonds have fallen since 2000 (to reflect their value as a hedge asset) but required returns on equity have not declined (because equity returns provide no such hedging benefit).

3.6 Rankin and Idil (2014)

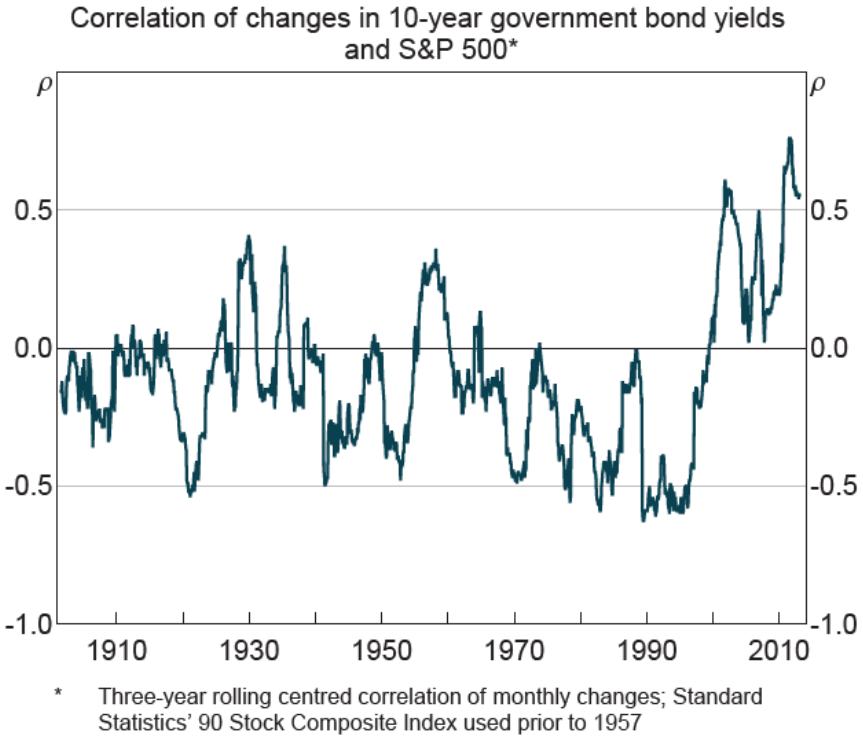
Consistency with Li et al (2020)

In an RBA Bulletin Paper, Rankin and Idil (2014)[68] consider the correlation between equity returns and changes in bond yields. Note that the correlation between equity returns and changes in bond *yields* is the opposite of the correlation between equity returns and bond *returns*. This is because an increase in the bond *yield* results in a decrease in the bond *price*, and therefore a negative *return* on that bond.

Thus, the correlation with bond *yields* reported by Rankin and Idil is the opposite of the correlation with bond *returns* reported by Li et al above. Rankin and Idil report that the correlation with bond *yields* has been positive since 2000, shown in Figure 8 below. This result is consistent with the negative correlation to bond *returns* in Panel A of Figure 7 above.

[68] Rankin, E. and M. Idil, 2014, *A century of stock-bond correlations*, RBA Bulletin, September.

Figure 8: Correlation between equity returns and bond yields



Source: Rankin and Idil (2014), Graph 1, p. 67.

Rankin and Idil (2014) explain the correlation between equity returns and changes in bond yields in terms of growth and inflation shocks and changes in uncertainty about future growth.

Growth and inflation shocks

First consider a positive shock to growth and inflation. That is, in a particular period, economic growth and inflation turns out to be higher than expected. In that scenario:

- Bond prices fall because the term premium (i.e., the market's expectations of future interest rates) increases – future rates are expected to rise during periods of higher inflation and higher growth; and
- Stock prices rise because:
  - Forecasted dividends increase – particularly due to higher growth expectations; and
  - The increase in dividends more than offsets the increase in discount rates because:
    - Although the base risk-free rate rises (due to the increase in the term premium described above);
    - Since 2000, the equity risk premium has increased even as risk-free rates have fallen, so equity prices are now less sensitive to changes in base risk-free rates. On this point, Rankin and Idil observe that:

> *the unusually persistent positive stock-bond yield correlation relates to the rise in estimates of the equity risk premium (Duarte and Rosa 2013[69]). This has occurred alongside a decline in short-term rates and has probably led to the equity risk premium having a proportionally larger influence on the discount rate for equities. As a result, equity prices may have become more sensitive to uncertainty about real growth, and thus more positively correlated with bond yields.*[70]

Thus, a positive shock to growth and inflation tends to result in stock prices and bond yields rising – resulting in positive correlation between those two variables. Conversely, stock prices and bond yields both tend to fall if a negative shock to growth and inflation occurs.

Changes to uncertainty about future growth

Rankin and Idil (2014) also consider changes in *uncertainty* about future growth. Consider the case where the market becomes more uncertain about future growth prospects for the economy. In that scenario:

- Stock prices fall due to an increase in the equity risk premium – as more uncertainty equates to more risk, which requires a higher premium. In this regard, the above quote notes that the equity risk premium now represents a larger share of the overall discount rate, such that stock prices are now more sensitive to changes in uncertainty; and
- Bond prices fall because the term premium falls due to a 'flight to quality' – as uncertainty increases, investors tend to seek safe haven assets such as government bonds. On this point, Rankin and Idil observe that:

> *the literature suggests that the term premium falls as uncertainty about growth increases, consistent with the 'flight-to-safety' phenomenon (Dick, Schmeling and Schrimpf 2013[71]).*[72]

and that:

> *there are indications that the term premium has become increasingly sensitive to uncertainty about growth (Dick et al 2013), implying that the same degree of uncertainty about real activity led to stronger positive correlations as bond yields became more sensitive to the outlook for growth. This is consistent with US Treasuries increasingly being viewed as a 'safe-haven' asset for global investors, and the substantial rise in foreign holdings of Treasuries over the past 50 years. Indeed, foreign investors' purchases of US Treasuries have historically been negatively correlated with the VIX index of expected US equity market volatility, which tends to rise during periods of elevated real uncertainty. However, in recent years foreign purchases have tended to increase in response to higher equity market volatility. Consistent with this, Treasury yields and the VIX index have historically been uncorrelated but have displayed a strong negative correlation more recently (Graph*

---

[69] Duarte F and C Rosa, 2013, *Are Stocks Cheap? A Review of the Evidence*, Liberty Street Economics blog, 8 May. Available at <http://libertystreeteconomics.newyorkfed. org/2013/05/are-stocks-cheap-a-review-of-the-evidence.html>.

[70] Rankin and Idil, 2014, pp. 70-71.

[71] Dick C, M Schmeling and A Schrimpf (2013), 'Macro-Expectations, Aggregate Uncertainty, and Expected Term Premia', *European Economic Review*, 58, pp 58–80.

[72] Rankin and Idil, 2014, p. 68.

> *5). As a result, the positive impact of heightened uncertainty about real growth on the stock-bond correlation has increased since 2000 (Table 1).* [73]

Thus, an increase in uncertainty about future growth prospects tends to result in stock prices and bond yields falling – resulting in positive correlation between those two variables. Conversely, stock prices and bond yields both tend to rise in the case of a reduction in uncertainty about future growth prospects.

Implications

Rankin and Idil (2014) explain the changing pattern in the correlation between equity returns and bond yields in terms of increases in the equity risk premium as risk-free rates have fallen.

3.7 RBA observations of a stable required return on equity

We also note that the RBA has twice commented on the stability of required returns on equity even as government bond yields have been driven lower.

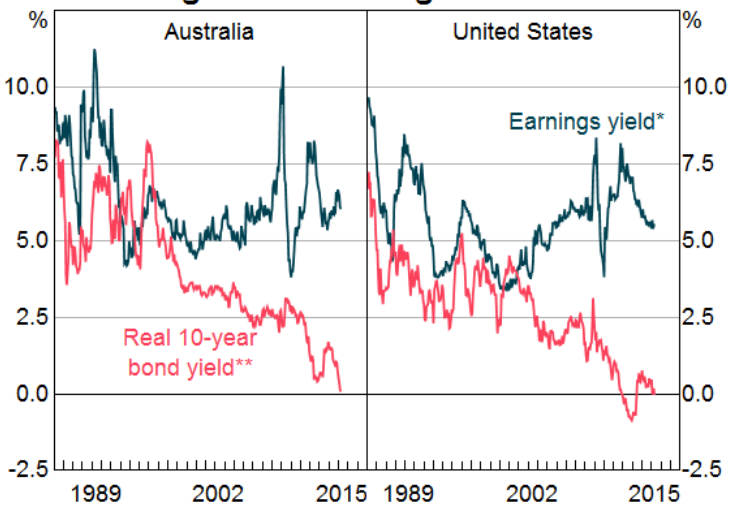
In 2015, the then Governor of the RBA stated that the equity risk premium[74] appears to have risen to offset the post-GFC falls in the risk-free rate such that the required return on equity did not fall in line with the decline in government bond yields:

> *…post-crisis, the earnings yield on listed companies seems to have remained where it has historically been for a long time, even as the return on safe assets has collapsed to be close to zero (Graph 2). This seems to imply that* ***the equity risk premium observed ex post has risen even as the risk-free rate has fallen*** *and by about an offsetting amount.* [75]

[73] Rankin and Idil, 2014, p. 70.
[74] The MRP parameter in the formula in paragraph **Error! Reference source not found.**.
[75] Glenn Stevens, 21 April 2015, *The world economy and Australia*, https://www.rba.gov.au/speeches/2015/sp-gov-2015-04-21.html, emphasis added.

Graph 2

Earnings and Sovereign Bond Yields



* Trailing earnings-to-price ratio for the MSCI Australia and S&P 500 indices

** Prior to 1996 for Australia and 2000 for the United States, 10-year sovereign yields are deflated using underlying inflation

Sources: ABS; Bloomberg; Board of Governors of the Federal Reserve System; MSCI; RBA; Thomson Reuters; Yieldbroker

Governor Stevens went on to note that the returns on equity required by investors have not shifted even though risk-free rates have fallen to exceptionally low levels:

> *…it might be explained simply by stickiness in the sorts of 'hurdle rates' that decision makers expect investments to clear. I cannot speak about US corporates, but this would seem to be consistent with the observation that we tend to hear from Australian liaison contacts that* ***the hurdle rates of return that boards of directors apply to investment propositions have not shifted, despite the exceptionally low returns available on low-risk assets****.* [76]

He went on to further consider the explanation that:

> *…the risk premium being required by those who make decisions about real capital investment has risen by the same amount that the riskless rates affected by central banks have fallen.* [77]

In a 2019 speech, the current Governor of the RBA made a similar point:

> *In this context, it is worth noting that despite the marked decline in global interest rates (and some decline in the cost of equity), average hurdle rates of return for new investments in many countries have not changed much (Graph 8). It seems that there is a global norm for hurdle rates somewhere around the 13 to 14 per cent mark and it is hard to shift this norm, even at record low interest rates.*
>
> *There are a couple of possible explanations for this.*

---

[76] Glenn Stevens, 21 April 2015, *The world economy and Australia*, https://www.rba.gov.au/speeches/2015/sp-gov-2015-04-21.html, emphasis added.

[77] Glenn Stevens, 21 April 2015, *The world economy and Australia*, https://www.rba.gov.au/speeches/2015/sp-gov-2015-04-21.html.

*The first is that **the reduction in the cost of borrowing has been offset by a rise in the required risk premium** due to the uncertainties that I spoke about. If this were so, the hurdle rate would be unchanged, with lower interest rates just compensating for the riskier environment.*

The second possibility is that some firms have been slow to adjust to the new reality of low interest rates. We hear reports that a hurdle rate of return of 13 to 14 per cent has been hard wired into the corporate culture in some companies. Changing this hard-wiring is difficult and time consuming. However, from our liaison with Australian companies, we do know that some companies have lowered their hurdle rates and this is opening up new opportunities for them. It would be good to hear more such reports.

My view is that there is an element of truth to both explanations: risk premiums have gone up and, in some cases, hurdle rates of return are too sticky.[78]

3.8 Conclusions on the relationship between the risk-free rate and the MRP

ENA considers that the evidence set out above:

- Makes a very strong case for the existence of a strong negative relationship between the risk-free rate and the MRP, at least since the turn of the century;
- The theoretical explanations for the observed relationship are grounded in two reinforcing phenomena:
  - A rise in the relative wealth of more risk-averse investors; and
  - Changes in central bank monetary policy that have resulted in a change in the relationship between inflation and consumption growth.

  Both of these effects tend to increase the demand for government bonds, and to increase the premium required on risky assets in 'bad' states of the world; and
- The most important implication from the theoretical literature is that the relationship exists. The literature accepts that the negative relationship has been well established and has turned towards identifying the reasons for it.

3.9 Benefits of recognising the relationship

ENA considers that the benefit of recognising the observed relationships compared to the existing approach is that it would:

- Be consistent with the theoretical, empirical evidence, as well as the practice of other regulatory bodies; and
- Result in a better unbiased estimate of the efficient rate of return, promoting efficient long-term network investment and utilisation signals.

[78] Philip Lowe, 29 October 2019, *Some echoes of Melville*, https://www.rba.gov.au/speeches/2019/pdf/sp-gov-2019-10-29.pdf, emphasis added.

4 Estimating the MRP for the 2022 RoRI

Key messages

- The expert reports commissioned by the AER have identified three main approaches for estimating the MRP:
  - Fixed MRP / Historical excess returns;
  - Fixed TMR; and
  - DGM.
- ENA recommends that:
  - **Material weight should be applied to the forward-looking DGM evidence.**

    ENA agrees that there is real merit in including forward-looking evidence to inform the estimate of the MRP. The 'calibrated' DGM approach developed in this chapter has the dual benefits of reflecting forward-looking evidence and of addressing the concerns expressed by the AER in 2018.
  - **The historical evidence should be assessed with reference to the hybrid approach identified in the recommendations of the CEPA report.**

    This approach applies weight to both the fixed MRP and fixed TMR approaches. The rationale for this method is that both of those approaches are based on unrealistic assumptions and the true relationship between the risk-free rate and the MRP is likely to lie somewhere between the two. When implementing this approach, the fixed TMR approach should receive at least as much weight as the fixed MRP assumption – in light of the evidence of a strong negative relationship between the risk-free rate and the MRP.
- ENA recommends that the next steps of the consultation process should focus on how these three estimation methods should be best combined into a single point estimate the best reflects the forward-looking MRP at the time of the RoRI.

4.1 Two tasks when setting the MRP allowance

Under the Binding Guideline legislation, the AER has two tasks when considering its MRP allowance:

- An MRP allowance must be adopted at the time of the RoRI. ENA considers that this task should be completed by adopting the MRP which, in conjunction with other parameter estimates, produces the best unbiased estimate of the market cost of equity capital at the time of the RoRI; and
- The RoRI must also explain if, and how, the estimate of the MRP is to be updated at the time of each determination that is made during the period of that RoRI. The Binding Guideline legislation requires that any such updating must be performed in a way that is objective and mechanical. This is a second-best solution in that the AER is prevented from having regard to relevant information at the time of each determination. Rather, the AER must bind itself by setting out some formulaic approach for determining the MRP over the subsequent four years. ENA considers that this task should be completed by adopting a formulaic updating procedure that, among all feasible formulaic procedures and in conjunction with other parameter estimates, is likely to produce the best

unbiased estimate of the market cost of equity capital at the time of each determination under this RoRI.

This section sets out ENA's views about the 'starting point' MRP to be adopted in the RoRI and the following section sets out ENA's views about how the mechanical updating procedure might work, and why there must be a consistency between the two tasks.

4.2 Three key estimation procedures for the 'starting point' MRP

The expert reports commissioned by the AER as part of the 2022 RoRI process have identified three key estimation procedures:

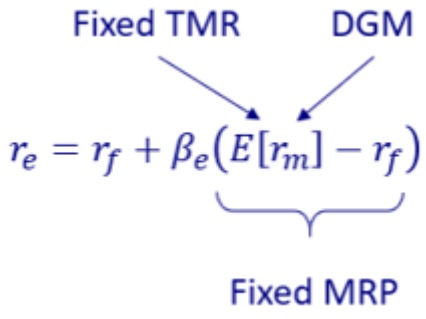
- **The fixed MRP approach**. Under this approach, the MRP is estimated as the mean of excess returns observed over a long historical period. The AER has previously referred to this as the 'historical excess returns (HER) approach';
- **The fixed total market return (fixed TMR) approach:** Under this approach, the expected return on the market is estimated as the average real return over a long historical period plus current expected inflation; and
- **The dividend growth model (DGM) approach:** Under this approach the expected return on the market is estimated as the discount rate that equates the present value of future dividends with the observed market index.

The AER's consultant reports identify these approaches as being commonly used by comparable regulators, academics and practitioners, and as being appropriate for the AER's task.

The fixed TMR and DGM approaches provide direct estimates of the required return on market equity – the $E[r_m]$ parameter as shown in Figure 9 below. Having obtained this estimate of $E[r_m]$, the CAPM is then implemented by using the prevailing risk-free rate in both places where the r_f parameter appears in the CAPM formula. To the extent that an estimate of MRP is required, it is simply obtained by subtracting the prevailing risk-free rate from the estimate of $E[r_m]$.

By contrast, the fixed MRP approach produces a direct estimate of the average MRP, as shown in Figure 9 below. To the extent that an estimate of $E[r_m]$ is required, it is simply obtained by adding the relevant risk-free rate.

Figure 9: Implementation of return on equity estimation approaches



Source: Sharpe-Lintner CAPM formula.

The following sections set out ENA's views on each of the three key estimation methods. The subsequent section then explains why ENA sees no direct role for other evidence such as surveys and conditioning

variables. The final section of this chapter sets out ENA's views on the evidence that should be used to inform the RoRI MRP allowance.

4.3 The fixed MRP approach

Overview

This section confirms ENA's view that the historical excess returns estimates are relevant evidence that should be used to inform the estimate of the MRP. It begins by summarising the approach adopted in the 2018 RoRI and presenting updated estimates based on that approach. The remainder of this section then addresses a number of implementation issues, explaining why ENA considers that:

- Arithmetic averages should be preferred to geometric averages;
- The estimates presented by Mathews (2019) should be disregarded; and
- The mean of historical excess returns should be interpreted as the MRP that would be appropriate in the average market conditions that were observed over the relevant historical period.

The section concludes with some recommendations about how the fixed MRP estimate should be used and interpreted in the 2022 RoRI.

The approach of the 2018 RoRI

The AER in 2018 computed the mean excess return over five different historical periods and concluded that the most recent period (post 1988) was most relevant to its task:

> *We have calculated HER over multiple time periods including both 100 year and 30 year periods. However, we consider data from the most recent period is the most relevant to our estimation of a forward looking MRP as it is most representative of recent market trends including the introduction of imputation credits and higher levels of integration with international markets.* [79]

The 2018 RoRI noted that the most recent period – from 1988 to 2017 – generated a mean estimate of 6.1% at that time:

> *The most recent, 30 year, period produces an estimate of 6.1 per cent and is most likely to reflect current prevailing conditions.* [80]

In 2018 the AER then concluded that:

> *We derive a point estimate of 6.1 per cent from HER evidence.* [81]

Updated historical excess returns estimates

ENA has updated the figures published by the AER in 2018 to reflect new data since that time, with the results summarised in Table 1 below.

Table 1: Updated historical excess return estimates

[79] AER, December 2018, *Final Rate of Return Instrument: Explanatory Statement*, pp. 90-91.
[80] AER, December 2018, *Final Rate of Return Instrument: Explanatory Statement*, p. 94.
[81] AER, December 2018, *Final Rate of Return Instrument: Explanatory Statement*, p. 94.

Sampling period	Arithmetic mean historical excess return
1883-2021	6.4%
1937-2021	6.2%
1958-2021	6.7%
1980-2021	6.8%
1988-2021	6.5%

Source: AER 2018 estimates updated by ENA. Year-to-date figures are used for 2021.

In its 2018 RoRI materials, the AER reported arithmetic and geometric means for a number of different historical periods and concluded that arithmetic averages represent the "most robust source of evidence" [82] and that the period from 1988 "is most likely to reflect current prevailing conditions." [83] The AER adopted a point estimate of 6.1%, in line with the arithmetic mean from the period beginning in 1988.

Arithmetic vs. geometric means

In previous reviews, the AER has considered the extent to which it is appropriate to rely on arithmetic and geometric means of historical excess returns for the purpose of estimating forward-looking expected returns. The *Equity Omnibus* paper sets out the AER's preliminary position as follows:

> *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.*[84]

Under the Binding Guideline legislation, the 2022 review process is ENA's first opportunity to make submissions on this issue.

ENA strongly disagrees with any weight being applied to the geometric mean when using historical data to estimate a forward-looking expected return. This view is supported by very clear statements on the issue in the 2020 editions of the two leading finance textbooks.

The two leading finance textbooks are *Corporate Finance* by Professors Berk and DeMarzo[85] and *Principles of Corporate Finance* by Professors Brealey, Myers and Allen.[86] The current editions of both contain clear explanations of why the arithmetic mean must be used, and why it is mathematically and

[82] AER, December 2018, *Rate of Return Instrument: Explanatory Statement*, p. 89.
[83] AER, December 2018, *Rate of Return Instrument: Explanatory Statement*, p. 94.
[84] AER, July 2021, *Equity Omnibus*, p. 24.
[85] Berk, J. and P. DeMarzo, 2020, *Corporate Finance*, 5th global edition, Pearson.
[86] Brealey, R., S. Myers and F. Allen, 2020, *Principles of Corporate Finance*, 13th edition, McGraw-Hill.

conceptually incorrect to use the geometric mean when using historical data to estimate a forward-looking expected return.

Berk and DeMarzo (2020) conclude that:

> *We should use the arithmetic average return when we are trying to estimate an investment's expected return over a future horizon based on its past performance.* [87]

Their full explanation of why arithmetic means must be used when estimating forward-looking expected returns is set out in Figure 10 below.

[87] Berk, J. and P. DeMarzo, 2020, *Corporate Finance*, 5th global edition, Pearson, p. 368.

Figure 10: Why arithmetic means must be used: Berk and DeMarzo

Arithmetic Average Returns Versus Compound Annual Returns

We compute average annual returns by calculating an *arithmetic* average. An alternative is the compound annual return (also called the compound annual growth rate, or CAGR), which is computed as the *geometric* average of the annual returns $R_1, \ldots, R_T$:

$$\text{Compound Annual Return} = [(1 + R_1) \times (1 + R_2) \times \ldots \times (1 + R_T)]^{1/T} - 1$$

It is equivalent to the IRR of the investment over the period:

$$(\text{Final Value/Initial Investment})^{1/T} - 1$$

For example, using the data in Figure 10.1, the compound annual return of the S&P 500 from 1926–2017 was

$$(664{,}567/100)^{1/92} - 1 = 10.04\%$$

That is, investing in the S&P 500 from 1926 to 2018 was equivalent to earning 10.04% per year over that time period. Similarly, the compound annual return for small stocks was 12.66%, for corporate bonds was 6.06%, and for Treasury bills was 3.3%.

In each case, the compound annual return is below the average annual return shown in Table 10.3. This difference reflects the fact that returns are volatile. To see the effect of volatility, suppose an investment has annual returns of +20% one year and −20% the next year. The average annual return is $\frac{1}{2}(20\% - 20\%) = 0\%$, but the value of $1 invested after two years is

$$\$1 \times (1.20) \times (0.80) = \$0.96$$

That is, an investor would have lost money. Why? Because the 20% gain happens on a $1 investment, whereas the 20% loss happens on a larger investment of $1.20. In this case, the compound annual return is

$$(0.96)^{1/2} - 1 = -2.02\%$$

This logic implies that the compound annual return will always be below the average return, and the difference grows with the volatility of the annual returns. (Typically, the difference is about half of the variance of the returns.)

Which is a better description of an investment's return? The compound annual return is a better description of the long-run *historical* performance of an investment. It describes the equivalent risk-free return that would be required to duplicate the investment's performance over the same time period. The ranking of the long-run performance of different investments coincides with the ranking of their compound annual returns. Thus, the compound annual return is the return that is most often used for comparison purposes. For example, mutual funds generally report their compound annual returns over the last five or ten years.

Conversely, we should use the arithmetic average return when we are trying to estimate an investment's *expected* return over a *future* horizon based on its past performance. If we view past returns as independent draws from the same distribution, then the arithmetic average return provides an unbiased estimate of the true expected return.*

For example, if the investment mentioned above is equally likely to have annual returns of +20% and −20% in the future, then if we observe many two-year periods, a $1 investment will be equally likely to grow to

$$\begin{aligned}(1.20)(1.20) &= \$1.44,\\ (1.20)(0.80) &= \$0.96,\\ (0.80)(1.20) &= \$0.96,\\ \text{or } (0.80)(0.80) &= \$0.64.\end{aligned}$$

Thus, the average value in two years will be $(1.44 + 0.96 + 0.96 + 0.64)/4 = \$1$, so that the expected annual and two-year returns will both be 0%.

* For this result to hold we must compute the historical returns using the same time interval as the expected return we are estimating; that is, we use the average of past monthly returns to estimate the future monthly return, or the average of past annual returns to estimate the future annual return. Because of estimation error the estimate for different time intervals will generally differ from the result one would get by simply compounding the average annual return. With enough data, however, the results will converge.

Source: Berk, J. and P. DeMarzo, Corporate Finance, 5th global edition, Pearson, p. 368.

Similarly, Brealey, Myers and Allen (2020) conclude as follows:

> *Moral: If the cost of capital is estimated from historical returns or risk premiums, use arithmetic averages, not compound annual rates of return.* [88]

Their full explanation of why arithmetic means must be used when estimating forward-looking expected returns is set out in Figure 10 below.

[88] Brealey, R., S. Myers and F. Allen, 2020, *Principles of Corporate Finance*, 13th edition, McGraw-Hill, p. 170.

Figure 11: Why arithmetic means must be used: Brealey, Myers and Allen

Arithmetic Averages and Compound Annual Returns

Notice that the average returns shown in Table 7.1 are arithmetic averages. In other words, we simply added the 118 annual returns and divided by 118. The arithmetic average is higher than the compound annual return over the period. The 118-year compound annual return for common stocks was 9.6%.[5]

The proper uses of arithmetic and compound rates of return from past investments are often misunderstood. Therefore, we call a brief time-out for a clarifying example.

Suppose that the price of Big Oil's common stock is $100. There is an equal chance that at the end of the year the stock will be worth $90, $110, or $130. Therefore, the return could be −10%, +10%, or +30% (we assume that Big Oil does not pay a dividend). The *expected* return is ⅓ (−10 + 10 + 30) = +10%.

If we run the process in reverse and discount the expected cash flow by the expected rate of return, we obtain the value of Big Oil's stock:

$$PV = \frac{110}{1.10} = \$100$$

The expected return of 10% is therefore the correct rate at which to discount the expected cash flow from Big Oil's stock. It is also the opportunity cost of capital for investments that have the same degree of risk as Big Oil.

Now suppose that we observe the returns on Big Oil stock over a large number of years. If the odds are unchanged, the return will be −10% in a third of the years, +10% in a further third, and +30% in the remaining years. The arithmetic average of these yearly returns is

$$\frac{-10 + 10 + 30}{3} = +10\%$$

Thus, the arithmetic average of the returns correctly measures the opportunity cost of capital for investments of similar risk to Big Oil stock.[6]

The average compound annual return[7] on Big Oil stock would be

$$(.9 \times 1.1 \times 1.3)^{1/3} - 1 = .088, \text{ or } 8.8\%$$

which is *less* than the opportunity cost of capital. Investors would not be willing to invest in a project that offered an 8.8% expected return if they could get an expected return of 10% in the capital markets. The net present value of such a project would be

$$NPV = -100 + \frac{108.8}{1.1} = -1.1$$

Moral: If the cost of capital is estimated from historical returns or risk premiums, use arithmetic averages, not compound annual rates of return.[8]

Source: Brealey, R., S. Myers and F. Allen, 2020, Principles of Corporate Finance, 13th edition, McGraw-Hill, pp. 169-170.

Other relevant evidence on this issue includes a Harvard Business School Case that compares the use of arithmetic and geometric means of historical excess stock returns. The instructor solutions to that case note that it is the *expected* annual return that is relevant when estimating MRP and that:

> *Students focusing on the geometric average will argue that it is the appropriate growth rate of an investment…However, the arithmetic average is a better measure of the expected return on an investment.*[89]

The instructor solutions then set out a number of numerical examples to demonstrate why the arithmetic mean is correct and the geometric mean is incorrect. The instructor solutions are also quite clear about which approach should be used to estimate the MRP:

> *The arithmetic average annual return is the correct measure of the expected annual return.*[90]

Consistent with the views of leading textbooks and Harvard Business cases, Dr Lally has advised that the arithmetic return must be used and that the geometric return is inconsistent with the NPV=0 principle. He presents a detailed algebraic analysis to evaluate whether each form of average is consistent with the NPV=0 principle and concludes that:

> *The geometric mean fails this test whilst the arithmetic mean will satisfy it if annual returns are independent and drawn from the same distribution. So, if historical average returns are used, they should be arithmetic rather than geometric.*[91]

ENA considers that the evidence is compelling. Leading textbooks and case studies prepared by Professors at Harvard, Stanford, MIT, Wharton and London Business School not only report that they recommend the use of arithmetic means, but explain why it is wrong to use a geometric mean for the purpose of estimating forward-looking expected returns.

The 2018 RoRI materials suggest that the geometric mean might be more appropriate if the investment horizon increases,[92] citing Jacquier, Kane and Marcus (2003)[93] as support for that proposition. But this is only relevant if the AER compounds returns over an investment horizon. But nowhere in the AER's process does it compound any returns, so that rationale is not relevant. Indeed, Dr Lally has previously explained to the AER that this point, and consequently Jacquier, Kane and Marcus (2003) is not relevant because there is no compounding of returns in the AER's process:

> *The AER's belief that geometric averages are useful apparently arises from a belief that there is a compounding effect in their regulatory process (AER, 2012, Appendix A.2.1), and therefore the analysis of Blume (1974) and Jacquier et al (2003) applies. However, I do not think that there is any such compounding effect in regulatory situations and the absence of a compounding effect leads to a preference for the arithmetic mean over the geometric mean. If historical average returns are used, they should be arithmetic rather than geometric averages.*[94]

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[89] HBS Marriott Corporation Case, Instructor Guide.
[90] HBS Marriott Corporation Case, Instructor Guide.
[91] Lally, M., 2012, *The cost of equity and the market risk premium*, p. 32. Moreover, historical excess returns must be independent and drawn from the same unconditional distribution to support an historical mean estimate.
[92] AER, December 2018, *Rate of Return Instrument: Explanatory Statement*, p. 90.
[93] Jacquier E, A. Kane and A.J. Marcus, 2003, *Geometric or Arithmetic Mean: A Reconsideration*, Financial Analysts Journal, 59, pp.46- 53.
[94] Lally, M., *The cost of equity and the market risk premium*, Victoria University of Wellington, 25 July 2012, pp. 31-32.

NERA (2012)[95] has also previously explained the same point.

This point is again explained in more detail in Wheatley (2021). [96]

ENA submits that geometric means should be disregarded in the AER's regulatory task. There is no rationale for having regard to geometric means and consistent and clear explanations from a range of sources as to why arithmetic means must be used in the AER's process.

Mathews (2019)

The Equity Omnibus paper draws attention to a recent discussion paper by Mathews (2019): [97] [98]

> *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…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. We invite stakeholders to consider the new series and its appropriateness for updating the HER data used by us in estimating the MRP.* [99]

ENA has commissioned Dr Simon Wheatley to consider the Mathews (2019) approach and his report is attached to this submission.[100] Dr Wheatley identifies a number of issues with the Mathews approach:

- **Mathews recommends that the Lamberton data should be preferred to his**

  Properly accounting for capitalisation changes is crucial when measuring stock returns. Mathews highlights that his approach to capitalisation changes (see below) is an approximation at best and recommends that the Lamberton data should be preferred to his approximations:

  > ***The share price indices calculated are probably the least reliable of all the series*** *due to the lack of information required to calculate an accurate divisor, a number used to deflate the index due to adjustments in the capital structure of included companies. To calculate this requires information about the terms of equity issuance, which is lacking from the RBA dataset: we can only infer issuance from a change in the number of shares outstanding.*
  >
  > *The approximation used is to assume that all equity issuance greater than 100 per cent of shares outstanding is a stock split, and not dilutive of existing shareholders. Everything else is assumed 100 per cent dilutive and therefore the index is revised*

[95] NERA, February 2012, *The market risk premium: A report for CitiPower, Jemena, Powercor, SP AusNet and United Energy*, pp. 3-12.
[96] Wheatley, S., August 2021, *An examination of the RBA's new estimates of the MRP*, Section 6.
[97] Mathews, T., 2019, *The Australian equity market over the past century*, RBA Bulletin. Pp. 167-171.
[98] Mathews, T., 2019, *The Australian equity market over the past century*, RBA Research Discussion Paper, RDP 2019-04.
[99] AER, July 2021, *Equity Omnibus*, p. 22.
[100] Wheatley, S., August 2021, *An examination of the RBA's new estimates of the MRP*.

down. As a result of this, ***the Lamberton share indices should be preferred to the ones calculated from the RBA dataset****, where they are available.* [101]

Dr Wheatley explains why the Mathews approximation will produce estimates that are downwardly biased.

» **Introduction of biases from capitalisation change assumptions:**

Mathews computes his own series of stock returns. He derives those returns from information about prices, dividend yields and number of shares outstanding. The data available to Mathews, however, does not include information about capitalisation changes such as stock splits and bonus issues. In seeking to account for this, Mathews employs a crude assumption – that a stock split has occurred whenever the number of outstanding shares doubles, but not otherwise. Dr Wheatley provides a number of examples where this crude assumption significantly fails to result in an unbiased estimate of the risk premium.

» **Use of approach that is inconsistent with AER MRP estimates**:

Mathews constructs MRP estimates that differ from the approach that is ordinarily used in practice, including by the AER. Rather than subtracting the 10-year government bond yield, Mathews subtracts the one-year holding period return on 10-year government bonds. That is, rather that measuring the MRP in excess of the 10-year government bond yield, he measures the return relative to what could have been earned by buying a bond at the beginning of the year, holding it for one year and then selling it. Thus, if the Mathews approach is adopted for the MRP, a consequential change would have to be made to the approach for estimating the risk-free rate – in order to preserve consistency.

Dr Wheatley explains why the Mathews approach to the risk-free rate is likely to produce MRP estimates that are downwardly biased relative to the standard approach that is currently employed by the AER.

» **Exclusion of dividend imputation impacts:**

Mathews appears to make no adjustment for the assumed value of dividend imputation tax credits, so will be downwardly biased relative to the AER's current approach.

» **Reliance on geometric mean:**

Mathews reports the geometric mean, which is incorrect for the reasons set out above.

For the reasons set out above, ENA submits that no further consideration of the Mathews (2019) figures should be given through the 2022 RoRI process.

An historical average, not a forward-looking estimate

The mean of the observed excess returns of an historical period is an estimate of the *average* MRP over that historical period. By definition, it reflects the average market conditions that occurred over the relevant historical period.

The mean historical excess return does not, and cannot, reflect the prevailing market conditions at a point in time. To see this, note that the estimate is computed using data through to the end of the

[101] Mathews, T., 2019, *The Australian equity market over the past century*, RBA Research Discussion Paper, RDP 2019-04, p. 32, emphasis added.

previous year. That estimate is the same whether the current year is an economic boom or a financial crisis.

Logically, the mean historical excess return can only be interpreted as a forward-looking MRP in the prevailing market conditions if it is the case that the forward-looking MRP is always the same, regardless of the state of the prevailing market conditions. CEPA has identified this point in noting that the historical excess return approach embeds the *assumption* that the MRP is constant over time and does not vary with market conditions.[102]

The notion that the MRP is constant over time is inconsistent with the advice that the AER has received from CEPA[103] and Dr Lally, who has advised the AER that:

> *Since the MRP estimated by the AER is very stable over time (because high weight is placed on the long-term historical averaging methodology), and the true value is likely to fluctuate much more than this (with high values during unfavourable economic conditions and low values during favourable economic conditions), the MRP is likely to be overestimated during favourable economic conditions and underestimated during unfavourable conditions.* [104]

By contrast, the *Equity Omnibus* paper suggests that the historical average *can* be used as a forward-looking estimate of the MRP:

> *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.*

Logically, the historical average could only be used as a forward-looking estimate of the MRP:

- If the AER *assumes* that the forward-looking MRP is constant over time and independent of the prevailing conditions in financial markets – against the evidence and recommendations of its expert consultants. ENA notes that CEPA has advised the AER that there is "no good evidence" for such an assumption; [105] or
- If the AER was prepared to accept an approach that is upwardly biased in some market conditions and downwardly biased in others – on the basis that these biases might tend to cancel out over time. ENA's understanding is that this approach is unacceptable as the AER has concluded that its approach should be aimed at producing the best unbiased estimate of the market cost of capital at the time of each decision.

Consequently, ENA considers that the proper interpretation of the historical average is as an estimate of the average MRP, reflecting the average market conditions over the relevant historical period. Under this interpretation, it would be necessary to recognise that the historical average MRP will be above the prevailing MRP in some market conditions and below it in others.

Specifically, CEPA has presented the AER with strong evidence of a negative relationship between the risk-free rate and the forward-looking MRP. Thus, the historical average MRP will tend to:

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[102] CEPA, *Relationship between RFR and MRP*, June 2021, p. 4.
[103] Set out in the previous chapter of this submission.
[104] Lally, M., 9 April 2021, *An appropriate term for the allowed cost of capital*, p. 33.
[105] CEPA, *Relationship between RFR and MRP*, June 2021, p. 44.

- Overstate the forward-looking MRP when risk-free rates are above average; and
- Understate the forward-looking MRP when risk-free rates are below average.

ENA submits that the AER should have careful regard to these biases when setting the allowed return on equity. For example, when risk-free rates are below average, the historical average MRP will tend to understate the forward-looking MRP, and the resulting estimate of the required return on equity will tend to understate the true figure. Thus, in those circumstances, the proper interpretation of an estimate of the required return on equity is as a lower bound rather than as a point estimate.

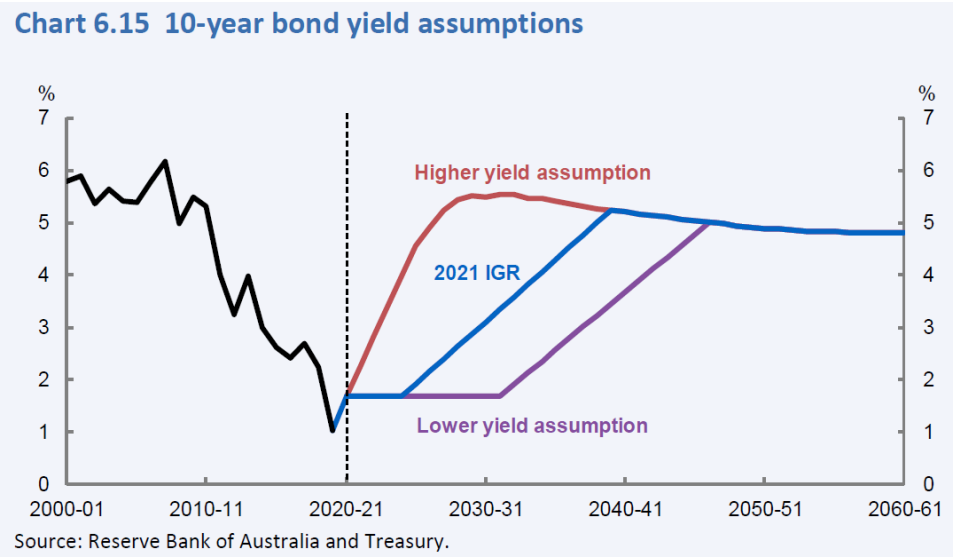
An estimate of the 'normal' required return on equity

The historical average MRP can be interpreted as a 'normal' or 'average' MRP in that it reflects the average market conditions over the relevant historical period. Consequently, this estimate of a 'normal' MRP can be consistently paired with an estimate of the 'normal' risk-free rate to produce an estimate of the 'normal' required return on equity – a figure that reflects average market conditions.

This estimate of the 'normal' return on equity could then be used a neutral reference point. The allowed return on equity would then be set above or below this neutral point to the extent that the prevailing market conditions differed from the average.

ENA considers that an appropriate estimate of the 'neutral' or 'normal' risk-free rate is 5%. The recent Intergenerational Report consider three future interest rate scenarios developed by the RBA and Commonwealth Treasury. All three scenarios converged on a nominal 10-year government bond yield of 5%, differing only in the length of time taken to reach that point. These scenarios are summarised in Figure 12 below. ENA notes that the average 10-year government bond yield since 1993, when the RBA charter was changed to require it to target inflation to the 2-3% band, has been 5.01%.

Figure 12: Intergenerational Report forecasts of long-run risk-free rates



Source: 2021 Intergenerational Report, June 2021, Chart 6.15, p. 85.

For example, an average historical MRP of 6.5% (from Table 1 above) and a neutral risk-free rate of 5% would both reflect 'average' or 'normal' market conditions. Thus, a firm with a beta of 0.6 would have an expected return of 8.9% p.a. in such normal market conditions:

$$r_e = r_f + \beta_e\left(E[r_m] - r_f\right)$$
$$= 5\% + 0.6 \times 6.5\% = 8.9\%.$$

The allowed return on equity would then move above or below this neutral benchmark to the extent that the prevailing market conditions differed from the average or normal market conditions.

The need for an appropriate 'pairing' of consistently formed estimates of MRP and the risk-free rate has been recognised and emphasised by key Australian commentators and developers of Capital Asset Pricing Model theory and practice. For example, Professor Robert Officer has observed:

> *Ideally, as I have already indicated, one would estimate the relevant parameters of the CAPM to reflect the expected or required return on equity for the period that the regulatory rate is set. If one is prevented from doing this, either because of a constraint that an average MRP must be used or through estimation problems, then a second beset [sic] approach is to use a period that is unaffected by "aberrant market conditions". In effect, the Rf should be estimated from a period that is consistent with the MRP estimate – an 'averaging period' or period of 'equilibrium'*[106]

Appropriate use of the historical average MRP

ENA considers that:

- It is inappropriate to implement the CAPM using a prevailing risk-free rate paired with an historical average MRP. CEPA has advised that such an approach embeds the assumption that the MRP is constant over time, which has no basis. Lally has advised that such an approach will produce biased estimates in different market conditions.
- It is appropriate to use the historical average MRP in two ways:
  - Paired with a long-run average "neutral" risk-free rate, to produce an estimate of the long-run average required return on equity. In this case, the risk-free rate and MRP parameters would be paired consistently and they would produce an estimate of the long-run average required return on equity; or
  - As part of a 'hybrid' approach, as recommended by CEPA, whereby weight is given to both the fixed MRP and fixed TMR approaches. The rationale for this method is that both of those approaches are based on unrealistic assumptions and the true relationship between the risk-free rate and the MRP is likely to lie somewhere between the two.

4.4 The fixed TMR approach

In 2018, the AER gave no weight to the fixed TMR approach (which was referred to as the 'Wright' approach) on the basis of a rejection of any negative relationship between the risk-free rate and the MRP:

> *We are of the view that there is neither strong theoretical reasons, nor strong empirical evidence, to support assumption of an ongoing and consistent inverse relationship between the risk free rate and the MRP. Consequently, having had regard to all the material before*

[106] Professor R. Officer, *Expert Report prepared in respect of certain matters arising from the AER's New South Wales Draft Distribution Determination 2009-10 to 2013-14*, 16 February 2009, paragraph 46.

us, we have determined that the Wright approach should not play a role in our MRP estimation process. [107]

The AER now has substantial empirical evidence and theoretical reasoning to support the existence of a strong negative relationship between the risk-free rate and the MRP – over the last two or more decades.[108] Consequently, the basis for the AER's 2018 rejection of the fixed TMR approach appears to be inconsistent with the evidence now before the 2022 AER.

Moreover, CEPA has advised the AER that the assumption of a fixed total market return has as much theoretical support as the assumption of a fixed MRP:

> *There also appears to be as strong a theoretical basis for the argument that the RfR and the MRP are perfectively negatively correlated (the "Wright" approach) as there is for the argument that the RfR and total equity market returns are perfectly positively correlated (the fixed MRP approach).* [109]

CEPA further explains that, when considering the historical data, there is "no good evidence" to support the assumption of a constant MRP.[110] This leads CEPA to advise that an approach that has real regard to estimates from the fixed TMR approach (either alone, or in combination with the fixed MRP approach) might provide a better estimate of the MRP:

> *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.*
>
> *The evidence indicates that* ***the second two alternatives cannot be ruled out, and may provide a better estimate of the forward looking MRP consistent with the AER's duty****. We suggest that consideration of these options, and the evidence that would be necessary to decide between them is undertaken as part of the 2022 RORI process.* [111]

ENA agrees that the fixed TMR approach should receive at least as much weight as the fixed MRP assumption.

ENA submits that the fixed TMR approach should be considered as one of the approaches for estimating the MRP as part of the 2022 RoRI consultation process.

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[107] AER, December 2018, *Final Rate of Return Instrument: Explanatory Statement*, p. 85.
[108] The relevant evidence is set out in the previous chapter of this submission.
[109] CEPA, June 2021, *Relationship between RFR and MRP*, p. 14.
[110] CEPA, June 2021, *Relationship between RFR and MRP*, pp. 6, 44.
[111] CEPA, June 2021, *Relationship between RFR and MRP*, pp. 6-7, emphasis added.

4.5 The DGM approach

A forward-looking estimate that requires no assumption

ENA notes that the DGM approach differs from the fixed MRP and fixed TMR approaches in two respects:

- It is entirely forward-looking in that it uses only current information rather than historical observations; and
- It requires no assumption about the relationship between the risk-free rate and the MRP, rather leaving the data to determine the extent of that relationship as part of the estimation process.

The context of the current review

The *Equity Omnibus* paper observes that Brattle has advised the AER that many comparable regulators use the DGM approach to estimate the MRP and that the AER's approach would be improved by having regard to such forward-looking evidence:

> *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. Brattle's report also identified other regulators that used the dividend growth models to estimate the MRP.* [112]

The *Equity Omnibus* paper then seeks proposals on how the DGM approach might be best used to inform the estimate of the MRP:

> *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.* [113]

The *Equity Omnibus* paper also briefly summarises the reasons why the AER in 2018 decided to give no weight to the DGM approach:

> *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.*
>
> *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.* [114]

The 'calibrated' DGM approach

ENA notes that the two primary reasons for the AER's 2018 rejection of the DGM approach were that:

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[112] AER, July 2021, *Equity Omnibus*, p. 24.
[113] AER, July 2021, *Equity Omnibus*, p. 25.
[114] AER, July 2021, Equity Omnibus, pp. 25-26.

- There is no single objective means for determining the long-run growth rate, and estimates are sensitive to the choice of growth rate; and
- There are concerns that the DGM approach might produce estimates that are systematically upwardly biased.

ENA has sought to construct a version of the DGM that addresses these two concerns expressed by the AER in 2018. This has resulted in a 'calibrated' DGM that is constructed in the following manner:

- We start with the AER's preferred specifications of the two-stage and three-stage DGM;
- We adopt the same consensus dividend forecasts and timing conventions as the AER has used in the past;
- We adopt the AER's 2018 estimate of theta, and make the same adjustment for imputation credits that the AER has used in the past; and
- We then solve for the (unique) long-run growth rate that equates the mean DGM estimate with the AER's preferred estimate of the historical average MRP. For illustrative purposes, we have adopted a mean MRP figure of 6.1%, consistent with the 2018 RoRI.

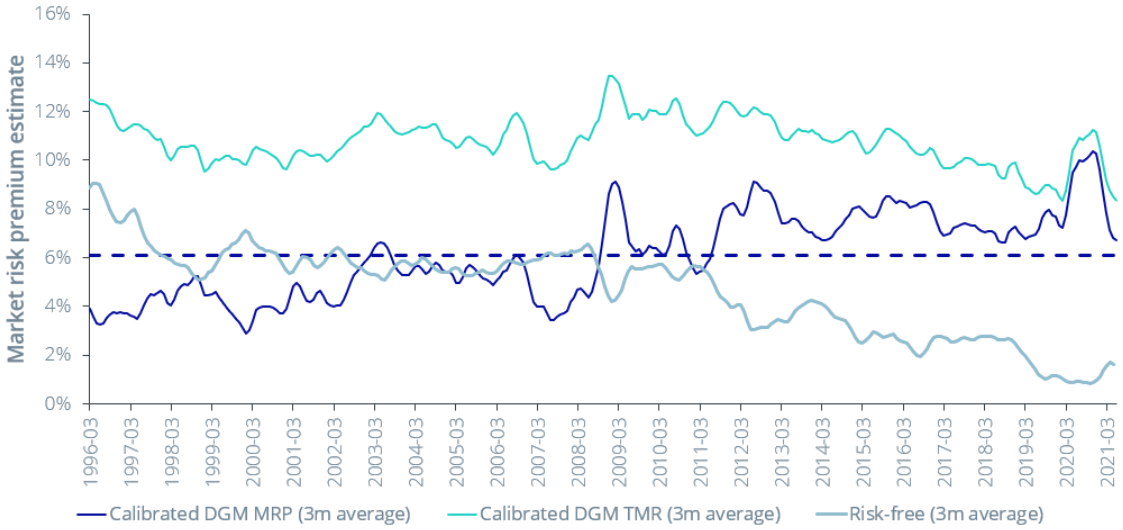
ENA considers that this approach addresses the key concerns expressed by the AER in 2018 as follows:

- The long-run growth rate is not estimated as a separate parameter, but is derived as part of the estimation process. There is a unique long-run growth estimate that equates the average of the DGM estimates with the average from the historical excess returns approach. Under this approach, there is no debate about what figure should be used for the growth parameter and no need for testing sensitivities to alternative growth estimates; and
- By definition, there is no bias in the DGM estimates relative to the historical excess returns estimates – both are constructed to have the same average. The only difference is that the historical excess returns approach is essentially constant over time, whereas the DGM estimates will fluctuate around the average figure as market conditions change.

Thus, ENA considers that this 'calibrated' DGM approach provides useful information about the forward-looking MRP in a way that addresses the concerns expressed by the AER in 2018.

Sample estimates of this calibrated DGM approach, using the 2018 historical average estimate of 6.1% as the reference point, are set out in Figure 13 below. For the avoidance of doubt, the 6.1% figure is used here for illustrative purposes. The calibration would always be to whatever long-run historical average estimate of the MRP that the AER was adopting at the relevant time. The objective is to obtain consistency between the AER's estimates, not to calibrate to a particular figure observed at a particular point in time.

Figure 13: Calibrated DGM estimates



Source: Frontier Economics calculations.

Figure 13 shows that:

- The calibrated DGM estimates fluctuate over time around a mean of 6.1%.
- The variation around the mean is intuitive in the sense that the estimates of the forward-looking MRP peak during the global financial crisis and the peak of the COVID pandemic, and estimates were below the mean during the strong bull markets of the 1990s and immediately prior to the GFC.
- The forward-looking DGM estimates tend to increase when government bond yields fall, and vice versa, consistent with the evidence set out above. It is important to note that this negative relationship is not imposed on the estimation, but is generated by the data as part of the estimation process.
- Although the MRP generally increases after 2010, the total market return falls somewhat. This occurs because the increase in the MRP estimates only partially offsets the decline in government bond yields over that period.

ENA considers that this calibrated DGM approach has a number of attractive features and recommends that it should be further considered throughout the 2022 RoRI review process. It has been developed after carefully considering the issues identified by the 2018 AER and seeking to address them.

4.6 Other approaches for informing the estimate of the MRP

Survey responses

ENA considers that the survey information is so unreliable that no reliance should be placed on it. Sample sizes are small and the estimates quickly become dated. There is no information about the qualifications of the respondents or their expertise or experience, or about the purpose or meaning of their MRP estimate. Rather, the authors simply tabulate the mean estimates of anyone who returns an emailed response. Moreover, there is no information about whether respondents would use their MRP figure to estimate the required return on equity, if so, whether they would use it in the SL CAPM, and, if so,

whether they would make any other adjustments such as increasing the risk-free rate or by adding a premium – as is the approach adopted in many independent expert reports. And it is unclear whether estimates include or exclude any assumed value of imputation credits.

ENA considers that these survey instruments cannot be described as "robust" or "credible" in any reasonable sense of those words. It is certainly not verifiable or timely. Survey instruments are also not "comparable" in the sense that there is no indication of what respondents use their estimate of MRP for, or how they use it. Consequently, this data would appear to fail several of the AER's criteria for evaluating evidence.

The QCA has recently reviewed this survey evidence and concluded that it is so unreliable that no use can be made of it, citing a number of the problems set out above:

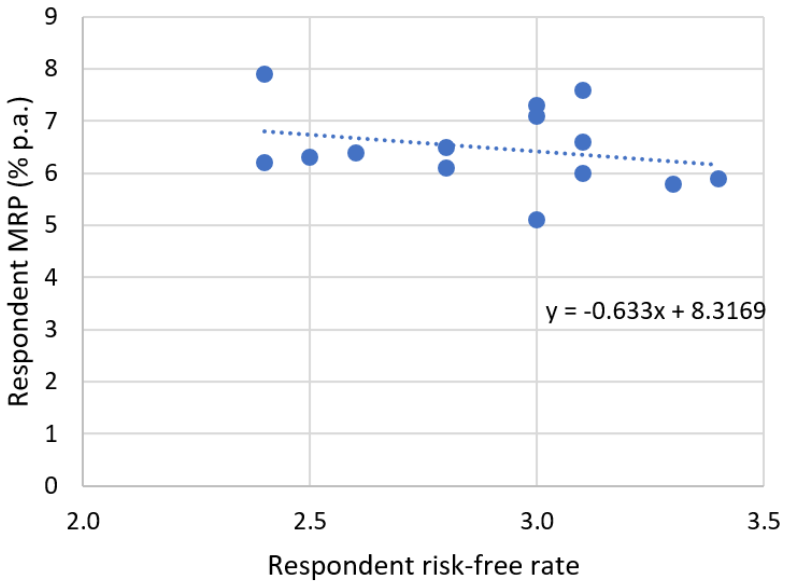
> *In past reviews, we have given weight to survey methods when determining a value for the MRP. These surveys attempt to estimate a future value for the MRP based on the survey responses from independent valuation experts, institutional investors, financial analysts, company managers and academics. Typically, when considering survey methods, we have used survey studies published annually by Pablo Fernandez and KPMG. We have also previously considered reports by independent analysts.*
>
> *Stakeholders raised a number of concerns with the use of survey methods to determine an MRP. The DBCT User Group submitted that MRP estimates from surveys are subjective because they depend on the participants who respond, and they may give information that is strategically the most beneficial to them. QTC submitted that a key problem with using surveys in a regulatory context is that surveys treat the MRP and the risk-free rate as independent parameters. Seqwater also raised concerns, including that:*
>
> *• surveys tend to have few respondents*
>
> *• the surveys quickly become dated and irrelevant*
>
> *• there is no information about the qualifications of respondents*
>
> *• surveys do not indicate what the respondents are using the MRP for.*
>
> *We are of the view that these are legitimate criticisms of survey methods. Furthermore, we note that, to the extent we use other methods to determine the MRP, and these are also commonly used by market practitioners in informing their views of an MRP, survey methods may not be providing any new or additional information. It is also not clear whether survey estimates of the MRP include an adjustment for imputation credits. Accounting for this possibility complicates the analysis of surveys.*
>
> *As surveys are only published once a year, the potential for these results to reflect out-of-date information is high if respondents use dividend discount models (or other forward-looking methods) to estimate the MRP. Outputs of dividend growth models are sensitive to changes in input values (which can move significantly over a span of months), meaning these survey results might reflect more of a historical view rather than the present view of the respondent.*

We therefore consider that including survey methods may not contribute meaningful or additional information that allows us to improve our determination of the MRP. As a result, we propose not to use them as part of future reviews.[115]

In the event that some reliance *is* to be placed on survey responses, it is important to consider the *whole* of the response and not just a part of it. For example, the Fernandez and KPMG surveys indicate that respondents use risk-free rates well in excess of the prevailing yield on government bonds. Thus, it would be unsafe and misleading to pair survey MRP figures with the prevailing yield on government bonds when that is clearly not how the survey respondents use those MRP figures.

For example, Figure 14 below shows the relationship between the mean and median MRP figures and the corresponding mean and median risk-free rate figures reported in the Fernandez surveys. Survey respondents have paired higher estimates of the MRP with lower estimates of the risk-free rate, and vice versa.

Figure 14: Survey relationship between risk-free rate and MRP



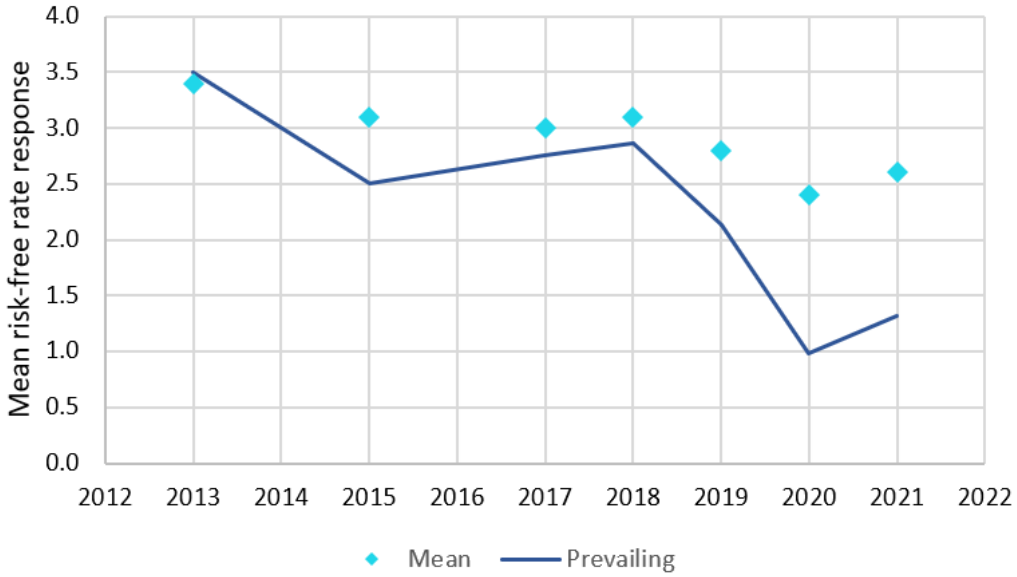
Source: Fernandez surveys; Frontier Economics calculations.

Moreover, the respondents to the Fernandez surveys have tended to maintain the risk-free rates that they adopt, even as 10-year government bond yields have fallen, as illustrated in Figure 15 below. The KPMG surveys also indicate that respondents currently adopt risk-free rates in excess of the prevailing government bond yield.

Thus, the MRP figures provided by these survey respondents are *not* paired with the prevailing risk-free rate, so it would be misleading to interpret them as though they were.

[115] QCA, June 2021, *Rate of return review*, pp. 55-56.

Figure 15: Survey responses on risk-free rate vs. prevailing 10-year government bond yields



Source: Fernandez surveys; Frontier Economics calculations.

In summary, ENA considers that survey responses cannot usefully inform the estimation of the MRP or the relationship between the MRP and risk-free rate. However, if some reliance *is* to be placed on survey responses, it is important to consider the *whole* of the response and not just a part of it.

Conditioning variables

In 2018, the AER considered a number of conditioning variables, but that evidence had no impact on the MRP that was adopted in the 2018 RoRI. The *Equity Omnibus* paper notes that:

> *We did not directly use the conditioning variables in estimating the MRP as they do not provide a reliable estimate on their own.* [116]

The *Equity Omnibus* paper goes on to consider whether conditioning variables could be used to adjust the MRP during the life of a RoRI, but notes that there are a number of implementation problems to consider:

> *The expert advice we received from Gibbard was that:*
>
> - *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.* [117]

[116] AER, July 2021, *Equity Omnibus*, p. 27.
[117] AER, July 2021, *Equity Omnibus*, p. 27.

ENA agrees with the AER's assessment and notes that these same problems are relevant to the use of conditioning variables in setting the MRP in the RoRI itself.

Moreover, to the extent that conditioning variables are given a more prominent and direct role in estimating the MRP, there will inevitably be controversy about which variables to use and how they might be processed to produce an estimate of the MRP. There is no standard set of variables and no standard means of processing them into a numerical estimate.

ENA considers that conditioning variables should have no role to play in the 2022 RoRI because:

- Conditioning variables are likely to only ever have, at most, a minor role in determining the MRP;
- Much work and consultation would be required to produce a framework for selecting and analysing conditioning variables before it would have any trust or confidence from stakeholders;
- There are more important aspects of MRP estimation already being considered as part of the 2022 review process – the roles of the fixed TMR and calibrated DGM approaches; and
- If the AER decides to adopt an approach whereby the MRP adjusts according to changes in the risk-free rate, the risk-free rate is essentially playing the role of the conditioning variable – it is a variable that is used to provide an indication of the state of the economy, which in turn informs the MRP. The AER has already commissioned expert advice and consulted on the relationship between the risk-free rate and the MRP. A similar process would be required for any other proposed conditioning variables.

For clarity, ENA submits that no consideration should be given to using conditioning variables to inform the estimate of the MRP in the 2022 RoRI or as part of a process for mechanically updating the MRP figure during the RoRI period. Much work and consultation would be required before stakeholders could have confidence in an approach for distilling this information into a useable form.

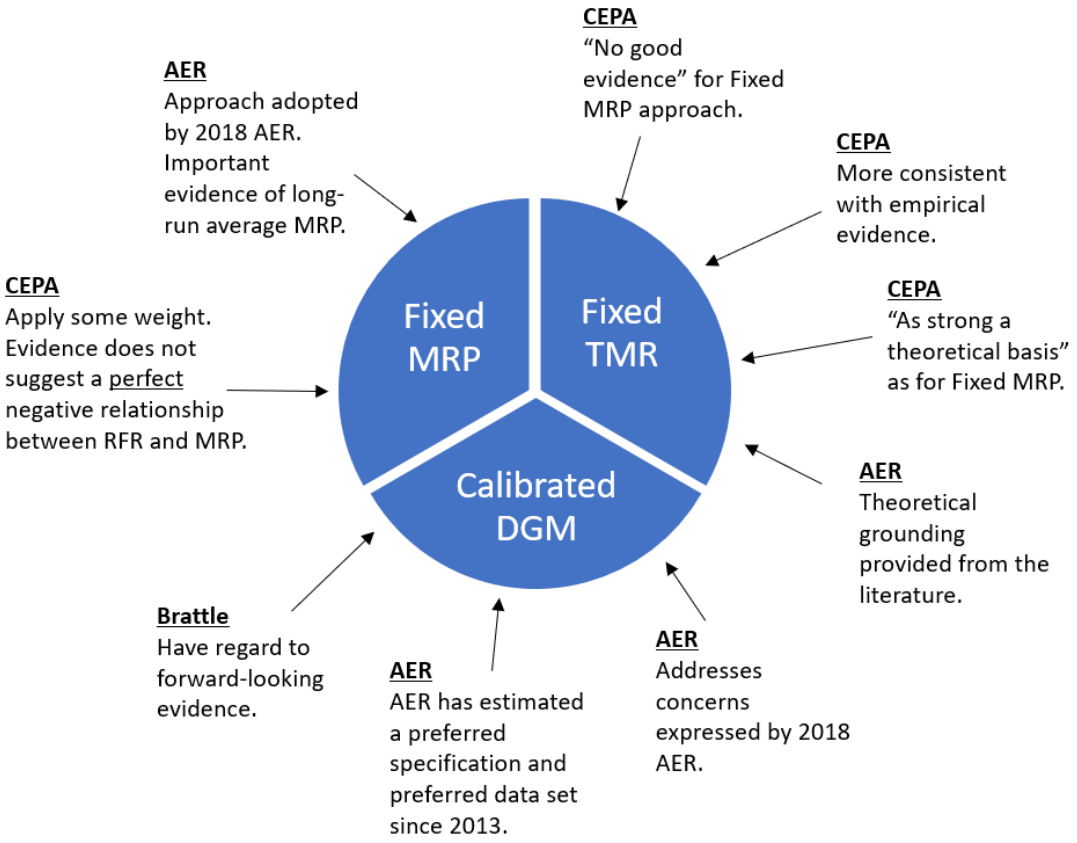
4.7 ENA's proposed approach for the RoRI MRP

Having regard to all relevant evidence

ENA's view is that the first principle of parameter estimation is that real regard must be given to all of the relevant evidence. When setting the MRP in the RoRI, the relevant evidence includes the fixed MRP approach, the fixed TMR approach, and the forward-looking DGM approach – for the reasons set out above.

ENA's proposed approach to setting the MRP in the RoRI is strongly guided by the material commissioned and prepared by the 2022 AER as part of the current review process, as illustrated in Figure 16 below.

Figure 16: Proposed approach for estimating RoRI MRP



The need to move beyond the 2018 approach

As noted above, the only evidence to impact the 2018 MRP allowance was the historical excess returns evidence – the AER used that evidence exclusively to set a preliminary point estimate and was not persuaded by any other evidence to move from that initial figure.

There is now a clear rationale for moving beyond that approach. CEPA has advised that there is no good evidence to support that approach, Brattle has recommended that regard should be given to forward-looking evidence, and Dr Lally has advised that this approach produces estimates that are upwardly or downwardly biased in different market conditions.

In addition, the Damodaran analysis cited by the AER concludes that the historical excess returns approach performs poorly and that forward-looking DGM estimates perform well in predicting future stock returns – over both short and long periods:

> *Over this period, the implied equity risk premium [DGM] at the end of the prior period was the best predictor of the implied equity risk premium [DGM] in the next period, whereas **historical risk premiums did worst**. If we extend our analysis to make forecasts of the actual return premium earned by stocks over bonds for the next five or ten years, the current implied premium [DGM] remains the best predictor, though the earnings yield does well for ten-year returns. Historical risk premiums perform even worse as forecasts of actual risk premiums over the next 5 or 10 years; in fact, they operate as good contra indicators, with a*

> *high historical risk premium forecasting lowered actual returns in the future. If predictive power were the only test,* ***historical premiums clearly fail the test****.*[118]

Damodaran's final conclusion is that:

> *If predictive power is critical or if market neutrality is a pre-requisite, the current implied equity risk premium [DGM] is the best choice. For those more skeptical about markets, the choices are broader, with the average implied equity risk premium [DGM] over a long time period having the strongest predictive power.* ***Historical risk premiums are very poor predictors*** *of both short-term movements in implied premiums or long-term returns on stocks.* [119]

An estimate of the long-run average required return on equity

As noted above, ENA considers that it is appropriate to use the historical average to provide an estimate of the long-run average required return by pairing it with a long-run average "neutral" risk-free rate. In this case, the risk-free rate and MRP parameters would be paired consistently and they would produce an estimate of the long-run average required return on equity.

For example, taking a long-run average MRP of 6.5% from Table 1 above and a long-run neutral risk-free rate of 5% from Section 4.3 above would produce an estimate of the long-run average required return on equity (for the broad market portfolio) of 11.5%.

Combining evidence to produce an estimate of the prevailing MRP

When combining the relevant evidence to produce an estimate of the prevailing MRP, ENA recommends that:

- Material weight should be applied to the forward-looking DGM evidence. ENA agrees that there is real merit in including forward-looking evidence to inform the estimate of the MRP. The 'calibrated' DGM approach has the dual benefits of reflecting forward-looking evidence and of addressing the concerns expressed by the 2018 AER; and
- The historical evidence should be assessed with reference to the hybrid approach identified in the recommendations of the CEPA report. This approach applies weight to both the fixed MRP and fixed TMR approaches. The rationale for this method is that both of those approaches are based on unrealistic assumptions and the true relationship between the risk-free rate and the MRP is likely to lie somewhere between the two. When implementing this approach, the fixed TMR approach should receive at least as much weight as the fixed MRP assumption – in light of the evidence of a strong negative relationship between the risk-free rate and the MRP.

To illustrate how the relevant evidence might be combined, we note that:

- The fixed MRP approach produces estimates in the range of 6.2% to 6.8% with a reasonable point estimate being 6.5%;

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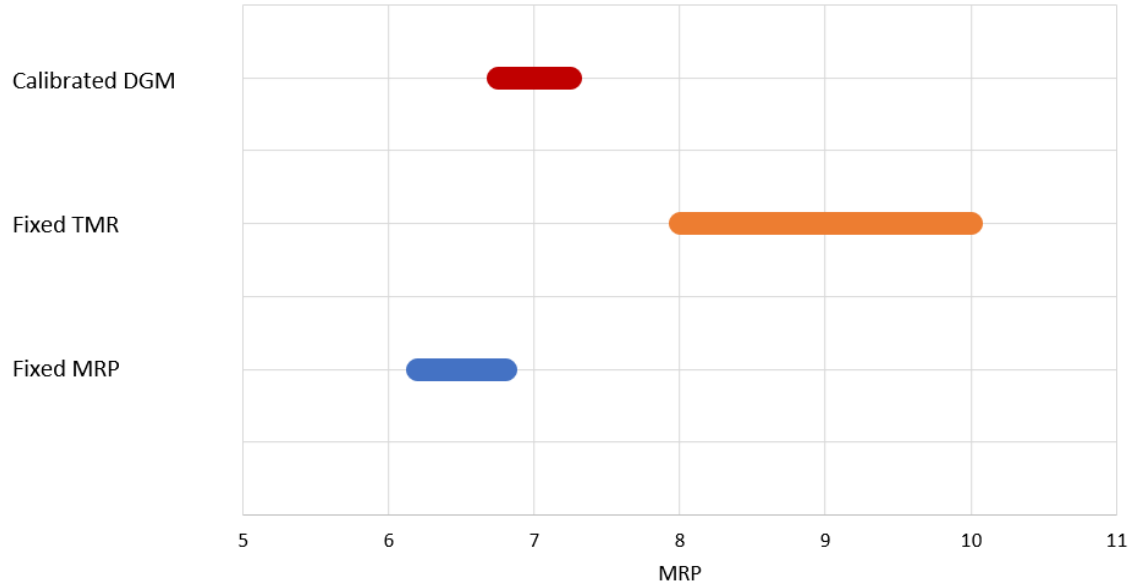
[118] Damodaran, 2021, *Equity risk premiums (ERP): Determinants, estimation, and implications – The 2021 edition*, p. 128, emphasis added.
[119] Damodaran, 2021, *Equity risk premiums (ERP): Determinants, estimation, and implications – The 2021 edition*, p. 129, emphasis added.

» The fixed TMR approach currently produces estimates in the range of 8% to 10% with a reasonable point estimate being 9%; and

» The calibrated DGM approach currently produces estimates in the range of 6.75% to 7.25%, with a reasonable point estimate being 7%.

These ranges are illustrated in Figure 17 below. Of course, these estimates will have to be re-estimated using the latest available data as part of the 2022 RoRI process.

Figure 17: MRP ranges



Source: MRP ranges. Indicative figures only. To be updated in 2022.

ENA notes that the above ranges imply that:

» An estimate below 6.5% could only be contemplated if 100% weight was applied to the Fixed MRP approach, under the assumption that there is zero relationship between the risk-free rate and MRP; and

» An estimate above 8% could only be contemplated if 100% weight was applied to the Fixed TMR approach, under the assumption that there is a perfect negative relationship between the risk-free rate and MRP.

Applying (conservatively) equal weight to the two approaches that use historical data produces a figure of 7.75%.

Giving equal weight to the forward-looking evidence (calibrated DGM) and the historical evidence (fixed MRP / fixed TMR) produces a point estimate of 7.4%.

ENA notes that none of the relevant evidence would currently support the 6.1% figure that was adopted in the 2018 RoRI.

ENA provides these sample calculations as an indication of the type of process that could be used to distil the relevant evidence into a single point estimate, and in response to the AER's request for concrete proposals. Clearly, the various MRP estimates will need to be updated at the time of the 2022 RoRI.

ENA suggests that the next stage of the consultation process should focus on:

- Confirming the set of data/approaches that are directly relevant to the estimation of the MRP (ENA suggests the three methods outlined above); and
- Developing a process or some guidelines for how real regard is properly given to all of the relevant data.

4.8 Benefits of ENA's proposed approach for the RoRI MRP

ENA's proposed approach to estimation of a MRP value would have the following benefits compared to the current approach:

- Ensuring resulting estimates of required equity allowances more fully reflected the range of market evidence for a forward-looking MRP at the time of the decision
- Resulting in the achievement of the AER's stated objective of reaching and applying an unbiased estimate of the efficient rate of return to promote efficient investment, utilisation and consumption decisions by consumers and networks; and
- Better reflecting the best available contemporary evidence commissioned by the AER, promoting regulatory confidence and transparency.

5 Potential adjustments to the allowed MRP during the term of the RoRI

Key messages

- When considering the possibility of updating the MRP during the RoRI period, ENA considers that the guiding principle is one of consistency. The nature of any mechanistic updating of the MRP must be consistent with the approach that was adopted when setting the 'starting point' MRP in the RoRI.
- For example, if the 2022 RoRI 'starting point' is set on the basis that the MRP is largely fixed, the updating method should be set on the same basis.
- By contrast, if the 'starting point' is set on the basis that the risk-free rate and MRP vary inversely, the updating method should be set on the same basis.
- Thus, the focus is first on determining how the 'starting point' MRP will be set and then the updating method would be determined in a consistent manner.

5.1 Potential approaches for updating the MRP

Having determined the MRP at the time of the 2022 RoRI, the AER will then consider the issue of whether the MRP should be updated at the time of each determination made under that RoRI.

ENA considers that, under the Binding Guideline legislation, there are effectively five options open to the AER:

- **Option 1: Fixed MRP, paired with prevailing risk-free rate**

  Fix the MRP for the entire RORI period – the approach adopted by the AER in 2018; or

- **Option 2: Fixed MRP, paired with 'neutral' risk-free rate**

  Fix the MRP for the entire RORI period, pairing it with an estimate of the long-run average or 'neutral' risk-free rate (e.g., the 5% figure adopted in the Intergenerational report, which is consistent with the historical average since 1993). This approach would set a regulatory allowance to reflect a long-run average required return on equity; or

- **Option 3: Adjust for changes in risk-free rate during RoRI period**

  Adopt a mechanistic approach such that the MRP that was adopted in the RoRI adjusts in a formulaic way as the AER's estimate of the risk-free rate changes. Under this approach, the RoRI would set out the estimates of the risk-free rate and the MRP that the AER considers will produce the best unbiased estimate of the market cost of equity capital at the time of the RoRI. As the risk-free rate changes from the 'starting point' figure adopted in the RoRI, the allowed MRP would also change in a formulaic manner.

  One example of this approach would be to fix the total market return for the RoRI period. Under this approach, any change from the starting point risk-free rate would be fully offset by an equal and opposite change in the MRP allowance.

Another example of this approach would involve a partial offset of changes in the risk-free rate. Under this approach, any change from the starting point MRP would be partially offset by a smaller change in the MRP allowance; or

» **Option 4: Mechanistic estimate from a single method at the time of each determination**

Adopt a mechanistic approach that sets the MRP at the time of each determination according to an updated estimate of the MRP from a single preferred approach. For example, the AER could specify the detail of how the DGM approach would be used to estimate the MRP at the time of each determination. This would require information about what data is used and precisely how it is to be processed, such that the MRP figure could be generated in an objective manner at the time of each determination; or

» **Option 5: Mechanistic estimate from multiple methods at the time of each determination**

Adopt an approach that produces mechanistic estimates of the MRP from more than one approach, plus a mechanistic process for weighting the estimates from the various approaches.

For the avoidance of doubt, and for the reasons set out in Section 4.6 above, ENA considers that there is no role for survey responses or conditioning variables to be used in mechanistically updating the allowed MRP during the RoRI period.

5.2 Internal consistency is the guiding principle

Consistency is required between the 'starting point' RoRI MRP and any updating method

When considering the possibility of updating the MRP during the RoRI period, ENA considers that the guiding principle is one of consistency.

Specifically, the nature of any mechanistic updating of the MRP must be consistent with the approach that was adopted when setting the 'starting point' MRP in the RoRI.

Example 1: A fixed 'starting point' MRP with no updating

For example, it would make no logical sense to consider any update at all if the RoRI MRP was determined solely on the basis of historical excess returns – as was the case in the 2018 RoRI. If the best estimate of the MRP is always considered to be the historical average, there is no reason to adopt a different figure at the time of any determination.

In other words, it would make no sense to set the 'starting point' RoRI MRP using a method that assumes no relationship between the risk-free rate and the MRP, but then to adjust the MRP *during* the RoRI period on the basis that there *is* such a relationship.

Example 2: A 'starting point' MRP and an updating method that both reflect time variation in the MRP

If, however, the 'starting point' estimate in the RoRI *does* reflect estimation methods that allow for the MRP to change over time (e.g., by giving real weight to the DGM and TMR methods), it would be consistent to contemplate an adjustment the MRP to reflect any change that might have occurred between the RoRI and the particular determination.

In this case, both the 'starting point' MRP and the updating method would consistently reflect any time variation in the MRP.

The importance of consistency

It is important that the *degree* of updating during the RoRI period is consistent with the extent to which the 'starting point' RoRI estimate contemplates time variation in the RoRI.

For example, if the 'starting point' MRP is determined by giving (say) 90% weight to the fixed MRP approach and 10% weight to forward-looking evidence, the updating approach must be such that the MRP remains largely fixed. That is, if the 'starting point' is set on the basis that the MRP is largely fixed, the updating method should be set on the same basis.

By contrast, if the 'starting point' MRP is determined by giving (say) 90% weight to the fixed TMR approach, the updating approach would be set such that any change in the risk-free rate is largely offset by an opposite change in the MRP. That is, if the 'starting point' is set on the basis that the risk-free rate and MRP vary inversely, the updating method should be set on the same basis.

5.3 The 'starting point' is the 2022 RoRI

ENA considers that, when considering any possible updating approach, the 'starting point' is the 2022 RoRI. The RoRI will set out the estimates of the risk-free rate and the MRP that the AER considers will produce the best unbiased estimate of the market cost of equity capital at the time of the RoRI. This determines the 'starting point.'

The alternative is an approach whereby parameters are set relative to 'long run' or 'neutral' parameters. For example, consider the case where the risk-free rate is the 'forcing variable' for any updates. In this case, ENA does not consider approaches whereby the MRP is set according to the difference between the prevailing risk-free rate and its historical average or some estimate of a neutral rate. Rather, the updating mechanisms that are contemplated above, are such that any update would depend on how the risk-free rate has changed since the starting point set out in the RoRI.

5.4 Concrete worked examples

ENA suggests that the guiding principle is that there must be consistency between the approach that is adopted in setting the 'starting point' MRP in the RoRI and any updating mechanism to be applied during the term of the RoRI.

Thus, the focus is first on determining how the 'starting point' MRP will be set and then the updating method would be determined in a consistent manner.

A number of illustrative examples are set out below to illustrate how such consistency could be maintained. In all of these examples, we assume that any updating mechanism will be based on movements in the 10-year government bond yield. That is, the AER's estimate of the risk-free rate is the 'forcing variable' for any updates.

Example 1: RoRI MRP set on the basis of historical excess returns only

In this first example, we consider the case where the AER decides to set the 2022 RoRI MRP using the historical excess returns approach only.

Since that approach embeds the assumption that there is no relationship between the risk-free rate and the MRP, that same assumption would apply throughout the RoRI period. Thus, the same fixed MRP would be maintained in all determinations throughout the RoRI period, irrespective of movements in the risk-free rate.

Example 2: RoRI MRP set on the basis of fixed TMR approach only

In this example, we consider the case where the AER decides to set the 2022 RoRI MRP using the fixed TMR approach only.

Since that approach embeds the assumption that there is a perfect negative relationship between the risk-free rate and the MRP, that same assumption would apply throughout the RoRI period. Thus, for every change in the risk-free rate (between the RORI and the particular determination) there would be an equal and opposite change made to the MRP. Thus, a 100 basis point increase in the risk-free rate would result in a 100 basis point reduction in the allowed MRP.

Example 3: Equal weight applied to the fixed MRP and fixed TMR approaches

In this example, we consider the case where the AER decides to set the 2022 RoRI MRP by applying equal weight to the fixed MRP and the fixed TMR approaches.

Those approaches assume that the relationship between the risk-free rate and the MRP is zero and perfectly negative, respectively. Consequently, updates during the RoRI period would offset half of any change in the risk-free rate. Thus, a 100 basis point increase in the risk-free rate would result in a 50 basis point reduction in the allowed MRP.

Example 4: RoRI MRP set on the basis of the DGM approach

In this example, we consider the case where the AER decides to set the 2022 RoRI MRP using the DGM approach only. Since the DGM approach makes no assumption about the relationship between the risk-free rate and the MRP, that relationship would have to be quantified empirically, such as in Figure 4 above. For this example, we take the slope of the relationship between the two variables to be -0.8.

This same relationship would then be maintained throughout the RoRI period. Thus, a 100 basis point increase in the risk-free rate would result in an 80 basis point reduction in the allowed MRP.

Example 5: RoRI MRP set using three approaches

In this example, we consider the case where the AER decides to apply equal weight to the three key approaches when setting the MRP in the RoRI.

In this case, each of the three methods implies a different relationship between the risk-free rate and the MRP:

- The fixed MRP approach is based on the assumption that there is no relationship at all between the risk-free rate and the MRP. That is, the relationship between the two variables is 0;
- The fixed TMR approach is based on the assumption that there is a perfect negative relationship between the risk-free rate and the MRP. That is, the relationship between the two variables is -1.
- The calibrated DGM estimates exhibit a relationship of -0.8, as shown in Figure 4 above.

In the case where all three methods receive equal weight, the implied relationship between the MRP and risk-free rate is:

$$\frac{1}{3} \times (0) + \frac{1}{3} \times (-1) + \frac{1}{3} \times (-0.8) = -0.6$$

In this case, for every 100 basis point increase in the risk-free rate (between the time of the RoRI and the time of the particular determination), there would be a 60 basis point decrease in the MRP allowance.

5.5 The importance of scenario analysis

ENA considers that any proposed updating mechanism should be tested via scenario analysis. In particular, government bond yields have changed in ways that were clearly not contemplated at the time of previous RoRIs. It is important to consider a range of potential future scenarios, such as ENA has previously provided to the AER.[120] When selecting any updating mechanism, the AER should be comfortable that the approach produces reasonable regulatory allowances across the range of scenarios.

To illustrate how the approaches under the above example would work in practice, we consider two example scenarios below. Both scenarios involve a risk-free rate of 1% at the time of the RoRI, and then consider changes in the risk-free rate over the RoRI period, which is taken as 5 years for these examples. Both scenarios also adopt the same indicative estimates of the RoRI MRP under the various approaches illustrated above. In both cases, we report the total market return (risk-free rate plus MRP) under each approach.

In the first scenario. The risk-free rate increases by 1% per year to 5% in Year 5. The results are set out in Table 2 below.

Table 2: Total market return under various adjustment approaches: Rising risk-free rate

	RoRI MRP	Offset	Year1	Year 2	Year 3	Year 4	Year 5
Risk-free rate			**1%**	**2%**	**3%**	**4%**	**5%**
Fixed MRP	6.5%	0.0	7.50%	8.50%	9.50%	10.50%	11.50%
Fixed TMR	9.0%	-1.0	10.00%	10.00%	10.00%	10.00%	10.00%
Fixed MRP/TMR	7.8%	-0.5	8.75%	9.25%	9.75%	10.25%	10.75%
DGM	7.0%	-0.8	8.00%	8.20%	8.40%	8.60%	8.80%
Equal weight x 3	7.5%	-0.6	8.50%	8.90%	9.30%	9.70%	10.10%

Source: ENA.

Table 2 shows that:

- For the fixed MRP approach, the total market return rises and falls to the full extent of the change in the risk-free rate;
- For the Fixed TMR approach, the total market return remains constant, even as the risk-free rate changes;

[120] G. Crawford (personal communication, 25 January 2021). See also, the ENA submission on the *Overall Rate of Return*, at Section 7.6.

- For the case where 50/50 weight is placed on the fixed MRP and fixed TMR approaches, half of the change in the risk-free rate flows through to the total market return; and
- For the DGM and equal weight approaches, less than half of the change in the risk-free rate flows through to the total market return.

In the second scenario, the risk-free rate falls to 0%, before recovering. The results are set out in Table 3 below.

Table 3: Total market return under various adjustment approaches: Varying risk-free rate

	RoRI MRP	Offset	Year1	Year 2	Year 3	Year 4	Year 5
Risk-free rate			**1.0%**	**0.5%**	**0.0%**	**1.0%**	**2.0%**
Fixed MRP	6.5%	0.0	7.50%	7.00%	6.50%	7.50%	8.50%
Fixed TMR	9.0%	-1.0	10.00%	10.00%	10.00%	10.00%	10.00%
Fixed MRP/TMR	7.8%	-0.5	8.75%	8.50%	8.25%	8.75%	9.25%
DGM	7.0%	-0.8	8.00%	7.90%	7.80%	8.00%	8.20%
Equal weight x 3	7.5%	-0.6	8.50%	8.30%	8.10%	8.50%	8.90%

Source: ENA.

Mechanisms to recognise a low or negative real rate environment

Networks support for development of proposal to apply a 'zero real risk-free rate' threshold

The AER Consumer Reference Group presented a modified version of the CAPM in the AER's stakeholder forum on 11 August 2021.

The modified CAPM model presented was designed to correct for any potentially unreasonably low allowed return on equity during periods of very low, or negative real risk-free rates. A model of this type recognises that the fundamental operation of Capital Asset Pricing Model is impacted by the use of negative risk-free rates as an input.

ENA has highlighted the developing risks to the effectiveness of current 2018 framework presented by the potential emergence of zero or negative rates in a range of discussions with the AER and consumer representatives since 2019. This risk has subsequently been realised with recent downward movements in Commonwealth Government Securities.

The proposal to investigate a potential 'floor' risk-free rate is strongly supported by ENA members as likely to lead to a cost of equity estimate more consistent with both the theoretical underpinnings of the AER's foundation model, and an estimate of the expected returns of 'real world' investors.

Importantly, development of a 'floor' mechanism to recognise that the mechanistic use of negative real rates in a the CAPM will produce flawed cost of equity outcomes is a recognition of current and possible future risk-free proxy values.

Recognition of this is separate to the additional specific need identified in this submission and evidence before the AER for market risk premium estimates to better reflect forward-looking evidence. The effective operation of the CAPM for the AER's regulatory task requires **both** the inputting of real risk-free values consistent with its core assumptions (i.e. non-negative), and the use of a more forward-looking market risk premium. Resolution of one of these outstanding issues is not a substitute for, or made redundant by, the resolution of the other.

ENA supports the further development of the types of models discussed by the CRG at the cost of equity public forum. Initial consideration by ENA suggests that there may be a variety of alternative – potentially simpler – means of setting an effective 'zero bound' on risk-free rates used in cost of equity estimates.

The key features and benefits of a 'floor' approach would be:

- Development of an appropriate 'floor', which consistent with the CRG's initial highlighted example could be where real risk-free rates < 0, or alternatives
- The 'floor' would only be activated where the real risk-free rate to be used by the AER to estimate the cost of equity was negative, or close to it
- An increased robustness of future AER rate of return decisions to interest rate conditions now common across a range of comparable international regulatory jurisdictions – and a reduced need to make future ad hoc adjustments to address the emergence of negative rates
- Advanced specification of its operation in the 2022 Rate of Return Instrument, in a similar manner as other contingencies are identified and provided for (i.e. cancellation of third part debt series data).

6 Equity beta

Key messages

- ENA recommends that:
  - No weight should be placed on the 'dead' comparators. That evidence is too dated, variable and inconsistent to have any real value.
  - For the three remaining domestic comparators, ENA recommends that the trade-off between sample size (statistical precision) and recency (relevance) might be best achieved by considering estimates computed over a 10-year period rather than periods of 2-5 years.
  - It is unsafe to rely exclusively, or primarily, on such a small set of comparator firms.
  - Material weight should be applied to the estimates adopted by other comparable regulators. ENA considers that this is important evidence in assessing the confidence that can reasonably be placed in the AER's 2018 approach of setting the equity beta based on its assessment of the available domestic comparators.
  - Consideration should also be given to other domestic infrastructure service providers and international energy network comparators. ENA considers that this is important evidence in assessing the confidence that can reasonably be placed in the AER's 2018 approach of setting the equity beta based on its assessment of the available domestic comparators.
  - Asset betas should be re-levered to ensure that the resulting equity beta is consistent with the AER's gearing parameter.
- ENA proposes that the next steps of the consultation process should focus on how these three sources of evidence should be best combined into a single point estimate the best reflects the true systematic risk of the benchmark network.
- ENA identifies low beta bias as an issue that would be usefully informed by expert opinion in the next stages of the consultation process, noting that it cannot simultaneously be the case that historical data *does* reflect investor expectations when estimating the MRP, but the same data *does not* reflect investor expectations when estimating beta.
- ENA has included specific approaches for estimating MRP (at the request of the AER) and equity beta, as potential options given the current evidence. If adopted, these would provide lower allowed returns than at the time of the 2018 RORI (reflecting falls in government and corporate bond yields) and lower real returns on equity than available to international comparable firms.

6.1 Beta estimates vs. true systematic risk

Beta *estimates* are affected by statistical noise

When considering beta estimation issues, it is important at the outset to recognise the difference between statistical estimates of beta and the (unobservable) true systematic risk of a firm. The available data only supports statistical *estimates* of beta and we can never observe the true systematic risk of a firm to test the accuracy of those estimates.

As with all statistical estimates, the estimate can diverge from the true figure due to statistical estimation error. Statistical estimation error does not refer to mistakes made in the estimation process, but to the fact that 'noise' or variability in the data contaminates the estimate.

To illustrate this, we take the example of the recent takeover announcement for Spark Infrastructure that resulted in the stock price increasing by approximately 17%. If such an announcement happens to be made during a period of strong positive market returns, the beta *estimate* rises as we have an observation where the stock and the market have moved strongly in the same direction. By contrast, if such an announcement happens to be made during a period of strong negative market returns, the beta *estimate* falls as we have an observation where the stock and the market have moved strongly in the opposite direction.

To illustrate this, we estimated the 5-year Ordinary Least Squares (OLS) beta using weekly data for the cases where the takeover announcement happens to occur in a week where the market is up 5% and in a week where the market happens to be down by 10% – both of which have occurred in the last 5 years. The beta is 0.52 in the first case, and 0.26 in the second. That is, the beta *estimate* can double or halve depending on whether the takeover announcement happens to be made in one week or the other.

The timing of the takeover announcement, of course, has no relevance at all to the *true systematic risk* of Spark Infrastructure, but it does have an impact on the beta *estimate*.

In this context, it is important to recognise that, even if the true systematic risk is perfectly constant over time, beta *estimates* can vary due to statistical noise, such as in the above example. Thus, it is important to consider whether any observed changes in beta *estimates* are likely to reflect changes in the true systematic risk, or statistical noise. These problems become more severe as the sample of firms that are considered becomes smaller and smaller.

Measures of statistical precision are not sufficient

In practice, beta estimates are well known to be affected by high levels of statistical noise. What we are trying to quantify is the extent to which market returns drive the returns of a particular stock. But market returns tend to explain only a small proportion of stock returns with other random (non-systematic) events explaining the rest. By way of analogy, a stone thrown into water will cause a ripple, but that will be difficult to accurately measure during a thunderstorm at a surf beach.

The possible effects of statistical noise can be quantified by standard errors and R-squared statistics, but those measures should not be interpreted as an indication of the reliability of a beta estimate. To see why, consider the above example of an earnings announcement. Suppose that, in a particular historical sample, a firm made several positive earnings announcements, and that all happened to be (by random chance) made in weeks when the broad market was down. These influential data points will all have the effect of reducing the beta *estimate*, even though they tell us nothing about the true systematic risk of the firm. In this case, the statistical metrics (standard error and R-squared statistic) are likely to indicate a high degree of precision, because there is a similarity among all of these influential observations. That is, the statistical metrics tell us something about the similarity of the data points in the historical period being examined – they do not tell us anything about the relevance of those data points to the true systematic risk of the firm.

To summarise, there are two reasons why a firm's beta estimate might vary over time – because the true systematic risk of the firm varies, or due to random chance depending on the extent to which important firm-specific events during the sample period happen to occur in weeks when the market was up or

down. Estimates of statistical precision provide no indication of the extent to which each of these factors is driving the variation in equity beta estimates.

Consequently, judgement is required when interpreting beta estimates, and especially when considering the variation in beta estimates over time. For example, if there is reason to believe that the true systematic risk of a particular firm is likely to be quite stable over time, and if we observe substantial variation in the beta estimates over time, we would conclude that those beta estimates are likely to have been affected by the sort of random estimation error described above.

Similarly, if a sample of comparators are all considered to have a similar degree of true systematic risk, but the beta estimates varied substantially between firms, we would conclude that the estimates have been affected by random estimation error. But there would be no way of determining which firms had been more or less affected.

Thus, the task of reliably estimating beta is a very difficult one.

Strategies for reducing the effects of estimation error

One strategy for reducing the effects of estimation error is to increase the length of the sample period. In a longer period, it becomes more likely that some firm-specific events will occur during up markets and some during down markets such that the effects will tend to cancel out.

However, the benefits of a longer data period must be weighed against the need to have more recent data to ensure that the estimates reflect the current level of systematic risk. The AER has commissioned two expert reports that have provided advice on this trade-off.

Economic Insights (June 2021) advise the AER that common practice is to estimate beta using five years of historical data:

> *Turning to the period of estimation, assuming beta is constant over time, increasing the number of observations will reduce the standard error of the estimate of beta thereby providing a more precise statistical estimate. However, increasing the estimation period increases the probability that the true beta will have changed as a result of changes in the determinants of beta.* ***It is a common practice in the finance sector to use five years of monthly data****.*[121]

Brattle (June 2020) suggests that five years may be too long, and recommends that periods of two to five years should be considered:

> *The AER relies on a beta estimate that "place[s] the most reliance on the data from the longest available period" and also had some regard to a five-year window. That is in contrast to most regulators that rely on a shorter horizon. Using a five-year window (or longer) risks that AER's beta measure fails to give sufficient weight to current financial conditions. We recognize that there is a trade-off between betas being stable and current, but find that* ***an estimation window of 2-5 years*** *using daily or weekly data provides sufficient statistical reliability and the impact of switching to a shorter estimation window can be material.*[122]

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[121] Economic Insights, June 2021, *Methodological issues in estimating the equity beta for Australian network energy businesses*, p. vi, emphasis added.
[122] Brattle, June 2020, *A review of international approaches to regulated rates of return*, Paragraph 232, emphasis added.

Another strategy for reducing the potential impact of estimation error is to use a larger sample of firms. Whereas some firms may have beta estimates that have been negatively affected by random events, others may have estimates that have been positively affected. In a large sample of firms, these effects will tend to cancel out.

The expert reports commissioned by the AER also consider the appropriate sample of comparator firms. For example, Brattle (June 2020) notes that the available set of Australian comparators is very small:

> *In the Australian context, a key issue is the availability of comparable companies for the proper estimation of beta. Because there is a limited number of publicly-traded utilities in Australia, finding appropriate Australian comparators is a problem, albeit one shared with other potential models.* [123]

Brattle further notes that other regulators also have small sets of domestic comparators and manage that problem by having regard to international comparators firms:

> *The AER prefers locally-based companies, which leaves a very small sample, while some European regulators (ACM, Ofgem, ARERA) often rely on companies from other European jurisdictions (or in some cases North American companies). The NZCC uses a very broad set of companies from different jurisdictions. While even in the US there are very few listed pure-play gas pipelines, for gas and electricity distribution there is generally a large sample of companies to choose from in North America. If utilities that operate in different jurisdictions have comparable business risks and regulatory frameworks (including all of the jurisdictions in this report that regulate energy utilities), the use of betas from a non-Australian market can provide information about the systematic risk of the industry in Australia.* [124]

Brattle recommends that expanding the data set by having regard to international comparators, rather than using more dated information from domestic comparators has merit:

> *If there is limited data in a local market we think that, the addition of international comparators instead of lengthening the estimation window and risking the incorporation of out of date data merits consideration.* [125]

Brattle further recommends that beta estimates for UK and US comparators, computed against the relevant local market index, provide relevant evidence on the systematic risk for use in the AER's CAPM:

> *We find that beta estimates for Australian, UK, and US utilities against the ASX, the S&P 500, and the FTSE, respectively are reasonably representative of the systematic risk relative to the market.* [126]

The Economic Insights (June 2021) report considers the various approaches that the AER might consider in relation to comparator sets, but makes no recommendations about which should be adopted.

ENA views

ENA considers that it is important to recognise that:

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[123] Brattle, June 2020, *A review of international approaches to regulated rates of return*, Paragraph 149.
[124] Brattle, June 2020, *A review of international approaches to regulated rates of return*, Paragraph 145.
[125] Brattle, June 2020, *A review of international approaches to regulated rates of return*, Paragraph 161.
[126] Brattle, June 2020, *A review of international approaches to regulated rates of return*, Paragraph 160.

- There is a difference between beta estimates and the true systematic risk of a firm.
- The quality of a beta estimate cannot be determined by statistical metrics such as standard errors and R-Squared statistics. Beta estimates are affected by the true systematic risk of the firm and by random chance depending on the extent to which important firm-specific events during the sample period happen to occur in weeks when the market is up or down. Estimates of statistical precision provide no indication of the extent to which each of these factors is driving the variation in equity beta estimates.
- The effect of potential statistical estimation error can be reduced by increasing the sample size. There are two ways to increase the amount of data available:
  - Increasing the historical period used for each firm; and
  - Increasing the number of firms considered.
- The AER's consultants have recommended that the most common practice is to examine historical periods of 2-5 years for each firm. ENA would make the trade-off between recency and sample size by considering historical periods of 10 years. We show below that beta estimates using 5 years of data tend to be unstable over time, more indicative of estimation error than changes in the true level of systematic risk. At the other end of the spectrum, very long-term estimates using data going back to the 1980s are less likely to be reflective of the current level of systematic risk. A 10-year term uses data from only the last decade and is long enough to smooth out much of the variability in estimates that are based on shorter periods. We note that the QCA has recently reached the same conclusion for precisely the same reasons:

  > *By using a longer time horizon of data, we consider that the impact of short-term events that might cause betas to move in different directions across countries is likely to be less pronounced. Furthermore, using a longer time horizon is likely to produce more stable results, which will allow for more regulatory certainty for stakeholders. Consequently, we consider that using 10 years of data to estimate beta is appropriate for our task. Using data any older may capture market information that is no longer relevant to estimating a current value for beta.* [127]

- Brattle recommends that the AER consider the use of international comparator firms – in line with the approach of other regulators. Brattle notes that the standard approach of other regulators is to estimate betas against the local market index for each firm and to use that evidence in the regulator's specification of the CAPM. That is also the standard approach adopted in independent expert valuation reports.

  For example:

  - QCA, IPART, the NZCC and the ESC all have regard to international comparators. All estimate betas relative to the local market index. All use the resulting beta estimates in a domestic version of the CAPM.
  - The independent expert reports for DUET (2017), Envestra (2014), the Ethane Pipeline Income Fund (2016) and Energy Developments Ltd (2015) all have regard to international comparators. All estimate betas relative to the local market index. All use the resulting beta estimates in a domestic version of the CAPM.

[127] QCA, June 2021, *Rate of return review*, p.66.

In summary, 'International' versions of the CAPM are not used in standard regulatory or commercial practice and should not be considered as part of the 2022 RoRI process.

6.2 The domestic data is evaporating as time passes

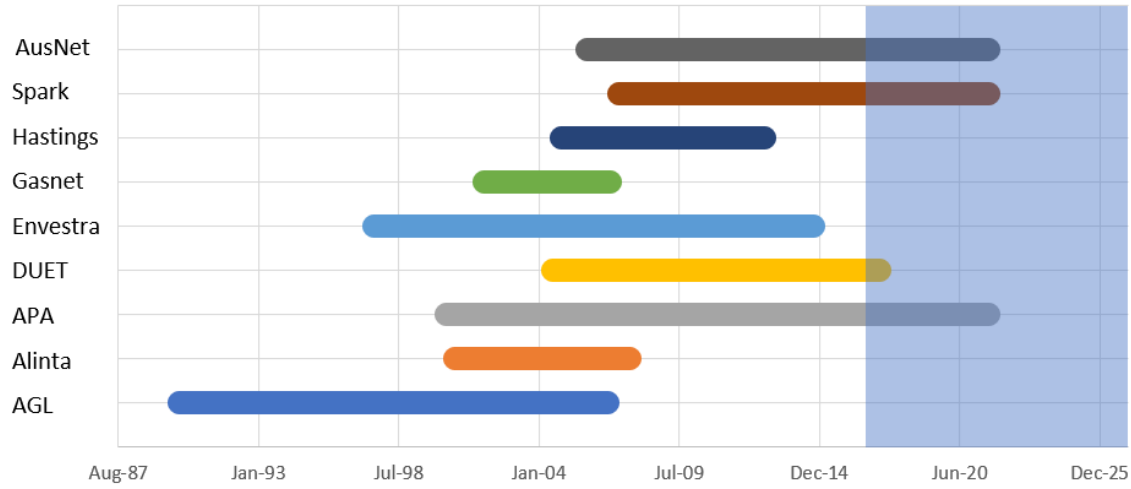
The need to consider international evidence depends, of course, on the availability of domestic comparators. If there are sufficient domestic comparators to provide reliable estimates, they would be used. However, the set of live domestic comparators in the AER's comparator set is tiny and becoming smaller at every successive RoRI. Indeed, it appears to have reduced once again during the consultation period considering this matter. It is inevitable that the AER must have regard to a wider range of evidence – that exercise should begin as part of the 2022 RoRI process.

ENA notes that the AER's previous approach to estimating equity beta has focussed on a set of nine domestic comparators. Six of those comparators no longer exist. Some have not existed for well over a decade. One of the remaining comparators will likely not exist at the time of the 2022 RoRI.

Continued reliance on these nine comparators would mean that some networks will be receiving allowed returns under the 2022 RoRI that are based, in part, on beta comparators that have not existed for over two decades.

The data periods available for the nine domestic comparators that the AER has previously considered are summarised in Figure 18 below. The shaded area in that figure represents a 10-year period to the end of the 2022 RoRI period. Of the dead firms, only DUET has a small number of observations within 10 years of the end of the 2022 RoRI period.

Figure 18: Data available for firms in the AER's comparator set



Source: AER, July 2021, Equity Omnibus, Table 4, pp. 38-39. The shaded area represents a 10-year period to the end of the RoRI period, December 2026.

Moreover, of the three remaining comparators:

- In 2018, the AER expressed concerns about the comparability of APA Group in light of its investment in unregulated gas pipeline assets;
- Spark Infrastructure is currently the subject of takeover proceedings, which has two potential implications:

- Recent returns for Spark have been driven by takeover speculation, which raises questions about their relevance for estimating the steady-state systematic risk of a benchmark network; and
- When the deal completes, the number of live comparators will fall further.

» The remaining two comparators, APA Group and AusNet Services have both been mentioned as takeover targets in the financial press.[128]

» Spark is not a standalone network business. Rather, Spark owns shares in a number of network owners. Thus, Spark is effectively a listed fund rather than an owner of physical assets.

The available domestic evidence is shrinking and the delisted firms are becoming more and more dated as time passes.

6.3 What do we learn from the dead comparators?

ENA submits that the degree of reliance that would reasonably be placed on the dead comparators depends on:

» **The extent to which the estimates from different comparators are consistent with one another.**

If all comparators produced similar estimates, there would be a higher degree of confidence that the estimates contained some valuable information rather than simply reflecting random estimation error;

» **The extent to which the estimates for an individual firm are stable over time.**

If the true systematic risk of a network business is expected to vary slowly over time, and the statistical estimates of beta were also stable over time, there would be a higher degree of confidence that the estimates contained some valuable information rather than simply reflecting random estimation error; and

» **The proximity to the current point in time.**

If the statistical estimates were relatively stable over time, there would be more confidence in the relevance of older data.

To test the beta estimates for the dead comparators against these criteria, ENA has constructed 5-year rolling average OLS equity beta estimates for five of them.[129] No results are available for GasNet, as it was listed on the ASX for less than five years in total. The results are displayed in Figure 19 below.

It is hard to imagine that the estimates for the five dead comparators could fare any worse against the above criteria. There is wild variation between firms and across time for the same firm, and there is no data available for the five-year period leading up to the 2022 RoRI. Some of the beta estimates are above 1.0 and others are below 0.2. The AGL beta varies between 0 (or just below!) and 1.2. The Envestra estimate doubles, and then doubles again all within a 10-year period.

ENA considers that the only reasonable conclusion from Figure 19 is that the equity beta estimates have been very materially affected by random statistical estimation error caused by the noise in the data.

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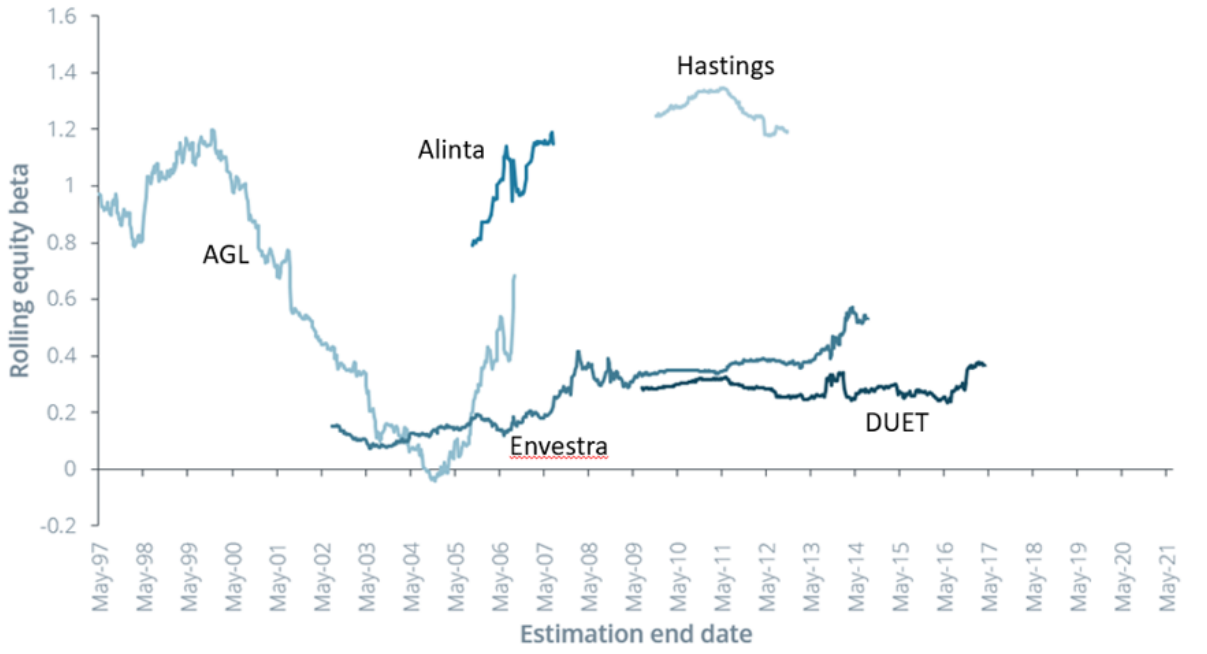
[128] https://www.afr.com/companies/financial-services/sydney-airports-is-just-the-crest-of-the-m-and-a-wave-20210706-p58799.

[129] We have selected 5-year periods for this illustration as the upper bound of the historical periods recommended by the AER's expert consultants.

ENA submits that it is unsafe and unreasonable to place material reliance on the sort of evidence displayed in Figure 19, and that the AER would be in error to place *primary* reliance on that evidence.

Figure 19: Rolling beta estimates for the dead comparators

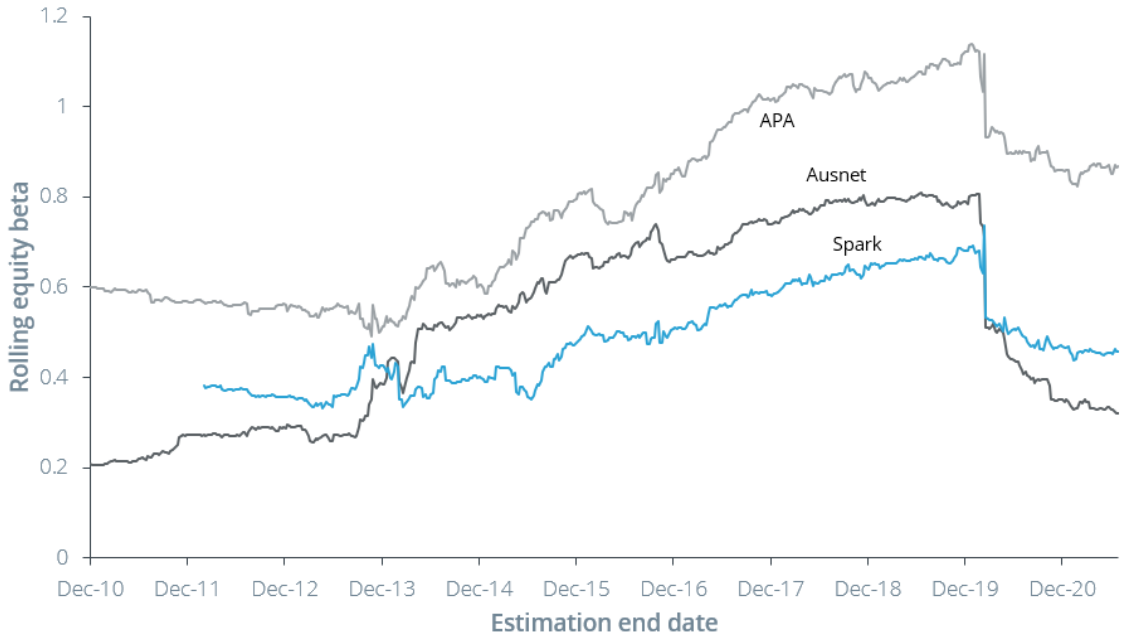


Source: Bloomberg data; Frontier Economics calculations. Rolling 5-year OLS beta estimates using weekly data. Re-levered to 60%.

6.4 Variability in the estimates of live comparators and the COVID-19 effect

To examine the time variation in the equity beta estimates of the remaining live comparators, ENA has constructed 5-year rolling average OLS equity beta estimates, and the results are displayed in Figure 20 below.

Figure 20: Rolling OLS beta estimates for the live domestic comparators



Source: Bloomberg data; Frontier Economics calculations. Rolling 5-year OLS beta estimates using weekly data. Re-levered to 60%.

Figure 20 shows that the equity beta estimates for the three live domestic comparators have varied considerably over time. For all three firms, the OLS beta estimates:

- Increased substantially between the 2013 Guideline and the 2018 RoRI;
- Continued to increase through to the COVID crash in early 2020; and
- Declined substantially in February 2020 when the ASX fell sharply at the peak of uncertainty about the COVID pandemic.

The point estimates at these points in time are summarised in Table 4 below – beta estimates increasing substantially through to January 2020 and then falling during the COVID crash.

Table 4: Domestic comparator rolling 5-year OLS beta estimates

Comparator	30 June 2013	30 June 2018	31 January 2020	31 March 2020
APA Group	0.64	1.04	1.14	0.86
AusNet Services	0.51	0.77	0.80	0.35
Spark Infrastructure	0.35	0.61	0.69	0.46
Mean	**0.50**	**0.80**	**0.88**	**0.56**

Source: Bloomberg data; Frontier Economics calculations. Rolling 5-year OLS beta estimates using weekly data. Re-levered to 60%.

The movement in the point estimates shown in Table 4 raises the question about whether these figures reflect changes in the true systematic risk of these firms or statistical noise in the data. As noted above, statistical beta *estimates* can change even though the *true systematic risk* remains constant.

In this case, the key question is whether the sharp reduction in beta estimates associated with the COVID crash reflects a sharp reduction in the true systematic risk of these firms, and an associated reduction in the true cost of equity capital, or whether the changes are a statistical artefact related to the COVID crash.

To isolate the effects of the COVID crash, Table 5 below shows the 5-year OLS equity beta estimates with and without February and March 2020. The removal of those two months increases the mean estimate by almost one third.

Table 5: Domestic comparator 5-year OLS beta estimates: Impact of COVID crash

Comparator	5 years to July 2021	Excluding February and March 2020
APA Group	0.88	1.04
AusNet Services	0.32	0.52
Spark Infrastructure	0.46	0.60
Mean	**0.55**	**0.72**

Source: Bloomberg data; Frontier Economics calculations. 5-year OLS beta estimates using weekly data. Re-levered to 60%.

ENA does not suggest that unusual or extreme events should be systematically identified and removed, but rather makes the point that beta estimates based on a very limited dataset can be highly sensitive to

a very small number of highly influential observations, and that this sensitivity should be taken into account when exercising judgment within the criteria of sustainability and longevity. This is essentially the same issue as seen in the Spark takeover example above. In this instance, rather than the impact being due to a temporary factor in the price movement of a stock, it is due to a temporary shock to the market occurring when Covid 19 first impacted the ASX; a shock from which the market has now recovered. For example, it seems unlikely that the true systematic risk of AusNet Services really did halve during February last year.

To shed further light on the effect that the Covid shock has had on beta estimates, we have plotted one-year rolling OLS estimates using daily data for the three domestic network comparators in Figure 21 below. That figure shows the sharp drop in beta estimates at the time of the Covid shock and the subsequent sharp rebound in estimates more recently as that single period drops out of the rolling data set.

Figure 21: Rolling 1-year daily OLS beta estimates for the live domestic comparators

Source: Bloomberg data; Frontier Economics calculations. Rolling 1-year OLS beta estimates using daily data. Re-levered to 60%.

The current 1-year daily estimates for the three remaining comparators are summarised in Table 6 below. These figures are presented to show the sensitivity of estimates to a single event and to support the conclusion that there is danger in mechanically adopting any statistical estimate without a clear understanding of what is driving that estimate. In this regard, we note the recommendation from Economic Insights that the statistical estimates of beta are just the starting point, and should not be mechanically adopted. [130]

[130] Economic Insights, June 2021, *Methodological issues in estimating the equity beta for Australian network energy businesses*, p. 28, emphasis added.

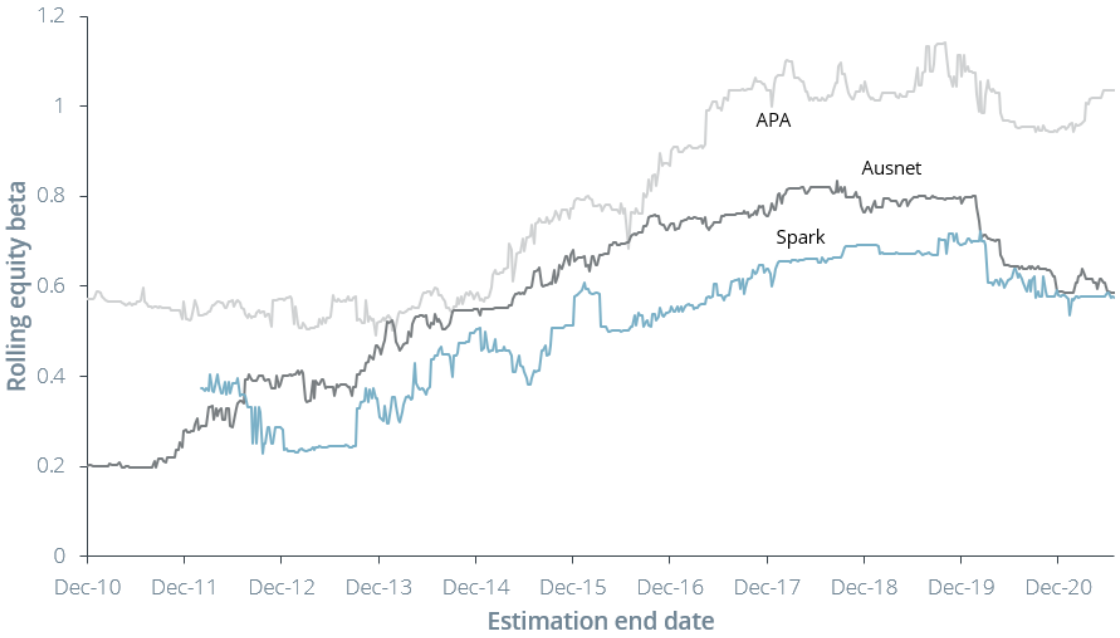
Table 6: Domestic comparator 1-year daily beta estimates

Comparator	OLS
APA Group	0.81
AusNet Services	0.53
Spark Infrastructure	0.72
Mean	**0.69**

Source: Bloomberg data; Frontier Economics calculations. 1-year beta estimates using daily data. Re-levered to 60%.

The AER has previously noted that the use of Least Absolute Deviations (LAD) regression is designed to give relatively less weight to extreme observations. The rolling 5-year LAD estimates for the remaining live domestic comparators are shown in Figure 22 below. That figure shows that, relative to the OLS estimates, the LAD estimates are less affected by the COVID crash and are uniformly higher as at July 2021.

Figure 22: Rolling LAD beta estimates for the live domestic comparators



Source: Bloomberg data; Frontier Economics calculations. Rolling 5-year LAD beta estimates using weekly data. Re-levered to 60%.

Table 7 below shows that the current LAD estimates are very similar to the OLS estimates after removal of the COVID crash period.

Table 7: Domestic comparator 5-year beta estimates: OLS vs. LAD

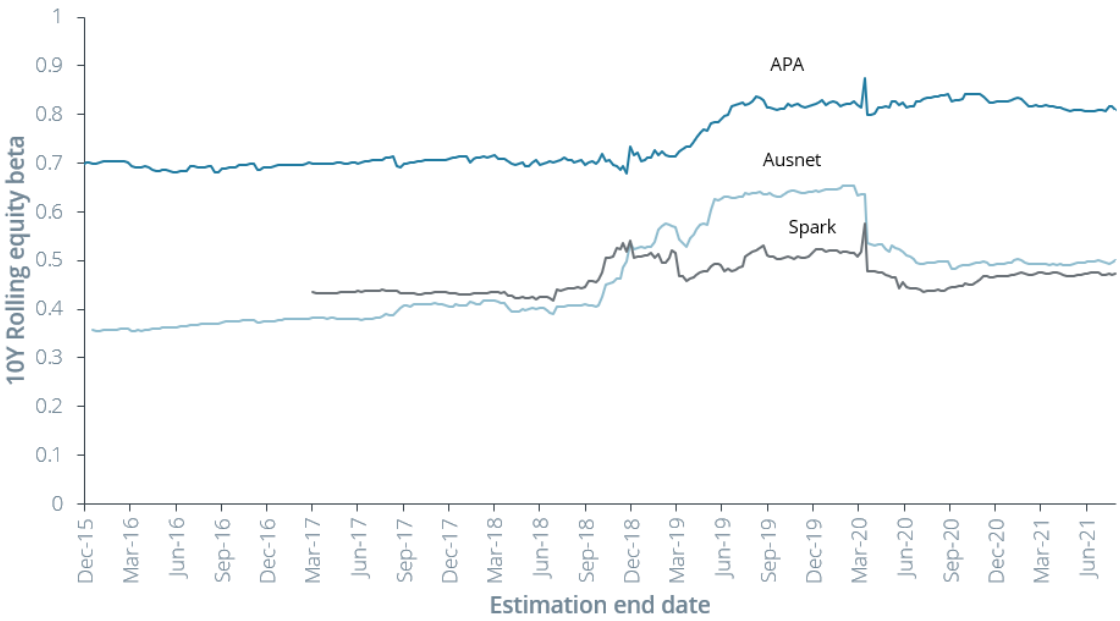
Comparator	OLS	LAD
APA Group	0.88	1.01
AusNet Services	0.32	0.56
Spark Infrastructure	0.46	0.57
Mean	**0.55**	**0.71**

Source: Bloomberg data; Frontier Economics calculations. 5-year beta estimates using weekly data. Re-levered to 60%.

Table 7is shown in Figure 23 below as a time series. This figure shows that:

- The estimates are more stable over time than the rolling 5-year estimates;
- The estimates have been generally increasing since 2015; and
- The impact of the COVID crash is more muted as that period is less influential over a longer sample period.

Figure 23: Rolling 10-year OLS beta estimates for the live domestic comparators



Source: Bloomberg data; Frontier Economics calculations. Rolling 10-year OLS beta estimates using weekly data. Re-levered to 60%.

The current 10-year estimates for the remaining parameters are set out in Table 8 below.

Table 8: Domestic comparator 10-year beta estimates: OLS vs. LAD

Comparator	OLS	LAD
APA Group	0.81	0.90
AusNet Services	0.50	0.63
Spark Infrastructure	0.48	0.54
Mean	**0.60**	**0.69**

Source: Bloomberg data; Frontier Economics calculations. 10-year beta estimates using weekly data. Re-levered to 60%.

ENA submits that the results set out above indicate that the trade-off between sample size (statistical precision) and recency (relevance) might be best achieved by considering estimates computed over a 10-year period rather than periods of 2-5 years.

For example, Figure 20 shows that the COVID crash resulted in a sudden and material fall in the 5-year OLS estimates. When that observation drops out of the data set in March 2025 - just prior to the 2026 Rate of Return Instrument - the result will be a sharp *increase* in the rolling 5-year beta estimate. Such an approach would seem to fail the criteria of longevity and sustainability.

By contrast, the 10-year estimates are not so sensitive to the COVID crash – they have generally been rising slowly and steadily since 2015.

6.5 ENA conclusions about domestic comparators

Domestic firms are the best comparators

ENA agrees with the AER that domestic comparators provide the best information about the true systematic risk of the benchmark energy network. If the available set of domestic comparators was sufficient to provide a robust and reliable estimate with a high degree of confidence, there would be no need to consider other evidence.

However, the set of domestic comparators is evaporating and becoming smaller at every rate of return review.

ENA considers that, with every passing review, it is becoming more and more untenable for the AER to continue to rely exclusively on the dwindling set of domestic evidence.

Dead comparators should not be relied upon

In relation to the dead comparators, ENA notes that:

- As the evidence from dead firms sinks further and further into the past, it becomes more remote from task of estimating today's market cost of equity; and
- The evidence in Figure 19 above engenders no confidence at all in the evidence from the dead comparators. The estimates vary wildly across firms and over time. Figure 19 provides much more

evidence about the statistical challenges of estimating beta from noisy data sets than it does about the true systematic risk of the benchmark energy network.

For these reasons, ENA submits that the AER can have no reasonable confidence in the information provided by the dead comparators.

Low confidence in estimates from the remaining live comparators

The Economic Insights (EI) Report commissioned by the AER[131] suggests that the true systematic risk of the benchmark energy network is likely to be quite stable over time:

> *For the regulated network energy businesses we consider that the regulatory arrangements contain a number of features that greatly limit the systematic risk that would otherwise apply in the absence of the regulatory protection and the natural monopoly type, essential service type characteristics and are most likely to lead to a high degree of stability for the equity beta.* [132]

And further that:

> *Recognising that economy-wide shocks are in general likely to impact on the market risk premium much more than industry betas, we consider that the betas of network energy businesses would not change much over time and particularly in the period since the regulatory arrangements described in this report have applied.* [133]

EI goes on to note that firms that are no longer listed might provide useful evidence in a setting where beta is stable over time. That is, if today's systematic risk is expected to be much the same as it was 10 or 20 years ago, the evidence from 10 or 20 years ago would remain relevant:

> *The appropriateness of using equity betas for firms no longer listed depends on the likely stability of beta for if beta is considered stable the historical use of estimates of beta for firms that are no longer listed would contribute to lowering the standard errors for the beta estimates meaning more statistically precise estimates would be obtained.* [134]

However, the problem with this statement is that we never observe the true systematic risk of an energy network – we can only ever observe beta *estimates*.

The 5-year rolling beta estimates for the three surviving domestic comparators do vary markedly over time (as shown above) even though EI consider that the true systematic risk is likely to exhibit "a high degree of stability." This implies that those estimates must be substantially affected by random statistical estimation error. It is for this reason that ENA recommends that the trade-off between sample size (statistical precision) and recency (relevance) might be best achieved by considering estimates computed over a 10-year period rather than periods of 2-5 years.

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[131] Economic Insights, June 2021, Methodological issues in estimating the equity beta for Australian network energy businesses.
[132] Economic Insights, June 2021, Methodological issues in estimating the equity beta for Australian network energy businesses, p. vi.
[133] Economic Insights, June 2021, Methodological issues in estimating the equity beta for Australian network energy businesses, p. vii.
[134] Economic Insights, June 2021, Methodological issues in estimating the equity beta for Australian network energy businesses, p. vii.

ENA considers that there are two primary reasons for having low confidence in the estimates from the surviving domestic comparators:

- There are only three that remain. One cannot have confidence in beta estimates based on such a small set of comparators; and
- The equity beta adopted in the 2018 RoRI, which was determined by the domestic comparators, is very materially lower than the equity betas adopted by other regulators engaged in the same task, as explained in the following section.

6.6 Estimates adopted by other regulators

The beta estimation task is common to many regulators around the world. Many other regulators have faced the same challenge as the AER – a small set of domestic comparators that produce variable and inconsistent estimates.

Other regulators consider different sets of evidence and exercise judgment in different ways, but the one thing in common is that they all adopt an equity beta substantially higher than the AER's 2018 figure of 0.6.

The AER has summarised the equity betas adopted by a number of international regulators in Table 9 below. Every regulator considered in the table adopts an equity beta higher than the 0.6 figure adopted in the 2018 RoRI.

Table 9: International regulatory beta allowances

Inter-national regulator	Original equity beta	Gearing	Adjusted equity beta
ACM	0.74	50%	0.79
FERC	0.84	60%	0.84
STB	1.11	16.92%	1.52
ARERA	0.71	44%	0.78
NZCC	0.60	42%	0.68
NZCC*	0.65	42%	0.74
Ofgem	0.76	55%	0.78
Ofgem*	0.71	55%	0.74
Ofwat	0.71	54.2%	0.74
Ofwat (CMA)	0.76	54.2%	0.79

Notes: All Ofgem values refer to the December 2020 values for the electricity transmission industry. FERC does not explicitly state a gearing value hence, we have assumed a gearing ratio of 60%. Ofwat de-levers equity beta to asset beta using an actual gearing estimate of 54.2% rather than a notional gearing value of 60%. Regulators marked with an asterisk indicate that an adjustment has been made in the Brattle report for easier comparison.

Source: AER, December 2020, International regulatory approaches to rate of return, Table 5, pp. 26-27.

However, the true differences are even more stark than the figures in Table 9 would suggest. The AER appears to have mis-estimated the re-levered beta estimates by replacing the standard measure of gearing of $\frac{D}{V}$ with $\frac{D/V}{1+D/V}$. The correct figures, re-levered to 60% in the correct way to be comparable with the AER's beta allowance, are set out in Table 10 below. The corrected equity betas are all above 0.8.

Table 10: Corrected international regulatory beta allowances

Regulator	Original equity beta	Gearing	Correct re-levered equity beta
ACM	0.74	50%	0.93
FERC	0.84	60%	0.84
STB	1.11	17%	2.31

ARERA	0.71	44%	0.99
NZCC	0.6	42%	0.87
NZCC*	0.65	42%	0.94
Ofgem	0.76	55%	0.86
Ofgem*	0.71	55%	0.80
Ofwat	0.71	54%	0.81
Ofwat (CMA)	0.76	54%	0.87

Source: Equity betas re-levered in the standard manner by multiplying by (1-gearing) and dividing by 0.4.

In addition, the ERA of WA performed the same beta estimation exercise at the same time as the AER in its 2018 Guideline. Examining the same set of evidence as the AER, the ERA of WA adopted an equity beta (re-levered to 60%) of 0.79 in its 2018 Guideline.

That is, among other regulators, the lower bound of equity beta allowances is in the order of 0.8 – one third higher than the allowance of the AER in 2018. That is, the *lower bound* of the estimates adopted by comparable regulators is one third higher than the figure adopted in 2018.

Thus, the judgment that the AER applied in assessing the domestic evidence led to an equity beta allowance markedly out of step with other comparable regulators.

ENA considers that this is important evidence in assessing the confidence that can reasonably be placed in the AER's 2018 approach of setting the equity beta based on its assessment of the available domestic comparators.

6.7 International evidence

Use of international comparators

Many other regulators face the problem of a tiny set of domestic comparators. It is common for regulators to address this problem by having some regard to international comparators. For example, the New Zealand Commerce Commission uses a large set of international gas and electricity transmission and distribution firms as its comparator set. Similarly, the QCA has recently concluded that, although there are some differences between international and domestic firms, the international firms are likely to be broadly similar in terms of their risk profile:

> *Despite these differences, we would expect many of the international energy firms to have broadly similar operational risks as a regulated energy business operating in Australia, such as Jemena or Ausgrid.* [135]

And that:

> *This arrangement is not dissimilar to regulated energy businesses in Australia that operate transmission and distribution infrastructure within specified areas as monopolists.* [136]

The QCA has also observed that a number of international regulatory regimes share many of the same key features as the Australian framework:

> *Additionally, while there may be differences in regulatory frameworks across countries, we generally find that most international regulated energy businesses are regulated in such a manner that allows them to recover their efficient costs, including a return on capital commensurate with the risks they face. Many businesses are allowed to recover costs where they depart from forecast levels and some have 'decoupling' mechanisms that allow the business to recover revenue independent of volume—similar in effect to a revenue cap.* [137]

ENA notes again that, if a suitable set of domestic comparators was available, that evidence would be used. The set of domestic comparators, however, is quickly disintegrating towards zero. There is no option other than to look elsewhere to expand the set of comparators and the obvious solution is to have regard to similar firms providing similar services in similar jurisdictions – as is the practice of other regulators faced with the same problem.

Indicative estimates

The EI report (June 2021) commissioned by the AER summarises a number of subsamples of international evidence. During the 2022 RoRI process, work will need to be done to update this evidence and to select the best possible set of comparators. Consequently, we consider the figures summarised in the EI report as indicative only, so that we have a basis for demonstrating the process of how different sets of evidence might be distilled into a single point estimate.

EI appear to propose that US comparators re-levered to 45% can be compared with the Australian benchmark firm re-levered to 60%.[138] In the following section we explain why that approach is incorrect and inconsistent with corporate finance theory and with market practice.

In this section, we set aside any differences in relation to the approach to re-levering and we ensure like-with-like comparisons by considering *asset beta* estimates. The asset beta is an estimate of the beta of the firm in the absence of leverage. It reflects the fundamental business risk of the firm, unaffected by any assumptions about what leverage should be assumed. Whereas different leverage might be adopted by different samples of firms in different markets, the fundamental business risk of comparator businesses will be the same. Indeed, that is what defines a firm as a comparator.

Under the re-levering approach adopted by the AER, the 2018 asset beta is:

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[135] QCA, June 2021, *Rate of return review*, p.63.
[136] QCA, June 2021, *Rate of return review*, p.63.
[137] QCA, June 2021, *Rate of return review*, p.63.
[138] Economic Insights, June 2021, *Methodological issues in estimating the equity beta for Australian network energy businesses*, pp. 78-79.

$$\beta_a = \beta_e \frac{E}{V} = 0.6 \times 0.4 = 0.24.$$

The asset betas of the international comparator samples considered by EI are summarised in Table 11 below.[139] That table shows that the asset beta estimates are substantially higher than the AER's 2018 figure of 0.24. Indeed, the weekly beta estimates in Table 11 are generally in the order of 50% higher than the figure adopted by the AER.

Table 11: Asset beta estimates for international comparators

Form of regulation	Electricity utilities	Gas utilities
Weekly data		
Incentive	0.37	0.36
Non-incentive	0.33	0.46
Both	0.33	0.36
NA	0.39	
Monthly data		
Incentive	0.34	0.24
Non-incentive	0.30	0.35
Both	0.29	0.30
NA	0.36	

Source: Economic Insights, June 2021, Methodological issues in estimating the equity beta for Australian network energy businesses, pp. 79-80. Standard asset beta calculation comparable with 2018 AER estimate of 0.24.

Thus, the judgment that the 2018 AER applied in assessing the domestic evidence led to an equity beta allowance markedly out of step with the international evidence. ENA considers that this is important evidence in assessing the confidence that can reasonably be placed in the AER's 2018 approach of setting the equity beta based on its assessment of the available domestic comparators.

[139] EI have considered estimates reported by Frontier Economics, 2016, *Estimating the equity beta for the benchmark efficient entity*. These figures will need to be updated during the 2022 review process to reflect the most recently available data.

6.8 Estimates from other domestic infrastructure firms

One way of expanding the comparator set is to consider international firms operating in the same industry and performing the same function. An alternative approach is to consider other domestic firms operating in similar (infrastructure-based) industries. The EI report considers a sample of other domestic infrastructure service providers. Similarly, in its recent WACC review, the QCA considered rail freight and toll road operators.

ENA considers that international energy networks are a superior source of comparators as they perform similar services and are subject to similar regulatory regimes. However, other domestic infrastructure firms are an alternative way of expanding the comparator set and represent the next best set of domestic comparators.

We have constructed equity beta estimates for a small sample of domestic infrastructure firms using 10-year data periods and weekly data. These are the domestic toll road and rail comparators that are considered by the QCA,[140] although the QCA also considers international comparators in these industries. ENA does not suggest that this particular set of comparators should be adopted and given weight. Rather, these figures are presented here to assist in illustrating how the various estimates might be distilled into a single parameter estimate – consistent with the AER's request for concrete proposals about how it should perform its task in 2022.

During the 2022 RoRI process, work will need to be done to update this evidence and to select the best possible set of domestic infrastructure comparators. Consequently, we consider the figures summarised in Table 12 below as indicative only.

Table 12: Equity beta estimates for domestic infrastructure comparators

Form of regulation	OLS	LAD
Aurizon	1.60	1.48
Atlas Arteria	1.53	1.65
Transurban	1.08	0.92

Source: Bloomberg data; Frontier Economics calculations. 10-year beta estimates using weekly data. Re-levered to 60%.

6.9 Re-levering must be done properly, in the standard manner

The equity beta is determined by two things:

- The fundamental business risk of the firm, known as the asset beta; and
- Leverage.

Thus, equity holders will require an expected return to compensate them for:

[140] QCA, June 2021, *Rate of return review*, p. 92.

- The fundamental risk of the firm they are investing in; and
- The extent to which there are debt holders in the firm with a claim that ranks ahead of the residual equity.

When estimating equity beta, we ensure that we are making like-with-like comparisons by:

- Selecting comparator firms in the same or similar industries to ensure that the fundamental business risk or asset beta is the same; and
- Re-levering equity beta estimates to a common level of gearing to ensure that this is also the same across any comparisons.

For these reasons, the standard approach to estimating equity beta is to:

- Select a set of comparator firms to provide information about the asset beta;
- Select a level of gearing that is believed to be appropriate for the firm in question (the benchmark network in this case); and
- Re-lever to the selected level of gearing.

For example, this is precisely the approach adopted by the NZCC, which uses international comparators extensively.

For the same reason that would be inappropriate to compare betas of software developers with betas of energy networks, it is similarly inappropriate to compare a beta that reflects 60% with one that reflects 40% gearing. In both cases, they are simply different things.

The need to re-lever to ensure a like-with-like comparison is explained in all major academic and practitioner textbooks and has been the standard approach of the AER since its inception. Additional detail to support this conclusion is provided in the Frontier Economics (June 2015) report to the AER.[141]

ENA submits that it would be useful at this stage of the process for the AER to make a clear statement about the need to re-lever any estimate of the asset beta to ensure that the resulting equity beta used for comparative purposes is consistent with the AER's gearing parameter.

6.10 ENA's proposed approach to estimating equity beta

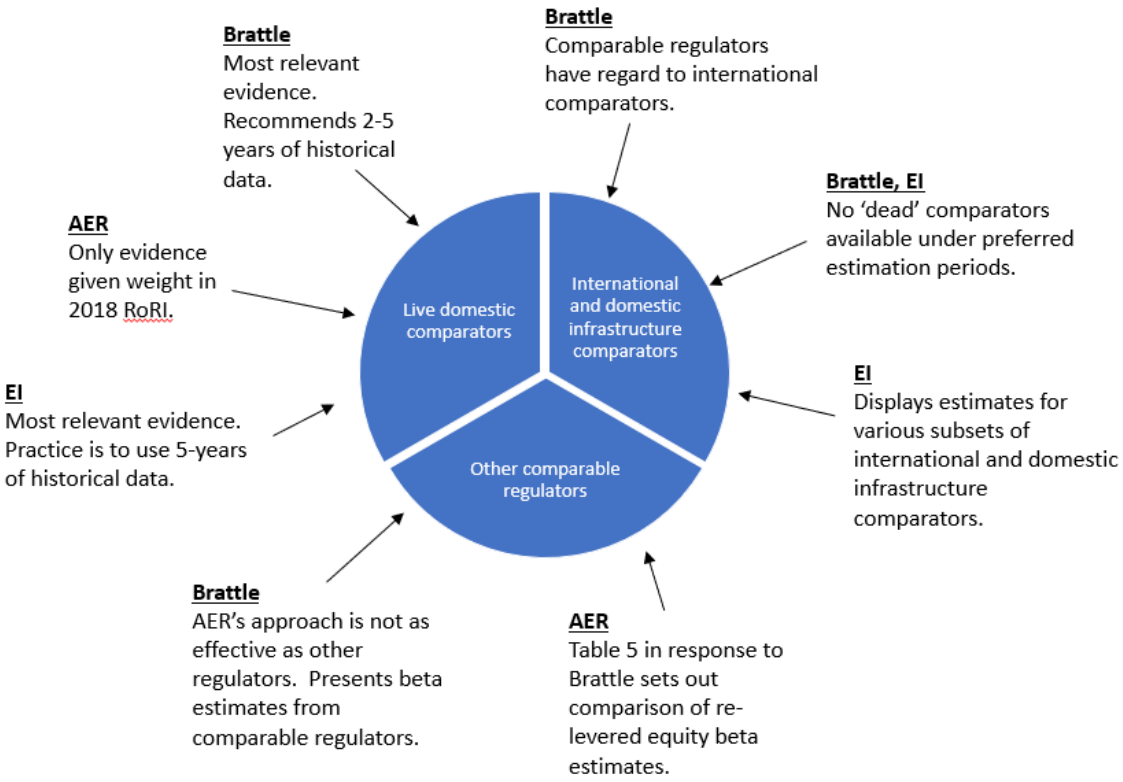
Having regard to all relevant evidence

ENA's view is that the first principle of parameter estimation is that real regard must be given to all of the relevant evidence. When setting the equity beta in the RoRI, the relevant evidence includes domestic comparators, estimates adopted by other regulators performing a similar task, international comparators and domestic infrastructure firms – for the reasons set out above.

ENA's proposed approach to estimating equity beta is strongly guided by the material commissioned and prepared by the 2022 AER as part of the current review process, as illustrated in Figure 24 below.

[141] Frontier Economics, June 2015, *Review of the AER's conceptual analysis for equity beta*, https://www.aer.gov.au/system/files/UE%20-%2015-06-10%20Review%20of%20the%20AER%27s%20conceptual%20analysis%20for%20equity%20beta-STC%20-%203%20July%202015.PDF.

Figure 24: Proposed approach for estimating equity beta



Considerations and illustrative example

ENA recommends that:

- No weight should be placed on the 'dead' comparators. That evidence is too dated, variable and inconsistent to have any real informative value.
- For the three remaining domestic comparators, ENA recommends that the trade-off between sample size (statistical precision) and recency (relevance) is best achieved by considering estimates computed over a 10-year period rather than periods of 2-5 years.
- It is unsafe to rely exclusively, or primarily, on the very small (and shrinking) set of domestic network comparator firms.
- Material weight should be applied to the estimates adopted by other comparable regulators. ENA considers that this is important evidence in assessing the confidence that can reasonably be placed in the AER's 2018 approach of setting the equity beta based on its assessment of the available domestic comparators.
- Material weight should be applied to the estimates from international comparators. ENA considers that this is important evidence in assessing the confidence that can reasonably be placed in the AER's 2018 approach of setting the equity beta based on its assessment of the available domestic comparators.

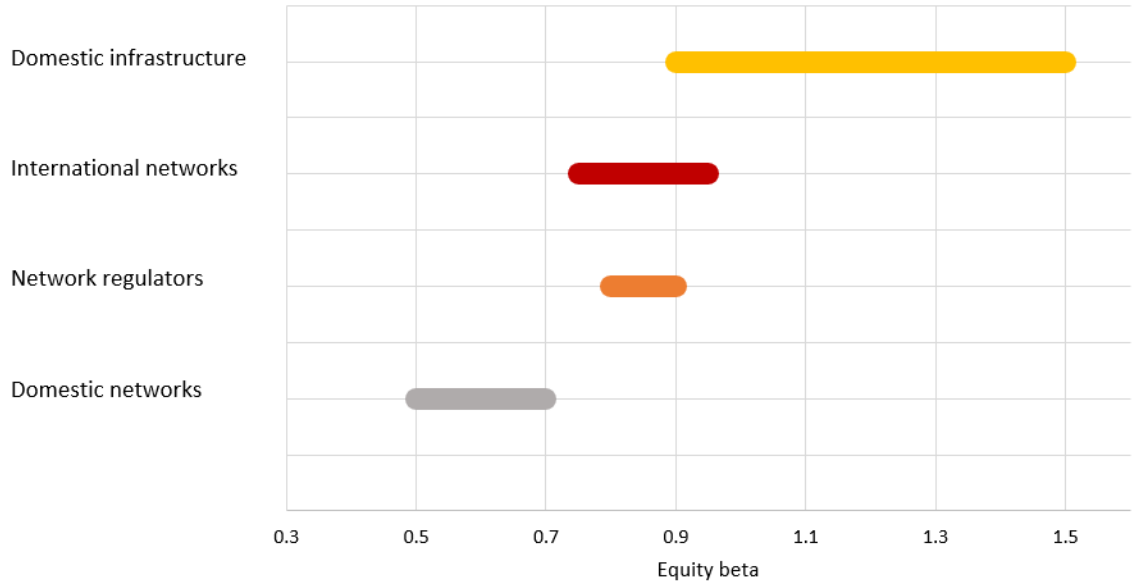
- Some weight should also be applied to the estimates from other domestic infrastructure service providers, however ENA considers this evidence to be less directly relevant than the international energy network comparators.
- Asset betas should be re-levered to ensure that the resulting equity beta is consistent with the AER's gearing parameter.

To illustrate how the relevant evidence might be combined, we note that:

- The 10-year equity beta estimates for domestic network parameters, set out in Table 8 above range between 0.5 and 0.9. The mean OLS estimate is 0.6 and the mean LAD estimate is approximately 0.7.
- Other regulators of energy transmission and distribution networks have adopted equity betas primarily in the range of 0.8 to 0.9, as set out in Table 10 above.
- The international comparators (re-levered to 60% to ensure a like-with-like comparison) primarily lie in the range of 0.75 to 0.95. These figures are obtained by re-levering the asset beta estimates in Table 11 to 60% gearing by dividing by 0.4 – consistent with the AER's approach to re-levering.
- The evidence from other domestic infrastructure service providers supports a range of 0.9 to 1.5, as set out in Table 12 above. Again, ENA does not suggest that these figures are anything more than indicative, and that work will have to be done throughout the 2022 RoRI process to select an appropriate set of comparators.

The ranges supported by the various sets of evidence are summarised in Figure 25 below.

Figure 25: Equity beta ranges



Source: Equity beta ranges, all figures re-levered to 60%. Indicative figures only. To be updated in 2022.

In assessing the evidence that is summarised above, ENA notes that the domestic network evidence is the most comparable, but the least reliable – due to the very small (and decreasing) set of comparator firms. It is for this reason that material weight must be given to the other relevant evidence.

ENA does not consider it appropriate to use the AER's domestic network comparators (or comparator, as the case may be) to fix the boundaries of a primary range, relegating the other evidence to the role of

informing the selection of a point estimate from within that range. The domestic network evidence is not of sufficient magnitude or precision or quality to enable all of the other evidence to be relegated to a type of cross-check role.

Indeed, the purpose of considering all relevant evidence is to identify, as Figure 25 does, whether the statistical estimates from the remaining domestic network firms might be out of step with the weight of other relevance. In this regard, we note the recommendation from Economic Insights that the statistical estimates of beta are just the starting point, and should not be mechanically adopted. [142]

In order to bound the range of potential estimates, ENA notes that an estimate below the 0.6 figure that was adopted in the 2018 RoRI could only be contemplated if:

- No weight was placed on the evidence from APA Group;
- No weight was placed on the estimates adopted by other regulators;
- No weight was placed on the evidence from international comparators;
- No weight was placed on the evidence from other domestic infrastructure service providers; and
- No weight at all is applied to the evidence of low-beta bias (see below).

Similarly, we note that an estimate above 0.9 could only be contemplated if:

- No weight was placed on remaining domestic comparators;
- Weight was placed on the top end of the range adopted by other regulators;
- Weight was placed on the top part of the range of evidence from international comparators; and
- Substantial weight was placed on the evidence from other domestic infrastructure service providers.

ENA considers that such an approach would be unreasonable and inappropriate.

ENA's view is that the above evidence supports an equity beta in the range of 0.7 to 0.75. We note that this small range:

- Is at, and slightly above, the range from the statistical estimates for the remaining domestic network comparators;
- Slightly below the range adopted by other energy network regulators;
- At, and slightly below, the range from the statistical estimates for international energy networks; and
- At, and somewhat below the range from the statistical estimates for other domestic infrastructure service providers.

ENA provides this as an example of how judgment might be exercised in the selection of an appropriate equity beta after having proper regard to all of the relevant evidence.

Finally, we note that ENA provides these sample calculations as an indication of the type of process that could be used to distil the relevant evidence into a single point estimate, and in response to the AER's request for concrete proposals. Clearly, the figures will need to be updated at the time of the 2022 RoRI.

ENA suggests that the next stage of the consultation process should focus on:

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[142] Economic Insights, June 2021, *Methodological issues in estimating the equity beta for Australian network energy businesses*, p. 28, emphasis added.

- Confirming the set of data/approaches that are directly relevant to the estimation of equity beta (ENA suggests the various types of evidence set out above); and
- Developing a process or some guidelines for how real regard is properly given to all of the relevant data and evidence.

6.11 Benefits of ENA's proposed approach to beta estimation

ENA considers that ENA's proposed approach to estimation of a beta value would have the following benefits compared to the current approach:

- Better reflecting a wider range of contemporary market and other evidence, by allowing that evidence to observably impact on beta estimates.
- Proactively address the consistent observed decline in direct beta comparators, providing clear guidance on future AER approaches that can be robustly applied in future reviews.
- Reduce the impact of noise and measurement error from the reliance on an increasingly narrow and out of date set of direct comparators.
- Ensuring resulting estimates of required equity allowances more fully reflect an efficient and unbiased estimate of the expected return on equity of investors, and thereby promoting efficient investment, utilisation and consumption decisions.

6.12 Assessing the impact of illustrative working examples on return on equity estimates

In sections 5.4 and 6.10 the ENA provides illustrative worked examples of how the AER could approach the task of selecting final point estimates of the market risk premium and equity beta, using current evidence.

This section highlights the current impact of adoption of these described approaches on the potential final cost of equity estimate.

Figure 26 below compares the WACC at the time of the 2018 RoRI with the WACC that would result as at 31 July 2021 under the indicative[143] return on equity estimates adopted in this submission (beta of 0.7 and MRP of 7.4%). It shows that even after the indicative increases, there would be a reduction in the allowed rate of return, flowing from the reduction in government and corporate bond yields since 2018. This would manifest as savings to customers relative to the allowances adopted in the 2018 RoRI.

[143] Note that the figures adopted throughout this submission are indicative only and will have to be reviewed and updated during the 2022 review process. This includes updating of data, selection of comparator sets, and consideration of how judgment should be exercised when selecting point estimates from the range of evidence that is available.

Figure 26: Comparing 2018 RoRI WACC and current illustrative example

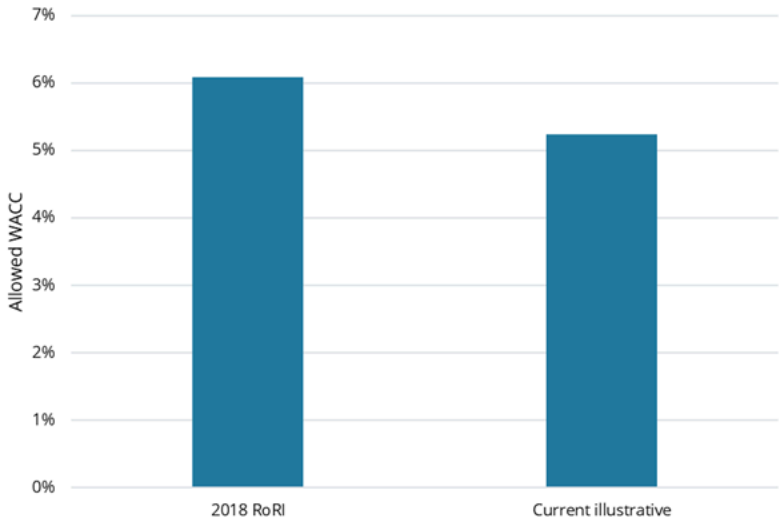
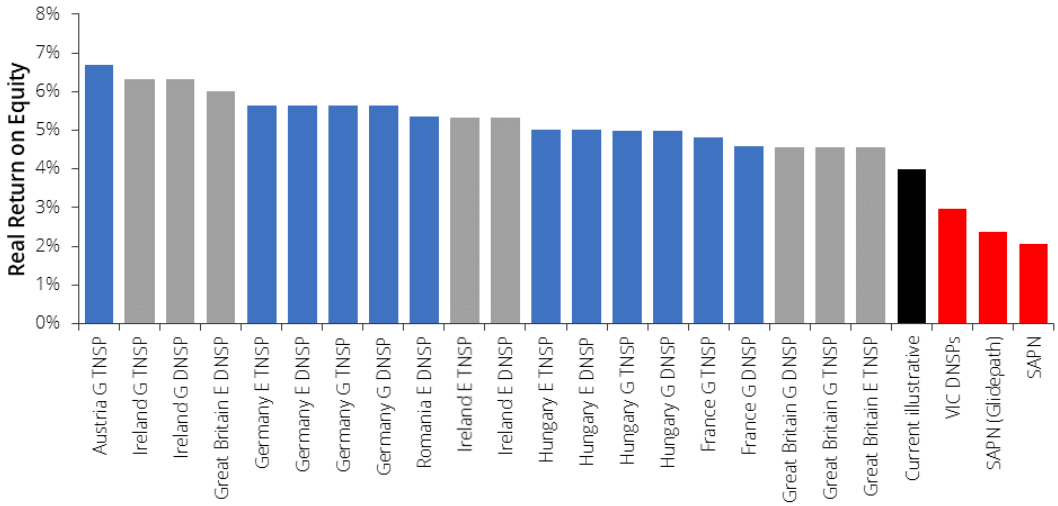


Figure 27 below compares the allowed real return on equity adopted in the most recent regulatory determinations of other comparable regulators with the allowances that would result as at 31 July 2021 under the indicative return on equity estimates adopted in this submission.[144] It shows that, even after the indicative increases, the real return on equity allowance (the black 'current illustrative' bar fourth from the right) would be lower than that currently available to other regulated energy network firms. The figure also shows that the indicative allowance is higher than in the AER's recent Victorian and South Australian decisions due to an increase in bond yields and in the allowed equity risk premium.

Figure 27: Comparing current illustrative example with international regulatory decisions



Figures 26 and 27 above show that the indicative changes to the beta and MRP parameters would serve to offset some of the reduction in allowed returns that has occurred under the significant changes made

[144] These calculations are based on a beta of 0.7, MRP of 7.4% and expected inflation of 2.25%.

under 2018 RoRI and the subsequent decline in government bond yields. The resulting WACC is lower than at the time of the 2018 RoRI and the resulting real return on equity allowance remains lower than that available to other regulated energy network firms.

6.13 Low-beta bias

ENA notes that the *Equity Omnibus* paper does not call for submissions about low-beta bias, so none are provided here.

However, ENA places this issue on the record for further consideration and consultation in the 2022 RoRI process.

In 2018, the AER placed no weight on the empirical evidence of low-beta bias, primarily on the basis that the observed historical evidence may not reflect investor expectations. It cannot simultaneously be the case, however, that historical data *does* reflect investor expectations when estimating the MRP, but the same data *does not* reflect investor expectations when estimating beta.

ENA proposes that this issue would be usefully informed by expert opinion in the next stages of the consultation process.

In this regard, the EI report recognises the evidence that the relationship between beta and returns is flatter than the CAPM would suggest – the phenomena known as low-beta bias in the regulatory setting. This leads EI to conclude that it is important to apply judgment to "ameliorate" this issue, warning that statistical beta estimates should not be used mechanistically, but are only "a starting point" for estimating beta:

> *An understanding that mechanistic application of the CAPM must be supplemented by expert judgement casts a different light on* ***the academic literature showing a flat relationship between beta and expected return****. Academic studies using large samples are constrained to rely on estimates of beta based on historical data. The significant methodological issues in identifying, obtaining and using historical data to estimate beta lower the likelihood of finding an empirical association between beta estimated from historical data and future return. Expert judgement is needed to ameliorate the issues.* ***That is, estimates of beta obtained from regression analysis are a starting point, not the end point, for estimating beta****.* [145]

This leads EI to note that industry practice is to adopt a higher rate of return for low-beta stocks than a mechanistic application of the CAPM would suggest. EI also cites evidence showing that "the independent experts' judgment is right":

> *A review of industry practice and academic studies supports the above interpretation. SFG Consulting, in its (2013) report "Evidence on the required return on equity from independent expert reports" observes that* ***independent experts' estimates of expected return for a set of low beta companies were higher than the estimate yielded by a mechanistic application of the model****. In other words, the experts estimated that the CAPM-based valuation was too high for the stocks. Strikingly, in their paper "CAPM-based company (mis)valuations", Dessaint, Olivier, Otto, and Thesmar (2021) report findings that suggest*

[145] Economic Insights, June 2021, *Methodological issues in estimating the equity beta for Australian network energy businesses*, p. 28, emphasis added.

> ***the independent experts' judgement is right**. The implied valuation of low-beta stocks when beta is estimated mechanistically is too high.* [146]

That is:

- There is empirical evidence of low-beta bias;
- Consequently, statistical estimates of beta are only a starting point – judgment is required to ameliorate this issue;
- Market practice in relation to low-beta firms is to adopt a required return above that indicated by a mechanistic implementation of the CAPM; and
- The empirical evidence indicates that application of judgment "is right."

However, EI then add one last paragraph to their discussion as follows:

> *However, it is also important to recognise the context and purpose in using the CAPM. While the CAPM as used in the 'mechanistic way' might not be generally adopted in valuation reports it may still be appropriate in a regulatory context where the monopoly nature of the firm and the regulatory arrangements provide strong stability in the cash flows and low revenue and profit risk, and hence low beta, for the firm.* [147]

This final statement seems entirely at odds with the foregoing discussion. It simply explains the reason *why* regulated infrastructure firms have low betas. That explanation does not imply that:

- Regulated infrastructure betas can be estimated with great precision; or that
- A mechanistic implementation of the CAPM provides unbiased estimates of the required returns of regulated infrastructure firms – the bias only relates to *other* low-beta firms.

ENA looks forward to exploring these issues over the next stage of the consultation process.

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[146] Economic Insights, June 2021, *Methodological issues in estimating the equity beta for Australian network energy businesses*, p. 28, emphasis added.
[147] Economic Insights, June 2021, *Methodological issues in estimating the equity beta for Australian network energy businesses*, p. 28.

7 Return on equity cross-checks

Key messages

- ENA considers that the focus of cross-checks should be on the allowed return on equity. Checks could be performed on the basis of the total required return on equity (both nominal and real) and on the equity risk premium (both nominal and real), as performed in the Brattle report.
- ENA has considered a wide range of potential cross-check information and concluded that the most valuable cross-checks involve a direct, like-with-like comparison of the AER's proposed allowance, with the comparable figure adopted by another entity. Examples of other estimates of the return on equity and ERP for network firms produced elsewhere in market practice include:
  - Allowances adopted by other regulators of comparable firms in comparable jurisdictions;
  - Estimates included for comparable firms in independent expert valuation reports; and
  - Rates of return required for the purposes of establishing the economic viability of network projects under the RIT-T evaluation framework.
- The cross-checks would be a tool to assist the AER in the application of its judgment to a difficult estimation exercise. There would be no mechanical formula that would replace the AER's proposed estimate with a figure drawn from the cross-check information. However, the draft and final decisions should explain how the exercise of judgment has been informed by the cross-check information.
- When performing cross-check comparisons, it is crucial that care is taken to ensure like-with-like comparisons are made.

7.1 Overall rate of return cross-checks

The ENA (August 2021) *Overall Rate of Return* submission provides detailed responses on a number of cross-checks relating to the overall allowed return on capital.

In some cases, we concluded that the proposed cross-check provided no useful information to provide any guidance at all as to whether a proposed regulatory allowance represents the best unbiased estimate of the market cost of capital at the time. For example, we do not see how past profitability data (largely reflecting, not the previous RoRI, but the one before that) can provide any insights about whether a proposed RoRI best reflects the prevailing market cost of capital in 2022.

In other cases, we concluded that there was some merit in cross-checks. For example, we concluded that financeability tests could be used to test the internal consistency of the AER's decision.

7.2 Return on equity cross-checks

ENA considers that return on equity cross-checks are particularly important – because a greater degree of judgment is required when estimating return on equity than return on debt.

Indeed, the current approach to setting the allowed return on debt – calculations using data from independent third-party providers – is a well-accepted and objective approach to setting the benchmark return on debt allowance.

By contrast, setting the allowed return on equity requires significant judgment in selecting an asset pricing model, in determining how to implement that model, and in estimating the parameters for that model. Consequently, cross-checks have an important role in identifying where the AER's exercise of judgment might have produced outcomes that fail a 'sense test.'

The literature has identified several approaches that provide information about the required return on equity. This includes approaches that involve consideration of other models (that recognise that equity returns are not well-described by the single-factor CAPM), information implicit in the prices of traded options and other derivative securities, approaches that consider the relativity between the required returns on equity and other securities (such as debt in the same firm), and estimates of the required return on equity for network firms compiled by other regulatory agencies and market professionals.

ENA notes that the estimation of models other than the single-factor CAPM is beyond the scope of the 2022 RoRI review and that data on traded options and other derivative securities is unavailable for the domestic listed network firms. Moreover, estimates of the required return on equity for energy network service providers that are produced by other entities are the most direct type of cross-check evidence. These are direct estimates of the same quantity (required return on equity) for the same types of firm (energy transmission and distribution networks) produced for the same purpose (discounting future expected cash flows) as the AER's task.

Consequently, ENA submits that the most valuable cross-checks involve a direct, like-with-like comparison of the AER's proposed allowance, with the comparable figure adopted by another entity.

7.3 The importance of like-with-like comparisons

When performing cross-check comparisons, it is crucial that care is taken to ensure like-with-like comparisons are made.

For example, when comparing equity risk premiums (beta multiplied by MRP) it is important to make adjustments to ensure that equity betas are re-levered to the same level of gearing and that MRP is interpreted as a premium to the prevailing risk-free rate (if that is what is adopted in the RoRI).

For example, an equity risk premium (ERP) cross-check comparison would be misleading if it compared one ERP reflecting 60% gearing with another ERP reflecting 45% gearing.

Similarly, an ERP cross-check comparison would be misleading if it involved one MRP that is added to the prevailing risk-free rate with another that is added to a materially higher risk-free rate.

And similarly, an ERP cross-check comparison would be misleading if it involved one MRP that includes the assumed value of dividend imputation tax credits with another that does not.

That is, care must be taken to ensure that any comparisons have been adjusted appropriately to ensure that the comparison is like-with-like.

7.4 Comparable regulators provide a key return on equity cross-check

The AER commissioned Brattle (June 2020) to consider the approaches of other comparable regulators. Brattle identified that other regulators use different approaches to the 2018 AER when estimating the beta and MRP parameters for use in the CAPM. Brattle demonstrated that the AER's 2018 approach produced lower return on equity allowances than other regulators. Brattle concluded that the 2018 AER's approach was not as effective as that of other regulators and identified some areas for consideration.

This is precisely how ENA sees such return on equity cross-checks being used. The cross-check does not mechanically feed back into a revision of the allowed return or of any particular parameter. Rather, it highlights a divergence between the AER's approach and that of other comparable regulators – for the AER to consider.

In the case where the AER's allowance differed materially from the allowances of comparable regulators performing the same task, the AER would reconsider how it has exercised its judgment throughout the estimation process. This may lead the AER to amend its approach, but it may not. In the case where the AER determines that its allowance does best reflect the prevailing market cost of equity capital for the benchmark firm, it would explain why that remains its view, even though comparable regulators had reached a different view.

In particular, ENA considers that the AER's estimation process might be informed by information about:

- The types of data that other regulators consider;
- The statistical and other methods that other regulators use to estimate parameters; and
- The way in which other regulators exercise their regulatory judgment.

More specifically, ENA considers that comparisons of other regulatory estimates could be performed in relation to the equity beta and MRP parameters, and in relation to the equity risk premium (the product of beta and MRP). In all cases, it is essential that like-with-like comparisons must be made.

7.5 The 2018 cross-checks

ENA made detailed submissions on the cross-check analysis performed by the 2018 AER in Chapter 7 of our submission on the Draft Instrument.[148] ENA has not changed its views about the merit and application of those cross-checks.

7.6 The focus of additional cross-checks

For the reasons set out above, ENA considers that the focus of cross-checks should be on the allowed return on equity. Checks could be performed on the bases of the total required return on equity (both nominal and real) and on the equity risk premium (both nominal and real), as performed in the Brattle report.

ENA submits that the most valuable cross-checks involve a direct, like-with-like comparison of the AER's proposed allowance, with the comparable figure adopted by another entity. Examples of other estimates of the return on equity and ERP for network firms produced elsewhere in market practice include:

[148] ENA, September 2018, AER review of the rate of return guideline: Response to draft guideline.

- Allowances adopted by other regulators of comparable firms in comparable jurisdictions;
- Estimates included for comparable firms in independent expert valuation reports; and
- Rates of return required for the purposes of establishing the economic viability of network projects under the RIT-T evaluation framework.

These are all direct estimates of the return on equity (or ERP) of network businesses. They are all used to discount future cash flows of network businesses back to present value.

ENA considers these direct estimates to be more informative than cross-checks that might provide an indication of whether the required return on equity has been increasing or decreasing over some recent period. It is not clear how that type of information could be usefully employed in setting the allowed return in the RoRI.

7.7 Implementation of cross-checks

To illustrate how cross-checks might be applied, we have set out a stylised example in Figure 28 below. This is an illustrative example only – included only to demonstrate the process for how cross-checks might be used.

It shows that the data supports a range for the return on equity – for example, there are a range of estimates for beta and MRP, as set out above. It also shows the proposed regulatory allowance from within that range. For example, the proposed allowance might place more weight on some pieces of evidence than others.

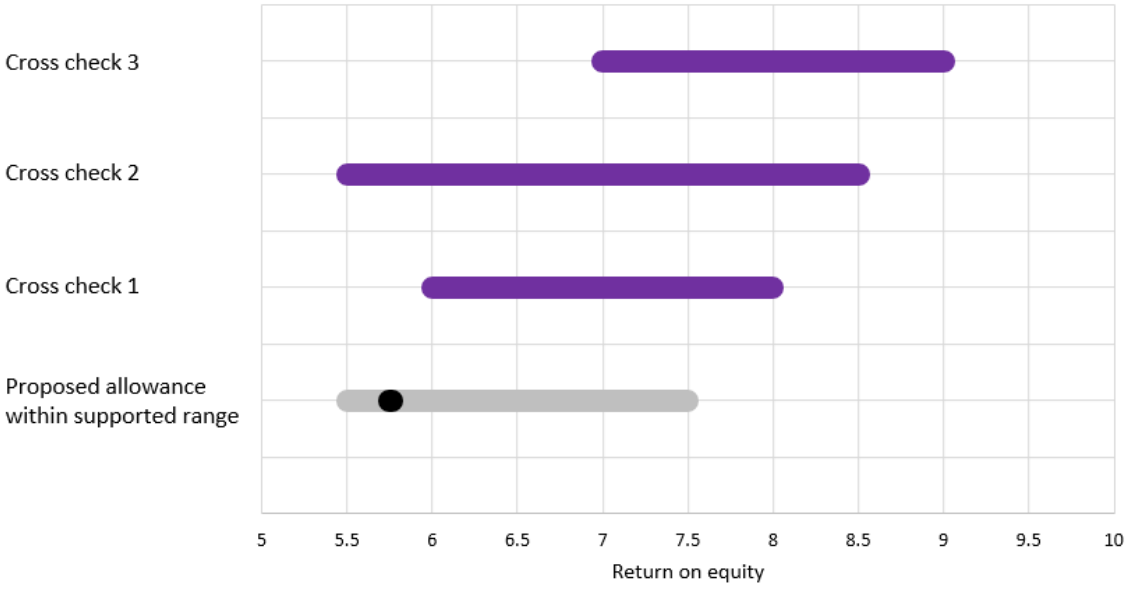
It also shows the range of like-with-like cross-checks. The cross-checks in this example support a return on equity higher than the proposed allowance.

ENA does not suggest that the cross-checks should be used in some way to replace the proposed allowance. Rather, the cross-checks would identify that the proposed allowance appears to be at the lower end of the range of estimates that have been adopted for the purposes of discounting future cash flows of network businesses. The AER would then seek to understand why the proposed allowance is at the lower end. For example, it may be that the AER has assigned predominant weight to particular pieces of evidence that tend to be assigned less weight than others. Or that others have regard to pieces of evidence that the AER does not.

This would then inform the AER's decision about whether to reconsider the set of evidence to which it has regard, and the way it has weighted the various pieces of evidence available to it.

To be clear, the cross-checks would be a tool to assist the AER in the application of its judgment to a difficult estimation exercise. There would be no mechanical formula that would replace the AER's proposed estimate with a figure drawn from the cross-check information. However, the draft and final decisions should explain how the exercise of judgment has been informed by the cross-check information.

Figure 28: Illustration of implementation of cross-checks



Source: Indicative illustration of process only.

7.8 Next steps

ENA proposes that the next steps of the consultation process should be to:

- Obtain general stakeholder endorsement of the principle that only like-with-like comparisons should be made:
  - Equity betas must be compared on a like-with-like basis, reflecting the same level of gearing;
  - MRP comparisons should also consider the risk-free rate that is paired with that MRP. For example, it would be unsafe and misleading to consider an MRP that is paired with the prevailing yield on government bonds to be equivalent to one that is paired with a substantially higher risk-free rate; and
  - MRP comparisons should not reflect different assumptions about the value of imputation credits. For example, the AER's estimate includes the assumed value of imputation credits. It would be inconsistent to compare that against an alternative ex-imputation estimate.
- Reach agreement on how to ensure that other estimates of the required return on equity (or ERP) are considered on a like-with-like basis.

8 Appendix A – Public forum and technical session themes

8.1 Summary of Themes of Stakeholder Responses to ENA Cost of Equity Approaches

This appendix provides a summary of ENA perspectives on a number of themes and points arising from the AER's Public Forum on the Equity Omnibus Working Paper and a separate Technical Session held by ENA.

Stakeholder theme	**ENA Response**
The use of the DGM is complex, sensitive to assumptions, and there is no new relevant evidence to support its adoption	The estimation of an unknown forward-looking market risk premium is a complex task, of high relative significance to the investment and consumption decisions across the Australian economy, impacting long-lived investments. A decision of this nature warrants the bringing to bear of the best tools to achieve an unbiased estimate. Many other comparable network and other regulatory bodies parameterise and operate DGMs for the purpose of informing both network access pricing determinations, and a range of other high-consequence public policy decisions (as in the case of the Bank of England). The DGM can be calibrated in a number of ways to address sensitivity or other cited implementation concerns. However, comparisons between it and a highly averaged market risk premium need to be interpreted with care, due to the inherent mathematical properties of long-run average estimate of historical MRP. There is significant academic and empirical evidence that the forward-looking market risk premium is inherently more volatile than an averaged measure of realised returns. Therefore the 'sensitivity of volatility' of the measure may reflect its greater accuracy than current historically based estimates. DGM continues to be used by a wide range of regulatory bodies. It is appropriate for the AER to regularly review existing approaches in the light of other bodies assigned with carrying out similar tasks.
The use of a DGM involves the AER adopting a 'speculative' approach to estimating future expected returns	In setting a return on equity estimation approach, the AER is inherently seeking to identify an unknown future value. Carrying out this task, the least speculative approach the AER can adopt is the balanced use of all relevant market data and evidence, including models known to be commonly used both by market practitioners and other regulatory bodies.

	Adoption of a purely historically based MRP also represents a speculation that investors *exclusively* set expected returns on the basis of historical average returns. This proposition is contradicted by observed evidence of market practice, including the use of DGM approaches. Market wide DGM models are based on consensus forecasts from a range of analysts. If a primary concern is the potential for market information based on speculative activities to not potentially bias or impact return on equity estimates, a logical consequence is that no weight should be applied to RAB multiple evidence, which necessarily represent the views of a single transacting party on future achievable returns, rather than a consensus average forecast.
The AER should not adjust the MRP approach, if the underlying issue is of low rates.	ENA concurs that if the AER concludes a primary driver of its regulatory returns on equity being lower than comparable jurisdictions is extraordinarily low risk-free rates, than direct measures should be applied. The Brattle report, however, found that the equity risk premium provided by the AER was also lower than for every other comparable regulator. This measure is not impacted at all by the risk-free rate measure. Rather, CEPA and Brattle reports when assessed together show that the 2018 AER return on equity methodology has two contributory issues to producing internationally uncompetitive equity allowances. First, adopts a prevailing bond rate, and alters the final return on equity estimate on a 1:1 basis with bond rates. Second, the equity risk premium it places on the base risk-free rate is also lower than comparable regulators.
Exposure to a low risk-free rate is a known risk, and does not need to be compensated by altered AER approaches.	No party is calling for 'compensation' for low risk-free rates. The focus of discussion in the AER's Working Paper is correctly on analysing what implications a low rate environment may have for the return on equity estimate. It is seeking to investigate the issue of whether forward-looking expected equity returns are impacted by low rates, in the manner currently assumed by the AER's approach. There is a significant body of survey, academic and empirical finance evidence to suggest this is a matter for deliberation by the AER. Presentation of the issue as a matter of compensation also obscures the shared and symmetrical nature of risks in this area. In circumstances of interest rates at a far higher levels, it is future consumers who would bear the potential risk of the AER's current 1:1 movement assumption. In these circumstances, networks would not be justified in characterising a future CRG request to review approaches in this area as a seeking of 'compensation'.
An approach which sets a 'zero floor' to government bonds is a simple, transparent and principled approach to addressing potential negative rates	Agreed.

	Importantly, the use of the CAPM involves the two-step process of parameterising (i.e. selecting the inputs for) and then applying the CAPM formula. An adjusted CAPM featuring a 'floor' on the risk-free rate does not have any particular implications for the first step, the estimation of parameter inputs, especially for economy-wide parameters such as the market risk premium.
The AER's return on equity estimate being found to be below other regulators does not mean that the AER's approach is 'wrong'.	Agreed. Such a finding, together with the AER's commissioned reports identifying that there is 'no good evidence' supporting key assumptions made in the AER's current approaches, however, should be a matter for careful consideration and investigation by any regulator. In circumstances where a regulator is found to be adopting approaches delivering such outcomes systematically, prudent matters for consideration would naturally be: • What areas of its current methodology are causing these outcomes? • What is the relative strength of evidence supporting their approach, versus other approaches commonly adopted by others undertaking comparable tasks? • What is the balance of risks arising from any potential divergence between allowed returns? • How will the regulator satisfy itself that providing equity allowances systematically below that of other regulators is in the long-term interests of current and future customers? If the AER process investigates each of these questions and answers them, confidence in its final conclusions is likely to be higher than any approach which leaves these matters not transparently evaluated.
The return on equity approach set in the AER 2018 Rate of Return Instrument has a unique status which sets a benchmark not to be departed from without strong evidence.	The according of special precedential weight to past outcomes was a matter considered in the policy design of the Rate of Return Instrument, however, consistent with past – consumer group supported – reforms to remove a requirement for a 'persuasive evidence' for change to previous rate or return approaches or parameters, policy makers chose **not** to accord the 2018 Instrument with any special status. In fact, legislation noted that even a failure on the part of the AER to carry out the legislative requirements in the Act would not impact its validity. It is proper for the AER to carefully evaluate any proposed departures from its previous approaches, as a principle of good regulatory practice. Departures should be considered in the light of relevant evidence arising in the process. In circumstances in which AER commissioned reviews of other regulators approaches have highlighted that current cost of equity estimates are based on assumptions for which 'no good evidence' exists, carefully evaluation of alternative approaches would appear especially prudent.

A 'calibrated DGM' might produce estimates which are too volatile, however, if averaged this will lose some of the claimed benefit of such estimates being 'forward-looking'	Estimates of total market return (risk-free rate plus the MRP) using a 'calibrated' DGM are likely to be less volatile than a cost of equity derived from approaches of adding a historically based market risk premium to an observed prevailing risk-free rate. This is because under the latter approach, the total cost of equity varies 1:1 with movements in the risk-free rate. It is the volatility of the total equity return, rather than underlying elements of an estimate, that flow through to revenues and prices. Importantly, ENA is not proposing the mechanistic adoption of point estimates of the calibrated DGM by the AER in a determination on the cost of equity as part of the RoRI.

9 Appendix B – Applying a 'calibrated DGM'

This appendix provides some additional detail on how ENA proposes that the calibrated DGM would be implemented and used by the AER. ENA would be happy to provide more explanation or further detail to interested parties as required.

When would the calibrated DGM be used?

ENA proposes that the calibrated DGM would only be estimated at the time of the RoRI. It would not be re-estimated at the time of each determination during the RoRI period.

How is the calibrated DGM constructed?

Step 1 – Establishing the base MRP

The first step is for the AER to estimate the average excess return over some historical period, in the usual manner. This was the AER's preferred approach to the MRP in 2018.

For example, in 2018 the AER estimated that the average historical MRP over the 1988-2017 period was 6.1%. For the 2022 RoRI, the AER will re-estimate that figure using data from 1988-2021. Whatever that figure turns out to be then becomes the 'target' to which the DGM will be calibrated.

Step 2 – Populating the market-level DGM

The next step is to obtain values for the current market index and consensus dividend forecasts (for the market as a whole) from Bloomberg. This is the same data as the AER uses for its preferred specification of the DGM.

The DGM simply equates the present value of future dividends to the current observed index level:

$$P_0 = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \frac{D_4}{(1+r)^4} + \frac{D_5}{(1+r)^5} + \cdots$$

Since we only have forecasts for the next 3 years, we assume constant growth thereafter, consistent with the AER's preferred specification:[149]

$$P_0 = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \frac{D_3(1+g)}{(1+r)^4} + \frac{D_3(1+g)^2}{(1+r)^5} + \cdots$$

[149] We note that the AER's preferred specification accounts for the possibility that the calculation is being performed during Year 1, rather than right at the beginning of Year 1. In this case, the timing is simply adjusted accordingly. We have adopted the AER's timing conventions in all of our calculations. We also note that this formula pertains to the AER's two-stage DGM. The same approach can be applied to the three-stage DGM and produces near identical results.

We assume a value for growth (g). Any figure will do, as we will ultimately derive this figure from the data using the method set out below. Suppose we start with an assumption of 4.6%, the base case figure adopted by the AER since 2013.

At this stage, we have observations of P_0, D_1, D_2, and D_3 from Bloomberg, and our starting value of 4.6% for g. We can then solve for the implied required return on the market, r. That is, there is a unique r that equates the current observed price with the forecasted future dividends.

Step 3 – Applying the model to reach monthly MRP estimates

This process is repeated for each month from 1988-2021 (using the period in the above example). This will produce a different estimate of the required return on the market for each month. For some months the combination of dividends and price will produce a high estimate of the required return and in other months we will have a low estimate of the required return. The time series of estimates might, for example, look like the 'before calibration' series in the figure below.

Steps 1 to 3 are entirely consistent with the way the AER has estimated its preferred specification of the DGM in every determination since 2013.

Step 4 – 'Calibrating' the model back to the AER's historical MRP estimate

The last step is to 'calibrate' the output to be consistent with the AER's estimate of the average MRP over that historical period. We do this for the following reason. The basis for the AER's use of the historical excess returns approach is that actual market outcomes reflect investor expectations on average over a long period. That is, although actual outcomes might differ from what investors were expecting in a particular year, over the long-term average observed market outcomes will reflect investor expectations. Thus, in the 2018 RoRI, the AER concluded that, on average over that period, investors were expecting an MRP of 6.1%.

Consequently, we calibrate the DGM to ensure that the average estimate of the expected MRP is also 6.1%. In this way, both estimates reflect the same average expected MRP over the same historical period. We do this by altering the assumed long-run growth, g, until we have an exact match. This is illustrated as the 'After calibration' in Figure A overleaf.

How would the estimates of the calibrated DGM be used?

The calibrated DGM series would then be used by the AER to inform its selection of an MRP figure in the 2022 RoRI. For example, the AER may have regard to the most recent estimates at the time of the RoRI and to estimates over the prior months or year. We would see the ENA using this information to produce a range that is supported by the DGM evidence – in the same way that the AER has regard to a range of different historical excess returns estimates.

The benefit of the calibrated DGM approach is that, whereas it produces the same *average* MRP as the historical excess returns approach, it provides an indication of whether the *current* MRP is above or below that long-run average.

Figure A - Comparing a 'calibrated' and uncalibrated DGM MRP estimate