Estimating the required return on equity

Report for ATCO Gas Australia

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1. Background and conclusions

Overview and instructions

1. SFG Consulting (**SFG**) has been retained by ATCO Gas Australia Ltd (**ATCO**) to provide our views on the estimation of the required return on equity under the National Gas Rules (**Rules**). In particular, we have been asked to provide:

    a) An assessment of the ERA's approach to estimating the return on equity set out in the Rate of Return Guidelines, including a critique of the ERA's reasoning for finding that only the Sharpe Lintner CAPM is relevant and the proposed use by the ERA of crosschecks.

    b) Your opinion on whether the ERA's proposed approach to the cost of equity results in the best estimate that contributes to the achievement of the allowed rate of return objective.

    c) Your opinion on whether the return on equity estimate using the ERA approach results in a cost of equity consistent with prevailing conditions in the market for equity funds.

    d) Your opinion on whether the return on equity estimate using the ERA approach is consistent with the achievement of the NGO and the RPP.

    e) If in your opinion the ERA's approach does not meet the requirements of the Rules identified above, what method for estimating the cost of equity (having regard to "relevant estimation methods, financial models, market data and other evidence"), should be used in order to produce the best estimate possible in the circumstances that complies with the Rule 87(5), (6) and (7) and the achievement of the NGO and RPP and why?

2. This report has been authored by Professor Stephen Gray, Professor of Finance at the UQ Business School, University of Queensland and Director of SFG Consulting, a specialist corporate finance consultancy. I have Honours degrees in Commerce and Law from the University of Queensland and a PhD in financial economics from Stanford University. I teach graduate level courses with a focus on cost of capital issues, I have published widely in high-level academic journals, and I have more than 15 years' experience advising regulators, government agencies and regulated businesses on cost of capital issues.

3. My opinions set out in this report are based on the specialist knowledge acquired from my training and experience set out above.

4. I have read, understood and complied with the Federal Court of Australia Practice Note CM7 *Expert Witnesses in Proceedings in the Federal Court of Australia.*

5. A copy of my instructions is attached as Appendix 2 to this report and a copy of my curriculum vitae is attached as Appendix 3.

Context for this report

6. This report addresses issues relating to the estimation of the required return on equity under the current version of the National Gas Rules and considers the ERA Rate of Return Guideline. It contains a mixture of:

a) New evidence and analysis that has not previously been considered by the ERA;[1]

b) Further explanation of issues that (in general terms) have previously been raised with the ERA as part of the Guideline process, but which the ERA has not yet addressed;[2] and

c) Further evidence in relation to issues that the ERA has addressed under the previous Rules, but which require fresh consideration under the new Rules.[3]

Summary of conclusions

7. Our primary conclusions in relation to the estimation of the allowed return on equity are set out below.

In effect, the ERA proposes to adopt the same approach it used under the previous Rules

8. The ERA's approach to estimating the required return on equity under the previous Rules was to use the Sharpe-Lintner CAPM (**SL CAPM**) exclusively with:

a) The risk-free rate set to the contemporaneous yield on 5-year Commonwealth Government bonds;

b) Beta determined from regression analysis applied to a small sample of domestic firms; and

c) Market risk premium set to 6%.

9. The ERA's proposed approach (set out in its Final Guideline) is, in effect and in outcome, identical to the approach it adopted in every one of its decisions under the previous Rules – the required return on equity is again estimated using the SL CAPM exclusively with risk-free rate set to the contemporaneous yield on 5-year Commonwealth Government bonds and MRP set to 6%.

10. In our view, for the reasons set out below, the adoption of this same approach with the same outcome is inconsistent with the AEMC's rule changes.

The ERA's proposed approach is inconsistent with the AEMC's Rule changes

11. Under the previous Rules, the Australian Competition Tribunal held that if a regulator or regulated business (a) was using a well-accepted financial model such as the CAPM, and (b) had a reasonable basis for each of its parameter estimates, then it must automatically be the case that the resulting estimate of the required return on equity was reasonable and commensurate with the prevailing

[1] For example, all of the empirical estimates in the report have been updated to reflect recent data and the report sets out new evidence and analysis in relation to the assessment of asset pricing models against the ERA's criteria, in relation to the implementation of the Sharpe-Lintner CAPM, and in relation to approaches for estimating the required return on equity that are consistent with the new Rules.

[2] For example, at the ERA Stakeholder Forum there was a detailed discussion of how it was inappropriate to take a statistical confidence interval for the historical mean estimate of MRP and to interpret that, not as a range for the long-term mean, but as determining what the maximum and minimum MRP could possibly be across the full spectrum of market conditions – the confusing of unconditional and conditional estimates. However, that same problem is perpetuated in the final Guideline. As another example, the final Guideline perpetuates the ERA's error in estimating the term of debt at issuance by measuring the term of debt remaining.

[3] For example, under the previous Rules the ERA decided that the Fama-French model was not as well-accepted as the CAPM. However, the new Rules require the ERA to have regard to all relevant models. Consequently, we consider the Fama-French model against the requirements of the new Rules.

conditions in the market. That position was the primary driver for the AEMC's return on equity rule change.

12. In making fundamental changes to the Rules, the clear intention of the AEMC was to alter the regulatory practice of relying exclusively on the SL CAPM when estimating the required return on equity. In referring to the Tribunal's conclusion that the use of a well-accepted financial model effectively guaranteed that the resulting estimate of the required return on equity was reasonable and commensurate with the prevailing conditions in the market, the AEMC stated:

> The Commission considered that this conclusion presupposes the ability of a single model, by itself, to achieve all that is required by the objective. The Commission is of the view that any relevant evidence on estimation methods, including that from a range of financial models, should be considered to determine whether the overall rate of return objective is satisfied.[4]

13. The AEMC went on to state that:

> The Commission considered that no one method can be relied upon in isolation to estimate an allowed return on capital that best reflects benchmark efficient financing costs [5]

14. The AEMC explicitly linked the consideration of a range of models to the production of the best possible estimate of the efficient financing costs as required by the National Gas Objective (NGO) and Revenue and Pricing Principles (RPP):

> Achieving the NEO, the NGO, and the RPP requires the best possible estimate of the benchmark efficient financing costs. The Commission stated that this can only be achieved when the estimation process is of the highest possible quality. The draft rule determination stated that this meant that a range of estimation methods, financial models, market data and other evidence must be considered.[6]

15. That is, the AEMC's clear view is that the NGO and RPP require the regulator to produce the best possible estimate of the required return on equity,[7] which in turn requires the consideration of a range of financial models.

16. In our view, the continued exclusive reliance on the SL CAPM excludes the consideration of relevant evidence, does not produce "the best possible estimate," and does not meet the requirements of the Rules.[8]

The ERA is wrong to use the SL CAPM exclusively

17. The ERA develops a set of criteria that it uses to support its conclusion that it should rely exclusively on the SL CAPM for the purpose of determining the required return on equity. In Section 3 of this report we compare and contrast the ERA's assessment against the criteria of the SL CAPM and the Fama-French model and conclude that:

[4] AEMC Final Determination, p. 48.
[5] AEMC Final Determination, p. 49.
[6] AEMC Rule Change Final Determination, p. 43.
[7] The required return on equity is a key component of the efficient financing costs.
[8] Specifically, NGR 87(5).

a) The ERA's criteria are not part of the Rules. The Rules do not state that the Fama-French model must be considered if it satisfies the ERA's criteria, the Rules state that the Fama-French model must be considered if it is relevant. That is, the question is not whether the Fama-French model is the "best" model, or whether it is consistent with the ERA's criteria, or whether it alone can achieve the allowed rate of return objective, but whether it is relevant. Our view is that the Fama-French model, as one of the leading models for estimating the required return on equity (even leading to a Nobel Prize for its developer), must surely be considered to be at least relevant to the estimation of the required return on equity; and

b) In any event, the Fama-French model generally satisfies the ERA's criteria at least as well as the SL CAPM. In this regard, we note that the Rules do not require the regulator to select a single "best" model, rather they require the regulator to have regard to every model that is relevant to the task of determining the required return on equity for the benchmark efficient firm.

The ERA is wrong to omit other relevant evidence

18. Section 4 of this report considers a range of evidence that we consider to be relevant for the purposes of determining the required return on equity that has regard to the prevailing conditions in the market for funds and is commensurate with the efficient financing costs of a benchmark efficient entity. In our view, the ERA has erred in dismissing this evidence.

19. In our view, the ERA's SL CAPM estimate of the required return on equity is:

a) Not based on all relevant evidence;

b) Not commensurate with estimates from other models and approaches;

c) Not commensurate with other ways of implementing the SL CAPM;

d) Not commensurate with estimates from other regulators; and

e) Not commensurate with estimates from independent expert valuation professionals.

Consequently, the allowed rate of return on equity produced by the ERA's SL CAPM estimate is not commensurate with the prevailing conditions in the market for equity funds or with the efficient financing costs of a benchmark efficient entity.

The ERA's proposed cross check step will have no material effect

20. In the first step of its proposed approach, the ERA concludes that the required return on equity will continue to be estimated using the SL CAPM exclusively. Thus, Steps 1 to 3 of the proposed approach relate to the implementation of the SL CAPM. Step 4 then involves "cross checks" of the SL CAPM estimate.

21. In our view, there are a number of logical problems relating to the implementation of the cross check step, as follows:

a) It is not clear that any cross check is capable of having any effect. Other regulators have made no revision to their preliminary estimates even when those estimates have unambiguously failed various cross checks;

b) The inclusion of weak and easily passed cross checks is likely to negate the potential effect of relevant evidence where a set of cross checks is considered holistically as a group;

c) Under the proposed approach, the SL CAPM[9] is immunised from any cross check evidence – it is maintained regardless of any evidence against it; and

d) It appears that cross check evidence is to be disregarded to the extent that it suggests a parameter estimate outside the range established by the "primary" subset of relevant evidence.

22. Our view is that the proposed approach is inconsistent with the new Rules to the extent that the issues set out above result in relevant evidence being denied the opportunity to appropriately inform the estimate of the required return on equity and to the extent that they result in the ERA persisting with a mechanistic SL CAPM approach.

23. In relation to these cross checks, the ERA refers to the data and evidence listed in its Appendix 29. However, there are in fact no cross checks to be found anywhere in that appendix. Every item set out in that appendix is either:

a) Not used anywhere in the ERA's process (because the ERA considers it to be too unreliable or irrelevant); or

b) Used to inform the estimate of individual parameters in Step 2 of the process, rather than as a cross check in Step 4; and/or

c) Used in such a way that it is incapable of having any material effect on the allowed return on equity.

24. In addition, the sample implementation in Appendix 30 contains no cross checks at all of the allowed return on equity for the benchmark firm. The appendix does, however, note that the ERA's estimate of the required return on equity for the market is materially (20%) below the historical average and that it is materially below the value used in independent expert valuation reports. But the ERA then concludes that this evidence does not warrant any reconsideration of its approach or estimates.

25. Consequently, it appears that in fact there is no Step 4 to the ERA's proposed approach, in which case the ERA's approach collapses estimating three parameters and inserting them into the SL CAPM formula.

The ERA's proposed approach is not similar to the approach proposed by industry

26. In its Guideline materials, the ERA states that its proposed approach for estimating the required return on equity is largely consistent with the approach proposed by industry (particularly the Energy Networks Association). In our view, this statement is at odds with the facts. The key point of difference is that:

a) Industry stakeholders have proposed that the ERA should set out all relevant methods, models, data and other evidence together and distil from it an estimate of the required return on equity after consideration of the relative strengths and weaknesses of each piece of evidence; whereas

[9] Or whatever model or models the ERA determines to be relevant in Step 1 of its proposed approach.

b) The ERA proposes a convoluted process whereby evidence is stratified into three disjoint subsets in a way that results in some evidence being over-weighted (in relation to its relative strengths and weaknesses) and other relevant evidence being effectively disregarded.

The ERA fails to consider relevant evidence when implementing the Sharpe-Lintner CAPM

27. In our view, the ERA has erred in its estimation of the individual SL CAPM parameter estimates. The primary estimation issues are:

    a) The ERA has failed to consider relevant evidence suggesting that investors assess required returns relative to the yield on 10-year government bonds rather than 5-year government bonds;

    b) When estimating beta, the ERA has erred in setting up a convoluted approach wherein the relevant evidence is partitioned into three sub-sets in a way that prevents the evidence from being properly considered in the context of relative strengths and weaknesses. The ERA has also disregarded evidence that is relevant to the estimation of beta, and disregarded evidence that questions the reliability of the ERA's estimation approach; and

    c) The ERA's estimate of MRP is also contaminated by the same convoluted partitioning approach that affects its beta estimate. In particular, the primary range is contaminated by two misunderstandings (the difference between conditional and unconditional means and the time variation in DGM estimates) and the selection of a point estimate from within the range is driven by the non-standard and misleading "normalisation" that the ERA applies to certain data series.

Our proposed approach

28. Our proposed approach is to have regard to a range of relevant methods, models, data and evidence when estimating the required return on equity that has regard to the prevailing conditions in the market for funds and is commensurate with the efficient financing costs of a benchmark efficient entity. All relevant evidence is considered together in one stage of the process. All evidence is considered in an internally consistent manner with each piece of evidence weighted according to its relative strengths and weaknesses. Our conclusion is that a required return on equity of 10.7% (as at November 2013) would be consistent with the Rules.

Departure from the Guideline

29. For the reasons set out above, our view is that the ERA approach does not produce the best possible estimate of the required return on equity. It therefore follows that the allowed return on equity will not contribute to the allowed rate of return objective because it will not reflect the efficient financing costs of the benchmark efficient entity. In turn, an allowed return on equity that does not reflect efficient financing costs will be inconsistent with the NGO and RPP. A key part of the NGO is to:

> promote efficient investment in…natural gas services…for the long term interests of consumers."[10]

30. An allowed return on equity that is materially above (below) the efficient financing costs of the benchmark efficient entity will create incentives for over (under) investment, neither of which are in the long-term interests of consumers.

[10] National Gas Law, s. 23.

31. Similarly, the RPP require that:

> regard should be had to the economic costs and risks of the potential for under and over investment, [11]

and that:

> a reference tariff should allow for a return commensurate with the regulatory and commercial risks involved.[12]

32. It is difficult to see how these principles can be complied with if the allowed return does not reflect the efficient financing costs of the benchmark efficient entity.

33. The RPP also require that

> a service provider should be provided with a reasonable opportunity to recover at least the efficient costs the service provider incurs,[13]

which would seem to require that the allowed return must be at least commensurate with the efficient financing costs of the benchmark efficient entity.

34. Our view is that the ERA approach does not produce an allowed return that is commensurate with the efficient financing costs of the benchmark efficient entity, that it does not (therefore) comply with the Rules, and that it should (therefore) be departed from.

35. In our view, the approach set out in Section 7 of this report does have regard to all relevant evidence and does produce the best possible estimate of the required return on equity, and it should be used in place of the ERA SL CAPM approach.

Specific issues set out in Terms of Reference

36. The specific issues identified in the Terms of Reference, and our response to each of them, are set out below.

    a) *An assessment of the ERA's approach to estimating the return on equity set out in the Rate of Return Guidelines, including a critique of the ERA's reasoning for finding that only the Sharpe Lintner CAPM is relevant and the proposed use by the ERA of crosschecks.*

       Our view is that the ERA's proposed approach of exclusive reliance on the Sharpe-Lintner CAPM is not well justified. For the reasons set out in Section 3 of this report, our view is that financial models other than the Sharpe-Lintner CAPM are relevant to the estimation of the required return on equity. Moreover, for the reasons set out in Section 6 of this report, our view is that the ERA's implementation of the Sharpe-Lintner CAPM is flawed.

[11] National Gas Law, s. 24(6).
[12] National Gas Law, s. 24(5).
[13] National Gas Law, s. 24(2).

Our view is that the ERA's proposed cross check step is cosmetic and unlikely to have any tangible effect, as explained in Section 5 of this report. Consequently, the ERA approach reduces to one of selecting values for three parameters and inserting them into the Sharpe-Lintner CAPM formula.

b) *Your opinion on whether the ERA's proposed approach to the cost of equity results in the best estimate that contributes to the achievement of the allowed rate of return objective.*

In our view, the ERA approach does not produce the best possible estimate of the required return on equity because it omits some relevant evidence and artificially constrains the effect of other relevant evidence. In our view, the best estimate of the required return on equity is obtained by giving full and proper consideration to all relevant evidence. By contrast, the ERA approach:

i) Disregards relevant financial models other than the Sharpe-Lintner CAPM, as set out in Section 3 of this report;

ii) Disregards other relevant evidence as set out in Section 4 of this report; and

iii) Artificially constrains the effect of certain relevant evidence by pre-assigning evidence to different categories, as set out in Section 6 of this report. For example, evidence that is assigned to the secondary category can only move a parameter estimate within the range established by the primary evidence – even if the secondary evidence points to an estimate outside that primary range. Moreover, where the ERA's point estimate is already at the top end of the primary range, further evidence pointing to an even higher estimate can have no effect at all.

For the reasons set out above, our view is that the ERA approach does not produce the best possible estimate of the required return on equity. It therefore follows that the allowed return on equity will not contribute to the allowed rate of return objective because it will not reflect the efficient financing costs of the benchmark efficient entity.

c) *Your opinion on whether the return on equity estimate using the ERA approach results in a cost of equity consistent with prevailing conditions in the market for equity funds.*

Our view is that the ERA approach does not produce an estimate of the required return on equity that is consistent with prevailing conditions in the market for equity funds. Reasons to support this conclusion are set out in Section 4 of this report and include:

i) The ERA approach suggests that the required return on equity has, since the onset of the GFC, been lower than at any other time since World War. In our view, it is self-evident that a global financial crisis does not lower the cost of equity capital to record lows;

ii) The ERA approach produces estimates of the required return on equity that are materially lower than those adopted by independent expert valuation professionals;

iii) The ERA approach produces estimates of the required return on equity that are materially lower than those adopted by other Australian regulators; and

iv) The ERA approach produces estimates of the required return on equity that are materially lower than those produced by every alternative estimation method.

d) *Your opinion on whether the return on equity estimate using the ERA approach is consistent with the achievement of the NGO and the RPP.*

Our view is that the NGO and RPP require the best possible estimate of the required return on equity for the benchmark efficient entity, which in turn requires consideration of all relevant evidence including a range of financial models.

We note that this view is consistent with that of the AEMC:

> Achieving the NEO, the NGO, and the RPP requires the best possible estimate of the benchmark efficient financing costs. The Commission stated that this can only be achieved when the estimation process is of the highest possible quality. The draft rule determination stated that this meant that a range of estimation methods, financial models, market data and other evidence must be considered.[14]

In our view, the ERA approach does not produce the best possible estimate of the required return on equity, for the reasons summarised in Paragraphs (b) and (c) above. Consequently, the ERA estimate is not consistent with the NGO and RPP.

e) *If in your opinion the ERA's approach does not meet the requirements of the Rules identified above, what method for estimating the cost of equity (having regard to "relevant estimation methods, financial models, market data and other evidence"), should be used in order to produce the best estimate possible in the circumstances that complies with the Rule 87(5), (6) and (7) and the achievement of the NGO and RPP and why?*

In our view, the best estimate of the required return on equity is obtained by giving full and proper consideration to all relevant evidence and by weighting each piece of evidence according to its relative strengths and weaknesses – as set out in Section 7 of this report.

[14] AEMC Rule Change Final Determination, p. 43.

2. The ERA's approach to estimating the required return on equity

The ERA's approach under the previous Rules

37. The ERA's approach to estimating the required return on equity under the previous National Gas Rules was to use the Sharpe-Lintner CAPM exclusively with:

    a) The risk-free rate set to the contemporaneous yield on 5-year Commonwealth Government bonds;

    b) Beta determined from regression analysis applied to a small sample of domestic firms; and

    c) Market risk premium set to 6%.

The AEMC's rule changes

38. Throughout 2011 and 2012, the AEMC considered a number of Rule change proposals submitted by the AER and a group of major energy users. SFG assisted the AEMC as principal advisor on cost of capital issues throughout this process.

39. In its determination in November 2012, the AEMC made a number of fundamental changes to the National Gas Rules insofar as the allowed return on equity is concerned. The key changes that the AEMC made were:

    a) To introduce an "overall rate of return objective" to ensure that the focus is on the reasonableness of the allowed rate of return – eliminating the silo approach that focused separately on each individual parameter; and

    b) Requiring the regulator to have regard to all relevant approaches and evidence – seeking to eliminate the focus on a single model (CAPM) that could be used without having regard to a weight of evidence suggesting that the way the regulator implemented that model produced an estimate of the required return on equity that was implausible in the circumstances.

40. In particular, the new rules require that the allowed rate of return must achieve the **allowed rate of return objective**:

> [t]he rate of return for a [Service Provider] is to be commensurate the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the [Service Provider] in respect of the provision of [services].[15]

41. In determining the allowed rate of return, regard must be had to:

> 1. relevant estimation methods, financial models, market data and other evidence;
>
> 2. the desirability of using an approach that leads to the consistent application of any estimates of financial parameters that are relevant to the estimates of, and that are common to, the return on equity and the return on debt; and

[15] For example, see NGR 87(2)(3).

> 3. any interrelationships between estimates of financial parameters that are relevant to the estimates of the return on equity and the return on debt.[16]

42. When determining the allowed return on equity, regard must also be had to:

> the prevailing conditions in the market for equity funds.[17]

43. In addition, the required return on equity must:

> Be estimated such that it contributes to the achievement of the allowed rate of return objective.[18]

44. In its Final Determination, the AEMC was very clear about its intention that the regulator should not use a narrow formulaic approach, but should have regard to all relevant evidence while keeping a focus on the reasonableness of the allowed return on equity. For example, the AEMC noted that:

> The Commission also expressed concern that the provisions create the potential for the regulator and/or appeal body to interpret that the best way to estimate the allowed rate of return is by using a relatively formulaic approach. This may result in it not considering the relevance of a broad range of evidence, and may lead to an undue focus on individual parameter values rather than the overall rate of return estimate.[19]

and that the rule changes were designed to:

> encourage the regulator to focus on whether its overall estimate of the rate of return is appropriate.[20]

45. The AEMC was also very clear about the need to ensure that the allowed return on equity has regard to the prevailing conditions in the market for equity funds. The AEMC stated that:

> If the allowed rate of return is not determined with regard to the prevailing market conditions, it will either be above or below the return that is required by capital market investors at the time of the determination. The Commission was of the view that neither of these outcomes is efficient nor in the long term interest of energy consumers.[21]

and:

> The second principal requirement is that the return on equity must take into account the prevailing conditions in the market for equity funds. It reflects the importance of estimating a return on equity that is sufficient to allow efficient investment in, and efficient use of, the relevant services. However, this requirement does not mean that the regulator is restricted from considering historical data in generating its estimate of the

[16] For example, see NGR 87(2)(5).
[17] For example, see NGR 87(7).
[18] NGR 87(6).
[19] AEMC Rule Change Final Determination, p. 40.
[20] AEMC Rule Change Final Determination, p. 41.
[21] AEMC Rule Change Final Determination, p. 44.

> required return on equity. Rather, it ensures that current market conditions are fully reflected in such estimates to ensure that allowed rates are sufficient for efficient investment and use.[22]

46. The AEMC also noted that for a framework to produce an allowed return on equity that has proper regard to the prevailing conditions in the market for equity funds, it must be flexible enough to respond to changes in financial market conditions. One of the AEMC's primary concerns was that the mechanistic CAPM approach was "overly rigid" such that the AER's implementation of the CAPM produced unreasonable results in the current market circumstances. The AEMC stated that:

> The global financial crisis and its continuing impact through the European sovereign debt crisis have highlighted the inherent dangers in an overly rigid approach to estimating a rate of return in unstable market conditions.[23]

and that its rule change would:

> enable the regulator to better respond to changing financial market conditions.[24]

47. The AEMC explicitly linked the consideration of a range of models to the production of the best possible estimate of the efficient financing costs as required by the NGO and RPP:

> Achieving the NEO, the NGO, and the RPP requires the best possible estimate of the benchmark efficient financing costs. The Commission stated that this can only be achieved when the estimation process is of the highest possible quality. The draft rule determination stated that this meant that a range of estimation methods, financial models, market data and other evidence must be considered.[25]

48. That is, the AEMC's clear view is that the NGO and RPP require the regulator to produce the best possible estimate of the required return on equity,[26] which in turn requires the consideration of a range of financial models.

49. In its Final Determination, the AEMC sought to address concerns that, despite its best efforts in making material changes to the Rules, the regulator would seek to continue to estimate the required return on equity via a mechanistic implementation of the CAPM. The AEMC sought to assuage these concerns, but indicated that it would not set out a list of what other information and models the regulator should consider, due to the risk that any such list itself would be applied in a mechanistic fashion:

> A major concern expressed in numerous submissions is that under the proposed changes the regulator would still be able to, in effect, make exclusive use of the CAPM when estimating a rate of return on equity. The Commission understands this concern is potentially of considerable importance given its intention is to ensure that the regulator takes relevant estimation methods, models, market data and other evidence into account when estimating the required rate of return on equity. As discussed above, the

[22] AEMC Rule Change Final Determination, p. 69.
[23] AEMC Rule Change Final Determination, p. 40.
[24] AEMC Rule Change Final Determination, p. 23.
[25] AEMC Rule Change Final Determination, p. 43.
[26] The required return on equity is a key component of the efficient financing costs.

> Commission takes the view that the balance between flexibility and prescription has been adequately achieved in the final rules. It would be counterproductive to attempt to prescribe a list of models and evidence, which would almost certainly be non-exhaustive and could lead to rigid adherence to them in a mechanistic fashion.[27]

50. Rather:

> To determine the rate of return, the regulator is also required to have regard [to] relevant estimation methods, financial models, market data and other evidence. The intention of this clause of the final rule is that the regulator must consider a range of sources of evidence and analysis to estimate the rate of return. In addition, the regulator must make a judgement in the context of the overall objective as to the best method(s) and information sources to use, including what weight to give to the different methods and information in making the estimate. In doing so, the regulator should also have regard to taking an internally consistent approach and, to the greatest extent possible, use consistent estimates of values that are common across the process, as well as properly respecting any inter-relationships between values used.[28]

and

> Implicit in this requirement to consider a range of methods, models and information is that checks of reasonableness will be undertaken.[29]

51. The AEMC also noted the need to:

> safeguard the framework against the problems of an overly-rigid prescriptive approach that cannot accommodate changes in market conditions. Instead, sufficient flexibility would be preserved by having the allowed rate of return always reflecting the current benchmark efficient financing costs.[30]

The ERA's approach under the new Rules

52. According to its December 2013 Guideline, the ERA's approach to estimating the required return on equity under the new National Gas Rules will be to use the Sharpe-Lintner CAPM exclusively with:

    a) The risk-free rate set to the contemporaneous yield on 5-year Commonwealth Government bonds;

    b) Beta determined from regression analysis applied to a small sample of domestic firms; and

    c) Market risk premium set to 6%.

53. A summary of the ERA's approach to estimating the required return on equity before and after the AEMC's fundamental Rule changes is summarised in Table 1 below.

[27] AEMC Rule Change Final Determination, p. 57.
[28] AEMC Rule Change Final Determination, pp. 67-68.
[29] AEMC Rule Change Final Determination, p. 69.
[30] AEMC Rule Change Final Determination, p. 46.

Table 1
ERA approach to estimating the required return on equity

	Previous rules	New rules
Approach	Sharpe-Lintner CAPM exclusively	Sharpe-Lintner CAPM exclusively
Risk-free rate	Contemporaneous yield on 5-year Commonwealth Government bonds	Contemporaneous yield on 5-year Commonwealth Government bonds
Beta	Regression analysis applied to a small sample of domestic firms	Regression analysis applied to the same small sample of domestic firms
MRP	6%	6%

54. In summary, the ERA's year-long Guideline process has led to it adopting exactly the same approach to estimating the required return on equity as it had been using under the previous Rules. That is, the ERA has concluded that the same approach for estimating the required return on equity that it adopted under the previous Rules should also be adopted under the new Rules. To see how the ERA has reached that conclusion, it is instructive to work through the flowchart set out in Figure 2 of the ERA's Guidelines.

55. In **Step 1** of the proposed approach, the ERA identifies which material is relevant and which is irrelevant. The new Rules require the ERA to have regard to relevant material, in which case material the ERA deems to be irrelevant is disregarded.

56. In this step of its approach, the ERA has concluded that nothing other than the Sharpe-Lintner CAPM is relevant to the estimation of the required return on equity:

> The Authority has reviewed financial models for determining the return on equity. The conclusion from its assessment leads the Authority to consider that only the Sharpe Lintner CAPM model is relevant for informing the Authority's estimation of the prevailing return on equity for the regulated firm, at the current time.[31]

57. That is, the requirement under the previous Rules of using "a well-accepted financial model such as the CAPM" and the requirement under the new Rules of having regard to all "relevant financial models" produce identical outcomes – because the SL CAPM is deemed to be the only relevant financial model.

58. In **Step 2** of its proposed approach, the ERA estimates the parameters of the single relevant model. The ERA proposes to effectively adopt the same approaches, producing the same numerical values as would have been obtained under the previous Rules. There is some discussion in the Guideline about having regard to additional information under the new Rules, but we demonstrate below that this is effectively cosmetic and unlikely to have any material effect on any estimate.

59. **Step 3** of the proposed approach simply involves inserting the parameter estimates into the single model to obtain the allowed return on equity.

60. **Step 4** of the proposed approach involves the application of cross-checks.

61. Under the previous Rules, the ERA did not apply any formal cross-checks to determine whether its mechanistic CAPM estimate was reasonable or commensurate with the prevailing conditions in the

[31] ERA Guideline, p. 7.

market. Rather, the ERA adopted the view that if it (a) was using a well-accepted financial model such as the CAPM, and (b) had a reasonable basis for each of its parameter estimates, then it must automatically be the case that the resulting estimate of the required return on equity was reasonable and commensurate with the prevailing conditions in the market.

62. The Tribunal decisions in the ATCO Gas and DBP cases[32] were the primary driver for the AEMC's return on equity rule change. In those cases, the Tribunal held that:

> it is almost inherently contradictory then to say that the approach or the model is not likely to produce a reliable output - assuming that the inputs are appropriate – if that approach and that model are well accepted.[33]

63. In response, the AEMC noted that one of its primary motivations for changing the Rules was to prevent a repetition of the outcomes of the ATCO Gas and DBP Cases. In referring to the Tribunal's conclusion that the use of a well-accepted financial model effectively guaranteed that the resulting estimate of the required return on equity was reasonable and commensurate with the prevailing conditions in the market, the AEMC stated:

> The Commission considered that this conclusion presupposes the ability of a single model, by itself, to achieve all that is required by the objective. The Commission is of the view that any relevant evidence on estimation methods, including that from a range of financial models, should be considered to determine whether the overall rate of return objective is satisfied.[34]

64. The AEMC went on to state that:

> The Commission considered that no one method can be relied upon in isolation to estimate an allowed return on capital that best reflects benchmark efficient financing costs [35]

and that under the new Rules:

> The focus should be on the outcome of the process rather than on individual steps of the process itself. [36]

65. Consequently, the new Rules require the regulator to:

    a) Have regard to all relevant estimation methods, models, data and evidence; and

    b) To ensure that the regulatory estimate of the required return on equity:

        i) Has regard to the prevailing conditions in the market; and

        ii) Contributes to the allowed rate of return objective.

[32] Application by WA Gas Networks Pty Ltd (No 3) [2012] ACompT 12; Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14.
[33] ATCO Gas Reasons, Paragraph 63, Application by WA Gas Networks Pty Ltd (No 3) [2012] ACompT 12.
[34] AEMC Final Determination, p. 48.
[35] AEMC Final Determination, p. 49.
[36] AEMC Final Determination, p. 49.

66. In its Final Determination, the AEMC indicated that, in introducing these Rule requirements, it was requiring regulators to have regard to a range of financial models and to all relevant evidence, rather than adopting a mechanistic implementation of the SL-CAPM to the exclusion of all other evidence. Having determined that the SL-CAPM is the only relevant model in Step 1 of its process, it is only the cross checks set out in Step 4 that can prevent the ERA approach from collapsing to the very mechanistic implementation of the SL-CAPM that the rule change seeks to avoid.

67. For the reasons set out in the next section of this report, our view is that the cross checks proposed by the ERA are incapable of having any tangible impact on the ERA's SL CAPM estimate of the required return on equity. In effect, the ERA's proposed approach is identical to its previous approach – the required return on equity is estimated using a mechanistic implementation of the CAPM. We explain in the subsequent sections of this report the reasons to support our view that a mechanistic implementation of the SL CAPM is not consistent with the AEMC's revised Rules.

Summary

68. The AEMC has substantially revised the Rules with the clear intention that regulators should not continue the previous practice of estimating the required return on equity by inserting three parameter estimates into the SL CAPM.

69. The outcome of the ERA's proposed approach is that it will continue its previous practice of estimating the required return on equity by inserting three parameter estimates into the SL CAPM. Beta and risk-free rate are estimated in exactly the same manner as under the previous Rules. The estimate of MRP is said to have regard to additional evidence, but the outcome is the same estimate (6%) as in every one of the ERA's previous decisions.

3. The relevance of evidence other than the SL-CAPM

Overview of the issues

70. In its Explanatory Statement the ERA sets out some "criteria" for how it will determine the best approach for meeting the allowed rate of return objective and for complying with the Rules.[37] The ERA notes that these criteria do not appear in the Rules and must be treated as being subservient to the NGL, the NGO, the NGR and the allowed rate of return objective:

> The Authority considers that the criteria necessarily need to be consistent with the requirements of the NGL, the NGO, the NGR and the allowed rate of return objective. The requirements of the NGL, the NGO, the NGR and the allowed rate of return objective have primacy at all times. The criteria allow the Authority to articulate its interpretation of those requirements in the NGL and the NGR.[38]

71. The ERA then uses its criteria to support its reliance on the SL CAPM, to the exclusion of all other models and approaches, when estimating the required return on equity. In Appendix 8 to its Explanatory Statement, the ERA states that the SL CAPM meets the criteria for inclusion as relevant evidence for the purpose of estimating the required return on equity:

> In summary, the Authority considers that the Sharpe Lintner CAPM remains a key tool for evaluating the return on equity. The model aligns with theory. It is also the most empirically stable model of the return on equity within an Australian context. Together, these outcomes lead the Authority to consider that the Sharpe Lintner CAPM is fit for purpose. On this basis, the Authority judges that the Sharpe Lintner CAPM model is relevant in terms of estimating the return on equity for the purposes of meeting the allowed rate of return objective.[39]

72. In the same section, the ERA concludes that the Fama-French model (**FFM**) fails to satisfy the criteria, in which case it is considered to be irrelevant and no regard is given to it:

> Overall, the Authority has significant concerns as to the robustness of the FFM model specification and its results, particularly as the model is not 'based on a strong theoretical foundation'. The Authority's view is that the model is not 'fit for purpose' or able to be 'implemented in accordance with best practice' at the current time. On this basis, the Authority considers that the model cannot be relied on to achieve the rate of return objective, and hence is not relevant at the current time.[40]

73. In our view, there are two problems with the ERA's conclusions in this regard:

    a) The ERA's criteria are not part of the Rules. The Rules do not state that the Fama-French model must be considered if it satisfies the ERA's criteria, the Rules state that the Fama-French model must be considered if it is relevant; and

    b) In any event, the Fama-French model generally satisfies the ERA's criteria at least as well as the SL CAPM. In this regard, we note that the Rules do not require the regulator to select a

[37] ERA Explanatory Statement, Paragraph 38.
[38] ERA Explanatory Statement, Paragraph 39.
[39] ERA Appendix 8, Paragraph 33.
[40] ERA Appendix 8, Paragraph 79.

single "best" model from among those that are relevant, but rather to have regard to all models that are relevant.

Does the Fama-French model meet the ERA criteria?

Overview

74. We note that the ERA's criteria, and the ERA's interpretation of those criteria, are not part of the Rules or the NGL. However, in this section we take the criteria as given and assess the Fama-French model against those criteria, noting that the objective is to obtain the *best* estimate of the required rate of return on equity having regard to *all* relevant financial models so as to achieve the allowed rate of return objective.

Driven by economic principles

75. The first of the ERA's criteria requires that a financial model be "based on a strong theoretical foundation, informed by empirical analysis."[41]

76. In relation to the Fama-French model, the Explanatory Statement concludes that "[t]here is no theoretical foundation that explains the choice of factors in the FFM, the exact form of the variables used, or reasons why these are common factors in returns."[42]

77. It is true that the origins of the Fama-French model were in studies documenting the empirical failings of the CAPM. Since that time, however, the model has been structured as a risk-factor model within the context of the Arbitrage Pricing Theory. This method of theoretical development has many precedents in the physical sciences. Prior to 1600, the accepted theory was that planets traversed their sun in a circular orbit. Astronomer Tycho Brahe made a series of astronomical observations, and based on this data, Johannes Kepler proved that the orbits were not circular but elliptical. Kepler published three empirical laws that explained planetary movements in a way that was consistent with the observed data. In the 1700s, Isaac Newton showed that Kepler's laws could all be theoretically justified within his unified theory of gravity. In short, theories are retained, replaced or improved ultimately by reference to their consistency with the evidence. They do not exist in isolation from it.

78. Indeed, the Fama-French model can be viewed as a response to the empirical rejection of the Sharpe-Lintner CAPM on the basis of evidence that risks other than systematic risk are priced. The extensive set of perfect market assumptions that are required for the Sharpe-Lintner CAPM to hold, and which do not hold in the real world because of market imperfections, have two important implications. First, in a world with real market imperfections, in general, risks other than market risk will be priced. Second, the simple relation between mean return and market beta will no longer hold. In short, in real-world markets, multiple risks are likely to be reflected in asset prices, and the empirical evidence suggests that the SMB and HML factors are the best available proxies for those risks.

79. Given that market imperfections should lead us to expect that risks other than market beta are likely to be priced, the second question is whether there is a body of theory to support the use of the particular factors that Fama and French have identified. For 20 years researchers have developed and built on theories that explain the Fama-French factors. These theoretical foundations should not be rejected simply because the factors were first used to document the empirical failings of the SL CAPM. Such an approach would be inconsistent with standard scientific progression, and with basic

[41] ERA Explanatory Statement, Paragraph 41.
[42] ERA Appendix 8, p.72, Paragraph 71.

logic – that is, it would clearly be illogical to maintain exclusive reliance on the SL CAPM on the basis that the Fama-French model has been shown to have demonstrably superior empirical performance.

80. The theoretical foundations for the Fama-French model establish that the Fama-French factors proxy for risks of financial distress,[43] asymmetric exposure to market conditions,[44] and arbitrage risk.[45] If the perspective of the ERA was adopted (risk factors are only valid if theories are developed in advance of observing relationships in data) it would be almost impossible to implement a multi-factor model to estimate the cost of equity. This represents a particularly high hurdle to adopting anything other than the one-factor Sharpe-Lintner CAPM, despite the evidence that asset prices cannot be explained by the Sharpe-Lintner CAPM.

Fit for purpose

81. The second of the criteria requires that the financial model be "able to perform well in estimating … the cost of equity over the regulatory years of the access arrangement period" and that it be "implemented in accordance with best practice."

82. The ERA concludes that:

> The Authority's view is that the [Fama-French] model is not 'fit for purpose' or able to be 'implemented in accordance with best practice' at the current time.[46]

83. In Appendix 8, the ERA does not directly provide the specific basis for the conclusion that the Fama-French model is not "fit for purpose." Nor does the ERA provide a direct basis for the claim that the Fama-French model cannot be "implemented in accordance with best practice" currently. Rather the ERA adopts the reasoning set out below.

84. First, the ERA notes that in determinations *prior to the AEMC rule change*, the ERA and AER did not use evidence from the Fama-French model.[47] In our view, the rejection of this evidence under a different set of Rules has no bearing on whether the Fama-French model is "fit for purpose" under the new Rules. In particular, the old Rules required the regulator to use "a well-accepted model such as the CAPM," whereas the new Rules require the regulator to have regard to all relevant models – indeed, to any evidence that can inform the estimate of the required return on equity.

85. Moreover, given both the motivation for, and the existence of, the AEMC rule change – with its emphasis on utilising all relevant financial models and data for the purposes of achieving the overall return objective – past practice by regulators is irrelevant.

86. Second, the ERA notes the existence of a recent published study implementing the Fama-French model using Australian data.[48] Brailsford et al. (2012) report that:

> Our study provides two advances. Firstly, the study utilizes a purpose-built dataset spanning 25 years and 98% of all listed firms. Secondly, the study employs a more appropriate portfolio construction method than that employed in prior studies. With

[43] Vassalou, M. and Y. Xing, 2004, "Default risk in equity returns," *Journal of Finance*, 59, 831–868.
[44] Petkova, R. and L. Zhang, 2005, "Is value riskier than growth," *Journal of Financial Economics*, 78, 187–202.
[45] Ali, A., L. Hwang and M.A. Trombley, 2003, "Arbitrage risk and the book-to-market anomaly," *Journal of Financial Economics*, 69, 355–373.
[46] ERA Appendix 8, p.73, Paragraph 79.
[47] ERA Appendix 8, p.72, Paragraph 72.
[48] ERA Appendix 8, p.72, Paragraph 73 referencing Brailsford T, C. Gaunt M.A. O'Brien, 2012, "Size and book-to-market factors in Australia," *Australian Journal of Management*, 37(2), 261-281.

> these advances, the study is more able to test the three-factor model against the capital asset-pricing model (CAPM). The findings support the superiority of the Fama–French model, and for the first time align the research in this area between Australia and the USA.[49]

87. It is difficult to see how citing this study is supportive of the rejection of the Fama-French model on the basis of its irrelevance. It is even more difficult to see how citing this study could be seen to support the rejection of the Fama-French model and the simultaneous acceptance of the Sharpe-Lintner CAPM.

88. Third, the ERA notes that this study "observes that prior Australian research has suffered from limited datasets, resulting in mixed and weak results compared to US studies."[50] It seems clear to us that if the datasets and other technical advances are now available that 1) improve upon the ability to draw valid statistical conclusions, 2) align the smaller Australian research with the vast US literature, and 3) conclude that the Fama-French model is superior to the Sharpe-Lintner CAPM for estimating the required return on equity, then this strongly suggests utilising the Fama-French model as part of the estimation process. Whether or not prior Australian research meant Fama-French couldn't be used confidently previously is no longer an issue.

89. Fourth the ERA notes that McKenzie and Partington (2013) consider that this study provides support for the Fama-French model in the Australian context.[51] We agree with this view.

90. Fifth, the ERA notes that Brailsford et al. (2012) report a negative risk premium for the size factor, although statistically it was not significantly different from zero. Brailsford et al. comment on this:

> This negative, though insignificant, difference between the small portfolio and big portfolio is consistent with recent evidence overseas that indicates that the size premium has substantially declined since its initial reporting in the early 1980s (Dimson and Marsh, 1999; Horowitz, et al., 2000a,b).[52]

91. Brailsford et al. (2012) further report that:

> The factors are then tested across a range of portfolios in both time series and in cross section. The results reveal that all factors are significant in both the time series and cross-sectional tests and that the premiums carry significant positive exposures.[53]

and:

> In a series of comparative tests, the three-factor model is found to be consistently superior to the CAPM, although neither model can fully explain the time-series variation in portfolio returns.[54]

92. Brailsford et al. (2012) conclude:

[49] Brailsford et al. (2012), p.261.
[50] ERA Appendix 8, Paragraph 73.
[51] ERA, Appendix 8, Paragraph 77.
[52] Brailsford et al. (2012), p. 271.
[53] Brailsford et al. (2012), p. 279.
[54] Brailsford et al. (2012), p. 279.

> This evidence is important for a number of reasons. Firstly, the findings appear to settle the disputed question as to whether the value premium is indeed a positive and significant factor in the Australian market. Given the growing trend to utilize the three-factor model in asset-pricing tests and in practical strategies of portfolio formation in the funds management industry, these findings provide direction. Secondly, the evidence continues the decline of the single-factor model, which has obvious implications for future research. This future research should include the added benefits of using a multifactor model to estimate cost of capital for firms.[55]

93. Moreover, the use of the Fama-French model as a basis for estimating required returns has become standard in the finance literature. The Fama-French model is regularly implemented as the standard three-factor version or with augmented factors (e.g., Carhart, 1997, Boguth and Kuehn, 2013). It is also very common for the Fama-French factors of book-to-market and size (market capitalization) to be used as adjustments. For example, Grullon et al. (2012) adjust their return model for these characteristics:

> Following common practice in the asset pricing literature (e.g., Fama and French (1993), Jegadeesh and Titman (1993), and Cooper, Gulen, and Schill (2008) among many others), these characteristics are log market equity, log book-to-market, and past returns.[56]

94. Evidence of the fact that the Fama-French factors are widely used for the purpose of estimating required returns can be found in the leading journals in the field, the *Journal of Finance* and the *Journal of Financial Economics*. Both of these leading journals are ranked as super A-star journals (the highest possible rating) by the Australian Business Deans Council.[57] The Australian Research Council (ARC) no longer provides journal rankings but awarded both the JF and the JFE its highest rating for all the years that it did provide rankings (the latest being 2010).[58] They are commonly ranked as being in the top two or three finance journals worldwide.[59]

95. The two most recent (February 2014 and December 2013) issues of the *Journal of Finance* feature five articles that use the Fama-French factors for the purposes of estimating required returns.[60] The most recent volume (2014) of the *Journal of Financial Economics* features four articles that use the Fama-French factors for the purposes of estimating required returns.[61]

96. Indeed, the use of the Fama-French factors, for the purpose of estimating the required return on equity, is so widespread in the academic literature that it is usually employed without any explicit justification for its use – it has become a matter of course.

97. Moreover, the Fama-French model is also an accepted tool in practice. The leading professional qualification in the US and Australia is the Chartered Financial Analyst (CFA) certification. The CFA Level II program includes extensive coverage of the Fama-French model – including rationale, development and implementation in practice.

98. In addition, the development of the Fama-French model is one of the key reasons for Professor Fama being awarded the 2013 Nobel Prize in Economics.[62] The Economic Sciences Prize

[55] Brailsford et al. (2012), p. 279.
[56] Grullon et al. (2012), p. 1505.
[57] See http://www.abdc.edu.au/journalreview.html.
[58] See http://www.arc.gov.au.
[59] See for example, Currie and Pandher (2011).
[60] Buraschi et al. (2014), Berkman et al. (2014), Ben-David et al. (2013), Hu et al. (2013), Boguth and Kuehn (2013).
[61] Roussanov (2014), Frazzini and Pedersen (2014), Fang et al. (2014), Hu (2014).
[62] Formally, the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel.

Committee (the Committee) cites the Fama-French Model in its background paper explaining the basis for the award noting that:

> …the classical Capital Asset Pricing Model (CAPM) – for which the 1990 prize was given to William Sharpe – for a long time provided a basic framework. It asserts that assets that correlate more strongly with the market as a whole carry more risk and thus require a higher return in compensation. In a large number of studies, researchers have attempted to test this proposition. Here, Fama provided seminal methodological insights and carried out a number of tests. It has been found that an extended model with three factors – adding a stock's market value and its ratio of book value to market value – greatly improves the explanatory power relative to the single-factor CAPM model.[63]

99. In respect of the contribution of the Fama-French Model to market practice and investment analysis the Committee note:

> …following the work of Fama and French, it has become standard to evaluate performance relative to "size" and "value" benchmarks, rather than simply controlling for overall market returns.[64]

100. The Committee further notes that the Fama-French Model is used commonly by professional investors in guiding portfolio decisions and evaluating investment performance, as well as by academics.

101. The background paper also discusses the fact that a key motivating reason for the development of the Fama-French Model was the observed shortcomings and poor predictive performance of the Sharpe-Lintner CAPM which is currently proposed by the AER as its foundation model. For example, in tracing this empirical literature the background paper states:

> Most of these results were integrated in the widely cited paper by Fama and French (1992), which convincingly established that the CAPM beta has practically no additional explanatory power once book-to-market and size have been accounted for.[65]

102. In their overall conclusion on the contribution of Fama's work to the area of asset pricing the Committee note:

> New factors – in particular the book-to-market value and the price-earnings ratio – have been demonstrated to add significantly to the prior understanding of returns based on the standard CAPM.[66]

103. In our view, there is no basis for the conclusion that the Fama-French model is not fit for purpose. Its only purpose is to estimate required returns and its use for this purpose is documented in a wide range of academic papers and industry training materials. Also, we reiterate that the question is not whether the FFM is *more* fit for purpose than the SL CAPM, but whether the FFM is even relevant.

[63] Economic Sciences Prize Committee, 2013, Understanding Asset Prices, p. 3.
[64] Economic Sciences Prize Committee, 2013, Understanding Asset Prices, p. 44.
[65] Economic Sciences Prize Committee, 2013, Understanding Asset Prices, p. 39.
[66] Economic Sciences Prize Committee, 2013, Understanding Asset Prices, p. 45.

Supported by robust, transparent and replicable analysis that is derived from available, credible datasets

104. The third of the criteria requires that the use of a particular financial model must be supported by robust, transparent and replicable analysis that is derived from available, credible datasets. In this regard the ERA requires that the method for estimating the required return on equity be "based on quantitative modelling that is sufficiently robust as to not be unduly sensitive to small changes in the input data" and "based on quantitative modelling which avoids arbitrary filtering or adjustment of data, which does not have a sound rationale" and be "capable of reflecting changes in market conditions and able to incorporate new information as it becomes available".

105. In Appendix 8 the ERA states that the Fama-French model fails to meet this criterion, on the basis of evidence that it considered years before the publication of the most relevant empirical study on this issue:

> Consistent with its decision on the 2011 - 2015 Dampier to Bunbury Natural Gas Pipeline access arrangement, the Authority remains of the view that the variation in FFM risk premia and inconsistent FFM factor coefficients factors are of concern. On this basis, it would be unreasonable to conclude that the additional FFM risk factors are present in the market for funds and provide a robust, transparent and replicable means to determine the rate of return on equity.[67]

106. The recent empirical study of Brailsford et al. (2012) provides a model example of "robust, transparent and replicable analysis that is derived from available, credible datasets". In contrast with the ERA contention "that it would be unreasonable to conclude that the additional FFM risk factors are present in the market for funds"[68] Brailsford et al. conclude that "the findings appear to settle the disputed question as to whether the value premium is indeed a positive and significant factor in the Australian market."[69]

107. The ERA also acknowledges that:

> McKenzie and Partington consider that the 2012 Brailsford, Gaunt and O'Brien study provides support for the FFM model in the Australian context, particularly with respect to the book to market factor.[70]

Supportive of specific regulatory aims

108. The fourth and final criterion is that a proposed method should be supportive of specific regulatory aims. We are of the view, that as "desirable" as a regulator may consider it to be for certain of its "aims" to be achieved, the primary objective that a regulator must concern itself with in this context is the allowed rate of return objective. That is, any conflict between achieving the allowed rate of return objective and fulfilling the "specific regulatory aims" must be resolved in favour of the former.

109. For example, it would be wrong to reject the Fama-French model in favour of the Sharpe-Lintner CAPM so as to "promote simple approaches to estimating the rate of return over complex approaches." We are concerned that the ERA may have reached a different conclusion when it approvingly cites McKenzie and Partington:

[67] ERA Appendix 8, Paragraph 33.
[68] ERA Appendix 8, Paragraph 77.
[69] Brailsford et al (2012), p. 279.
[70] ERA Appendix 8, Paragraph 78.

> Despite these issues, the Fama and French three factor model has been used as a method to estimate the cost of equity. However, to do so requires significant effort in estimating factor risk premiums and factor loadings with no clear evidence that an improved estimate of the cost of capital results relative to the simpler CAPM.[71]

110. The fact that estimating factor risk premiums and factor loadings "requires significant effort" is irrelevant to any consideration of whether it is appropriate to have regard to the Fama-French model. The only consideration is whether it is a relevant financial model, which in our view it clearly is. Our understanding is that the Rules no not permit the disregarding of relevant models in order to simplify the regulator's task.

111. Moreover, the new Rules do not set up a "horserace" between models whereby a single "best" model is selected. Rather, the regulator is required to have regard to all relevant models. Indeed, the AEMC's rule change was motived by the advantages gained from moving away from a practice of relying exclusively on the output from one single model.

112. In any case, the Brailsford et al. (2012) report that "the three-factor model is found to be consistently superior to the CAPM."[72]

113. Moreover, if the aim of the ERA is to "enhance the credibility and acceptability of a decision" it would seem that all relevant financial models, including the Fama-French model, must be considered.

Does the Sharpe-Lintner CAPM meet the ERA criteria?

Overview

114. In this section, we consider whether the SL CAPM would meet the standards that the ERA has applied when testing the Fama-French model against its criteria. Whereas we consider that the Sharpe-Lintner CAPM is a relevant financial model and should be one of the models used by the ERA as part of the process of estimating the required return on equity, we note that it is unlikely to meet several of the ERA's criteria.

115. We begin by noting that the ERA concludes that the Sharpe-Lintner CAPM does meet its criteria:

> In summary, the Authority considers that the Sharpe Lintner CAPM remains a key tool for evaluating the return on equity. The model aligns with theory. It is also the most empirically stable model of the return on equity within an Australian context. Together, these outcomes lead the Authority to consider that the Sharpe Lintner CAPM is fit for purpose. On this basis, the Authority judges that the Sharpe Lintner CAPM model is relevant in terms of estimating the return on equity for the purposes of meeting the allowed rate of return objective.[73]

116. The first of the ERA's criteria requires that the method be "based on a strong theoretical foundation, informed by empirical analysis." Holding the Sharpe-Lintner CAPM to the same standard as the Fama-French model would see the SL CAPM fail this test. In particular, the SL CAPM is a special case of the Fama-French model – the SL CAPM formula is identical to the Fama-French formula with the added assumptions that the size and book-to-market premiums are both zero. That is, to obtain the SL CAPM, one starts with the Fama-French model and then adds two additional assumptions that are at odds with the observable data.

[71] ERA Appendix 8, Paragraph 77.
[72] Brailsford et al (2012), p. 279.
[73] ERA Appendix 8, Paragraph 33.

117. The second of the ERA's criteria requires that the method be "fit for purpose" "able to perform well in estimating…the cost of equity over the regulatory years of the access arrangement period." Again, holding the Sharpe-Lintner CAPM to the same standard as the Fama-French model would see the SL CAPM fail the test here. The SL CAPM does not fit the data. For example, in the most recent study applied to the Australian data, NERA (2013)[74] show that there is no discernible relationship at all between beta estimates (constructed in the way the ERA proposes) and stock returns. The ERA itself acknowledges that the evidence shows that SL CAPM estimates are poor.[75]

118. The argument that is typically raised in response to such evidence centres on explaining why the poor empirical performance does not disprove the SL CAPM as a theoretical model.[76] In particular, under the assumptions of the SL CAPM, a linear relationship *must* exist between the expected returns of individual firms and the expected return on an ex ante efficient (market) portfolio. Standard mathematics *proves* that such a relationship will *always* exist, under the assumptions of the SL CAPM. However, the problem is that the assumptions of the SL CAPM do not hold in reality and the market portfolio that the ERA uses need not be ex ante efficient. In this case, there need be no linear relationship between beta and required returns.

119. What the NERA (2013) results show is that the CAPM, as the ERA proposes to implement it, produces effectively random output. That is, when the CAPM is estimated by using a stock index to proxy for the market portfolio and by using regression analysis relative to that stock index to estimate beta, those beta estimates are completely unrelated to the stock returns they are designed to explain.

120. The ERA's third criterion requires that the method be "capable of reflecting changes in market conditions and able to incorporate new information as it becomes available." The Sharpe-Lintner CAPM would fail to meet this test also. As was highlighted during the peak of the GFC, one of the chief problems with sole reliance on the SL CAPM was the model's inflexibility to produce estimates that reflected changes in market conditions. Indeed this very failing of the SL CAPM was one of the primary reasons for the AEMC's rule change.[77]

121. The ERA's fourth criteria requires that the method "seek to achieve rates of return that would be consistent with the outcomes of efficient, effectively competitive markets" and that the method "provide incentives to finance efficiently." For the reasons already outlined, sole reliance on the SL CAPM is unlikely to achieve these objectives. The fourth criterion also requires that the method must "enhance the credibility and acceptability of a decision." It is certainly the case that sole reliance on the CAPM would also fail to achieve this objective.

Dividend growth models

Context

122. The ERA proposes to use a dividend growth model (**DGM**), applied at the broad market level, to inform its estimate of the required return on equity for the market (or average firm).[78]

[74] http://www.aer.gov.au/sites/default/files/Report%202%20-%20Black%20CAPM%20Zero%20Beta%20Estimate%20%28Final%29%20-%2027%20June..pdf.
[75] See for example ERA Appendix 8, Paragraphs 18, 26-27.
[76] See for example ERA Appendix 8, Paragraph 26.
[77] AEMC Final Determination, p. 40: "The global financial crisis and its continuing impact through the European sovereign debt crisis have highlighted the inherent dangers in an overly rigid approach to estimating a rate of return in unstable market conditions."
[78] The ERA proposes to obtain an estimate of the forward-looking MRP as the difference between its estimate of the risk-free rate and its DGM estimate of the required return on equity for the average firm.

123. The ERA further proposes that the DGM should not be used to inform its estimate of the required return on the benchmark efficient entity.[79]

124. Taken together, these two positions logically imply that:

a) The ERA is satisfied that the DGM is an appropriate and relevant financial model; and that

b) When populated with market wide inputs, the DGM produces relevant estimates of the required return on equity for the average firm; but that

c) When populated with inputs from the set of comparable firms, the DGM is so unreliable that it should be afforded no weight at all.

The ERA's conclusions are inconsistent and unjustified

125. The only logical rationale for the ERA using the DGM at the market-wide level, but rejecting it at the comparable firm level, is that the comparable firm input data is materially less reliable than the market-wide data. However, when concluding that the DGM is not relevant to the estimation of the required return on equity for the benchmark efficient entity, the ERA sets out a list of reasons that pertain to the structure of the model itself, rather than to implementation issues at the comparable firm level.

126. For example, the ERA sets out its concern that the DGM may not be "informed by a strong theoretical foundation,"[80] that the DGM "requires analyst's inputs,"[81] and that it is "sensitive to inputs."[82] All of these issues relate to the general operation of the DGM – applying equally whether the DGM is implemented at the market or industry level. In our view, none of these reasons support the adoption of the DGM at the market level and the simultaneous rejection of the DGM at the industry level.

127. The ERA elsewhere notes that the industry data consists of a small number of firms, two of which have some assets that may be affected by ERA regulatory decisions.[83] However, it is precisely the same set of firms that the ERA uses to estimate beta, gearing, term of debt and credit rating.

128. In our view, the Guideline materials provide no proper rationale for why:

a) Dividend growth models provide reliable evidence of the required return on equity when implemented at the market level, but should be disregarded entirely at the industry level; or

b) Domestic comparables alone can be relied upon to estimate beta, gearing, term of debt and credit rating, but not growth in dividends over the next two years.

The ERA has not considered recent evidence

129. The ERA's primary concern with the DGM appears to be that a systematic bias in dividend growth forecasts might affect the results.[84] In its discussion of that issue, the ERA cites a regulatory debate

[79] ERA Appendix 8, Paragraph 102.
[80] ERA Appendix 8, Paragraph 102.
[81] ERA Appendix 8, Paragraph 101.
[82] ERA Appendix 8, Paragraph 98.
[83] ERA Appendix 8, Paragraph 101.
[84] See for example, ERA Appendix 8, Paragraph 97.

from 2010.[85] As set out in the remainder of this sub-section, the ERA has apparently not considered the subsequent evidence or even its own proposed implementation of the DGM.

130. The ERA presents a figure to show that actual dividends since the onset of the GFC have turned out to be lower than what analysts had been forecasting.[86] This is said to "support the view that a systematic bias exists in analyst forecasts of future dividends."[87] However, such a comparison between forecasted dividends and actual dividends is entirely meaningless in the context of the DGM. The only way that bias in inputs can possibly be relevant to DGM estimation is if there is a bias in forecasted dividends that is not in the current share price. That is, if the analyst forecasted stream of dividends differs from the stream of dividends that is reflected in the current share price, the implied discount rate will exhibit a bias. The relevant comparison is between the dividend stream forecasted by analysts and the dividend stream that is reflected in the current stock price. The ERA has mistakenly compared the dividend stream forecasted by analysts and the actual dividend stream that eventuated, which is a clear error.

131. Fitzgerald, Gray, Hall and Jeyaraj (2013)[88] consider the correct comparison (between the dividend stream forecasted by analysts and the dividend stream that is reflected in the current stock price) and develop a DGM methodology to mitigate any bias that may exist. They do this by comparing the earnings and dividend forecasts of each analyst with their own target price for each stock. Presumably, each analyst will have used their own forecasts when determining their target price. They conclude that "there is no reliable evidence that earnings projections have more of an upward bias than target prices,"[89] which would seem to entirely address the ERA's concern on this point.[90]

132. Finally, the version of DGM that the ERA ultimately adopts does not require dividend forecasts at all.[91]

133. In summary, it is our view that the ERA's primary concern with dividend growth models has been fully addressed

The ERA has applied an incorrect test

134. In rejecting the industry-level application of the DGM, the ERA states that:

> the Authority is not convinced that the DGM family can be relied on to achieve the allowed rate of return objective for the benchmark efficient entity, and hence considers that the DGM is not relevant at the current time.[92]

135. That is, the ERA concludes that the DGM is not relevant because it cannot be relied on to achieve the allowed rate of return objective.

136. Our interpretation of "relevance" is quite different from the ERA's, ours being consistent with the ordinary usage of that word. We consider a model to provide relevant evidence if it can, in any meaningful way, inform the estimate of the required return on equity. We do not require that a

[85] ERA Appendix 8, Footnote 153, p. 77.
[86] ERA Appendix 15, Figure 14, p. 126.
[87] ERA Appendix 15, Paragraph 13.
[88] This paper has been published in a high-quality peer-reviewed international journal that has an A* rating in the Australian Business Deans Council rating system.
[89] Fitzgerald, Gray, Hall and Jeyaraj (2013), p. 563.
[90] ERA Appendix 8, Footnote 153, p. 77.
[91] ERA Appendix 15.
[92] ERA Appendix 8, Paragraph 102.

model must be capable of achieving the allowed rate of return objective to be considered to be relevant. Moreover, the ERA appears to have concluded that the DGM is irrelevant because it cannot, *by itself*, achieve the allowed rate of return objective. In our view, this test would rule out every model because none is individually capable of achieving the allowed rate of return objective – and we note that this view is shared by the AEMC which concluded that:

> The Commission considered that no one method can be relied upon in isolation to estimate an allowed return on capital that best reflects benchmark efficient financing costs. [93]

137. In particular, our view is that a model can contribute to the achievement of the allowed rate of return objective[94] even though it is not capable of achieving that objective alone, or even though other models may make a larger contribution.

The relevance of industry DGM evidence

138. For the reasons set out above, our view is that industry-level DGM evidence is relevant to the estimation of the required return on equity. We do not conclude that the DGM should be used in isolation, or that the DGM also is capable of achieving the allowed rate of return objective. However, we do consider that it can (in conjunction with other relevant evidence) inform the estimate of the allowed return on equity. For these reasons, we consider that the industry DGM evidence is relevant and that the ERA should have regard to it.

139. Details relating to the particular specification of the DGM are set out in the SFG (2013)[95] report to the AER guideline process.

The required return for the average firm

140. Asset pricing models (such as the various forms of CAPM and the Fama French model) all begin with an estimate of the required return on the market and then make adjustments for the extent to which the firm in question is considered to be different from the average firm. In the case of the SL CAPM, an adjustment is made for the market beta and for the Fama-French model adjustments are also made for two additional factors.

141. There is debate in the literature and in regulatory practice about (i) how many, and which, factors must be adjusted for, and (ii) the extent to which the benchmark firm differs from the average firm. For a regulated gas network, there is no a priori reason to expect that the required return would be higher or lower than that for the average firm. Some factors suggest a lower-than-average required return (asset beta) whereas others suggest a higher-than-average return (leverage, book-to-market). Consequently, our view is that an estimate of the required return of the average firm is relevant evidence. That is, if the task is to estimate the required return on equity for the benchmark efficient firm, an estimate of the required return on the average firm must be relevant evidence as a point of comparison.

142. Moreover, the ERA itself has indicated that its estimate of the required return on equity for the average firm is likely to be materially more reliable than its estimate of the required return on equity

[93] AEMC Final Determination, p. 49.
[94] See NGR 87(6).
[95] http://www.aer.gov.au/sites/default/files/ENA%2C%20Attachment%202%20-%20SFG%20Report%20-%20Reconciliation%20of%20DDM%20estimatesl%2C%20Submission%20to%20draft%20AER%20rate%20of%20return%20guideline%20-%2011%20Oct%202013.pdf.

for the benchmark efficient entity. In particular, the ERA's estimate for the average firm is informed by historical excess return data and DGM evidence, whereas the ERA's estimate for the benchmark efficient entity is not.

143. In addition, the estimate for the average firm does not require the estimation of beta or any other factor sensitivity parameters, which are particularly contentious and prone to estimation error. Indeed, the empirical evidence that is available to the ERA suggests that betas are so imprecisely and unreliably estimated that the best forecast of future returns is generated by setting beta equal to 1 for all firms.[96]

144. For the reasons set out above, we conclude that an estimate of the required return on equity for the average firm is relevant evidence and that the ERA should have regard to it.

Summary and conclusions

145. Our primary conclusions are that:

a) The ERA has failed to have regard to all relevant evidence. In our view, the Sharpe-Lintner CAPM is not the only relevant model – the Fama-French model and DGM are also relevant to the estimation of the required return on equity. In this regard, we understand the test in NGR 87(5) to be about whether these other models are relevant, not about whether they might be *more* relevant than the SL CAPM. Moreover, our view is that a model can contribute to the achievement of the allowed rate of return objective[97] even though it is not capable of achieving that objective alone, or even though other models may make a larger contribution;

b) The ERA's criteria are not part of the Rules. The Rules do not state that the Fama-French model must be considered if it satisfies the ERA's criteria, the Rules state that the Fama-French model must be considered if it is relevant. That is, the question is not whether the Fama-French model is the "best" model, or whether it is consistent with the ERA's criteria, but whether it is relevant. Our view is that the Fama-French model, as one of the leading models for estimating the required return on equity, must surely be considered to be relevant to the estimation of the required return on equity;

c) In any event, the Fama-French model generally satisfies the ERA's criteria at least as well as the SL CAPM. In this regard, we note that the Rules no longer allow the regulator to select a single "best" model, but that the regulator must have regard to every model that might assist in determining the required return on equity for the benchmark efficient firm;

d) When estimating the required return on equity for the benchmark efficient entity, the dividend growth model is relevant. This approach has a sound basis and is extensively used in practice, including for the purpose of determining regulatory rates of return. The ERA dismisses this approach using arguments that are irrelevant, dated and inconsistent with its acceptance of the DGM approach at the market level; and

e) When estimating the required return on equity for the benchmark efficient entity, it would be useful to know the required return on equity for the average firm. This would not, by itself, be sufficient, but it would be relevant information in that it is not something that a rational decision-maker would discard without considering. In particular, the estimation of the required return on equity for the average firm does not require the estimation of any factor

[96] See, for example, NERA (2013).
[97] See NGR 87(6).

sensitivities (betas) or even the specification of which or how many factors are relevant. Consequently, the estimate for the average firm is much less prone to estimation error and imprecision than the estimate for the benchmark firm.

146. In our view, the ERA SL CAPM approach does not produce the best possible estimate of the required return on equity. It therefore follows that the allowed return on equity will not contribute to the allowed rate of return objective because it will not reflect the efficient financing costs of the benchmark efficient entity. In turn, an allowed return on equity that does not reflect efficient financing costs will be inconsistent with the NGO and RPP.

4. Other relevant evidence that the ERA has not considered

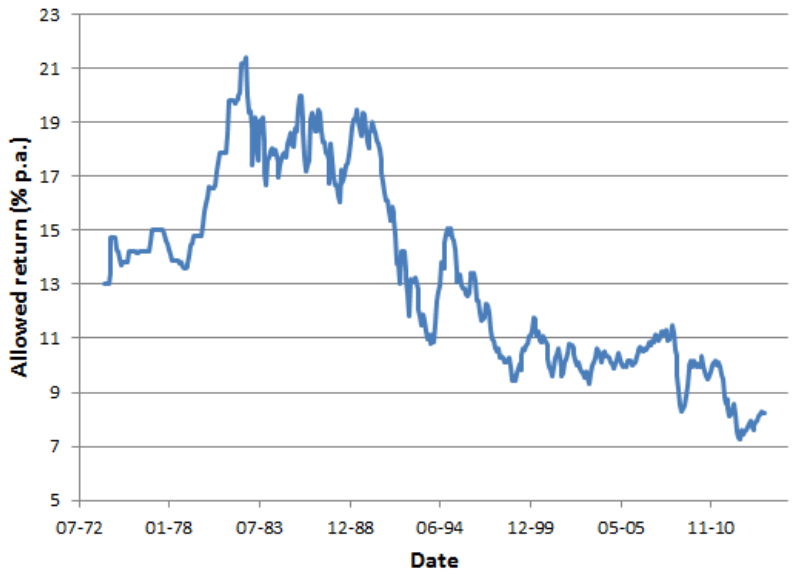
Overview

147. In our view, there are several pieces of evidence to suggest that the allowed return on equity set out in the Final Guideline is not commensurate with the prevailing conditions in the market or with the efficient financing costs of the benchmark efficient entity. These pieces of evidence are examined in turn below.

Allowed return on equity is at historical low

148. Under the previous Rules, the ERA approach was to estimate the required return on equity using the SL CAPM with the risk-free rate set to the 5-year government bond yield and MRP set to 6%.[98] The Final Guideline indicates that the ERA will maintain the same approach under the new Rules. That approach produces estimates of the required return on equity for a firm with beta of 0.8 as set out in Figure 1 below.

Figure 1. Allowed return on equity under the ERA approach



149. In summary, the ERA's approach suggests that the required return on equity has been lower since the onset of the GFC than ever before. By contrast, there is a substantial amount of relevant evidence to suggest that the required return on equity *increased* materially after the onset of the GFC – stock prices plummeted 40% and financially distressed companies that had to issue equity did so at massive discounts to the current stock prices. No serious commentator has ever indicated that the GFC resulted in a *fall* in the cost of equity that is of historical proportions.

150. This begs the question of whether an approach that suggests that the required return on equity fell to historical lows after the onset of the GFC is producing estimates that are commensurate with the prevailing conditions in the market and with the efficient financing costs of a benchmark efficient entity.

[98] The ERA has used that approach with those parameter estimates in every one of its decisions to date.

151. In its Guideline materials, the ERA disputes the notion that government bond yields (and consequently its estimates of the required return on equity) have been "abnormally low" since the onset of the GFC. We address this tangential issue in Appendix 1 to this report, noting that the ERA appears to have been misled by the McKenzie and Partington (2013)[99] report on which it relies. Specifically, McKenzie and Partington (2013) fail to recognise that current government bond yields are market rates whereas older historical rates were effectively fixed by government.

152. Quite apart from this tangential debate, it remains a demonstrable fact that post GFC government bond yields *have* been lower than at any time in the post World War II period,[100] and consequently the ERA approach suggests that the required return on equity fell to historical lows with the onset of the GFC. In our view, it is exactly this sort of outcome that the AEMC has sought to address in its Rule changes. The new Rules require the regulator to do more than simply write down a model and explain the parameter estimates that are plugged into it (risk-free rate is 5-year government bond yield, same as before; MRP=6%, same as before). Rather, the new Rules require the regulator to consider whether the model output is commensurate with the prevailing conditions in the market and with the efficient financing costs of a benchmark efficient entity. The regulator can no longer simply assume that these tests are satisfied because they have used a particular well-accepted model – indeed, that appears to be the whole point of the AEMC's Rule changes.

153. In our view, the requirement to consider whether the regulatory estimate is commensurate with the prevailing conditions in the market and with the efficient financing costs of a benchmark efficient entity is heightened if the regulatory approach produces an extreme estimate. The ERA's proposed approach currently suggests that the required return on equity is at historical lows. The rationale for this historically low estimate is simply that that is what the SL-CAPM (implemented in accordance with the ERA's approach) has produced.

154. Under the new Rules, it would seem that a regulator should be particularly cautious about adopting an extreme (historically low) value unless that value is consistent with all relevant evidence, confirming that the estimate is indeed commensurate with the prevailing conditions in the market and with the efficient financing costs of a benchmark efficient entity. However, as set out below, the ERA has disregarded much of the evidence that has been submitted to it and has adopted an historically low estimate of the required return on equity that is:

    a) Not commensurate with estimates from independent expert valuation professionals;

    b) Not commensurate with estimates from the Wright approach, which other regulators consider to be relevant evidence;

    c) Not commensurate with estimates from other regulators;

    d) Not commensurate with estimates from other models and approaches; and

    e) Not commensurate with other ways of implementing the SL-CAPM.

[99] McKenzie, M. and G. Partington, 2013, Review of the AER's overall approach to the Risk free rate and Market Risk Premium, A report to the AER, 28 February.
[100] As shown in Appendix 1 to this report.

Independent expert valuation reports

Role of independent expert reports

155. In a submission to the AER, SFG (2013)[101] note that independent expert valuation reports that are prepared as part of the process of corporate transactions (such as mergers, acquisitions and divestitures) are:

    a) Governed by the Corporations Law and ASX Listing Rules;

    b) Regulated by the Australian Securities and Investments Commission;[102] and

    c) Form the basis of numerous transactions involving the investment of material amounts of equity capital.

156. For these reasons, information from independent expert valuation reports is likely to be relevant evidence for the purpose of determining allowed returns in the regulatory setting.

Use of independent expert reports

157. In its Guideline materials the ERA indicates that independent expert valuation reports (which the ERA refers to as "brokers' estimates" even though they are compiled by independent expert valuation and accounting firms rather than brokers) "have potential to provide relevant information."[103] However, the ERA goes on to express some concerns with these estimates and then disregards them in its sample implementation in its Appendix 30.

158. In its Guideline, the AER states that it also proposes to have regard to information from independent expert valuation reports.[104]

159. Also, in a recent report for the QCA, Lally (2013)[105] recommends that the QCA should have regard to the independent expert valuation reports that are prepared as part of the process of corporate transactions such as mergers, acquisitions and divestitures.[106]

Evidence from independent expert reports

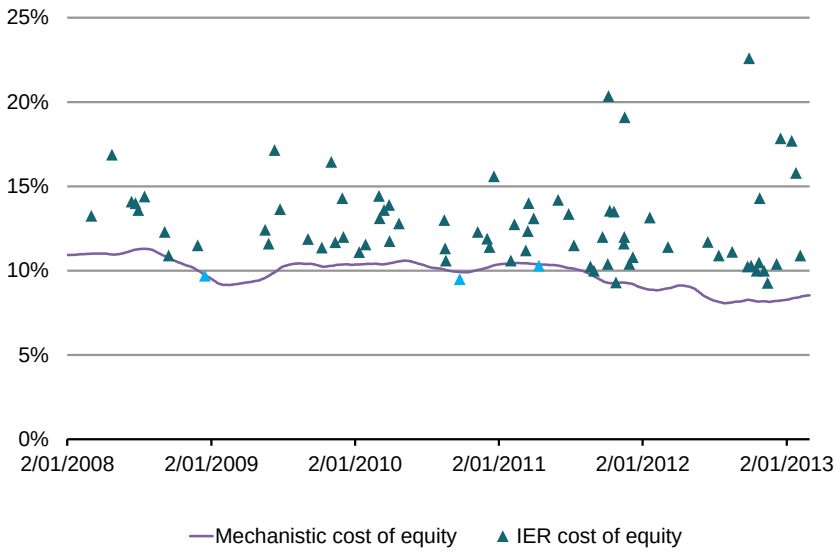
160. SFG (2013) examine all of the independent expert valuation reports from January 2008 to April 2013 that set out a cost of capital calculation. Figure 2 below shows a comparison between:

    a) Mechanistic estimates of the required return on the market (10-year government bond yield plus 6%); and

    b) Independent expert estimates of the final required return on equity for firms for which the independent expert adopted an equity beta estimate between 0.75 and 1.25. They restricted the sample to this set of firms with an equity beta estimate close to 1.0 to ensure a reasonable basis of comparison with an estimate of the required return on the market (which also has a beta of 1.0).

[101] SFG Consulting, 2013, *Evidence on the required return on equity from independent expert reports*, Report for the Energy Networks Association, June.
[102] See ASIC Regulatory Guides 111 and 112.
[103] ERA Appendix 29, Paragraph 65.
[104] AER (2013), Rate of Return Guideline, pp. 14, 16.
[105] Lally, M., 2013, Response to submissions on the risk-free rate and the MRP, Report for the QCA, 22 October.
[106] Lally (2013), p. 5.

Figure 2
Expert report cost of equity estimates (for beta estimates between 0.75 and 1.25) compared to mechanistic market cost of equity (for beta of 1.0)



Source: SFG analysis

161. The striking feature of this graph is that, with only three exceptions, every one of the independent expert estimates of the required return on equity is higher than the mechanistic estimate. The three exceptions all have equity beta estimates between 0.75 and 0.80 – below the market beta of 1.0 – and all have cost of equity estimates that are only marginally below the mechanistic estimate of the market cost of equity. Since the ERA uses 5-year, rather than 10-year, government bonds to estimate the risk-free rate, there will be an even more material difference between its estimates and independent expert estimates.

162. SFG (2013) also determine, for each report in their sample, the overall cost of equity capital estimated by the independent expert. The average cost of equity capital calculated for the entire sample (2008-2013) is 14.4%, within a range of 9.3% to 35%.

163. They then compare:

a) The independent expert's estimate of the required return on equity for each firm; with

b) An estimate formed by inserting the following values into the Sharpe-Lintner CAPM:

i) Contemporaneous 10-year government bond yield for risk-free rate;

ii) 6% for market risk premium; and

iii) The equity beta estimate adopted by the independent expert.

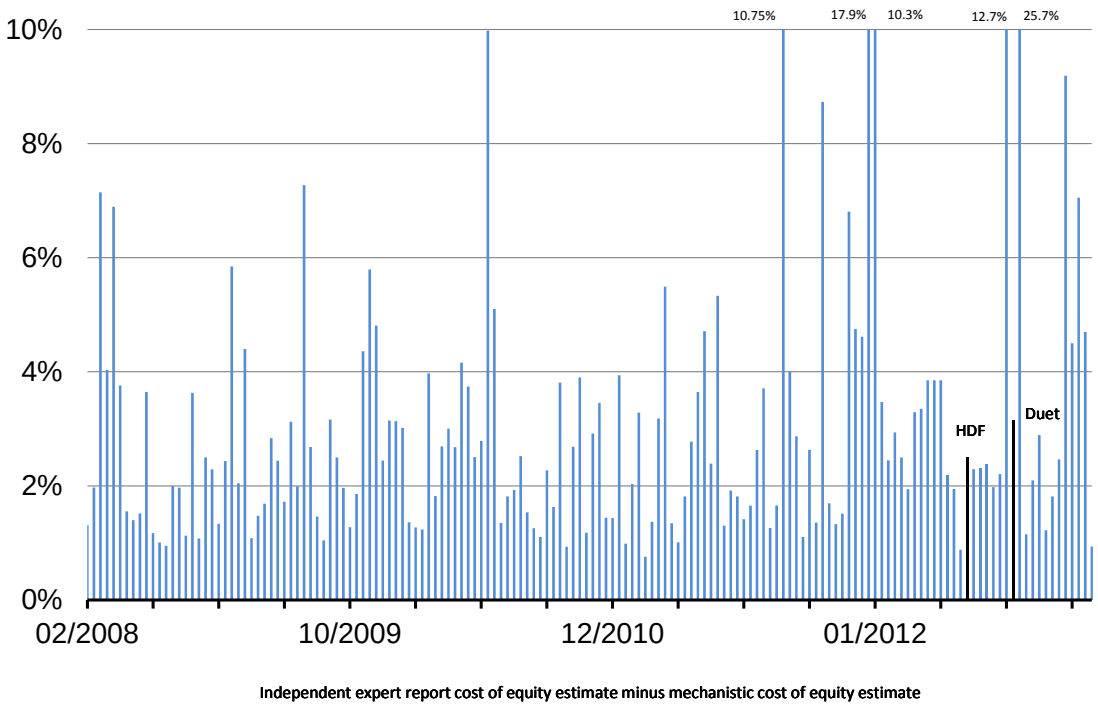
164. The average estimate of the required return on equity from the former approach is 14.4%, and the average from the latter approach is 11.1%.

165. The pair-wise comparisons of the two estimates for each asset are set out in Figure 3 below, which shows that in every case the mechanistic estimate is below the figure that is adopted in the independent expert report. In that figure, the vertical scale is capped at 10% to show sufficient detail, but in a number of cases the difference is even greater than that. In almost every case, the difference is greater than 1% and the difference is greater than 2% in many cases.

166. The results for the 2012-13 period are particularly striking. In almost every case the difference between the two estimates exceeds 2% and the average differential of 4.1% is substantially higher than for the earlier period. Again, the differential with ERA estimates will be even greater since the ERA uses 5-year government bond yields to estimate the risk-free rate.

167. Highlighted in the graph are the differences between the expert estimate and the mechanistic estimate for the only two utilities companies in the data (Hastings Diversified Fund and the Duet Group) in the recent period sub-sample. Both show that the market-based assessment of the cost of equity is materially higher than the mechanistic approach would suggest. That is, the approach that the independent experts have taken in the Hastings and Duet cases has resulted in estimates of the required return on equity that are materially greater than the mechanistic approach would suggest – in line with all of the other expert reports in the sample.

Figure 3
Difference between expert report and adjusted mechanistic estimates of cost of equity



Source: SFG analysis

Summary of evidence

168. The fact that the ERA's proposed regulatory estimate of the required return on equity is so materially different from contemporaneous independent expert estimates is relevant evidence that goes to the question of whether the regulatory estimate is commensurate with the prevailing conditions in the market and with the efficient financing costs of the benchmark efficient entity. In our view, this is a relevant consideration and it would be an error to disregard this evidence.

Reason for rejecting independent expert valuation evidence

169. In its sample implementation in Appendix 30, the ERA notes that its own estimate of the required return on equity for the market is materially below the contemporaneous estimates in independent

expert valuation reports. Nevertheless, the ERA concluded that its own estimate required no reconsideration or adjustment on the basis that the regulatory period is five years and the independent experts may have adopted a different estimate of the required return on equity if they were considering a 5-year time horizon.[107]

The Lally term structure argument

170. The term structure argument has been developed most fully in a recent report for the QCA by Lally (2013).[108] Lally cites the report by Ernst and Young (2012) which shows that independent expert valuation reports were adopting a risk-free rate of 4.4% and a MRP of 6.3% (total market return of 10.7%) at a time when the QCA would have adopted a risk-free rate of 3.1%. He notes that one interpretation of this evidence is that the independent expert reports are consistent with the use of a 7.6% MRP in the QCA framework.[109] However, Lally (2013) argues that:

> This line of argument presumes that the QCA is engaged in the same exercise as the valuers and therefore ought to be using the same parameter values. However the two exercises are fundamentally different, and this readily explains the difference in rates.[110]

171. In particular, Lally (2013) conjectures that there may be a term structure of required returns such that equity investors may require lower returns over the earlier years of their investment, with higher returns required in later years. He goes on to present an example in which an independent expert may estimate that the required return on equity is 9.5% p.a. over 10 years and 10.6% p.a. over 20 years. His point is that a regulator may seek a short-run estimate (9.5%) whereas the independent expert valuation professionals may be reporting a long-term estimate (10.6%). In our view, there are a number of problems with this argument, each of which is considered below.

*Regulators **should** be estimating the required return on long-term equity*

172. Lally (2013) conjectures that the independent experts are computing the required return on long-run equity capital and that regulators are seeking to compute something other than the required return on long-term equity capital. This argument is out of step with recent pronouncements by regulators. For example, the AER has recently determined that allowing a return on equity that is commensurate with the return required by long-term providers of equity capital is precisely what it *should* be doing. In particular, the AER recognises:

> the long term nature of cash flows in equity investment, in general, and the long lived nature of the assets in an infrastructure business (such as electricity and gas service providers), in particular.[111]

173. The AER also states that:

> in applying the CAPM, practitioners assume that the equity investment for an ongoing business is long term. This is because it generates a potentially infinite stream of cash-flows. Pratt and Grabowski (2010) and Damodaran (2008) both propose that, in general,

[107] ERA Appendix 29, Paragraph 60; Appendix 30, Paragraph 30.
[108] Lally, M., 2013, Response to submissions on the risk-free rate and the MRP, Report for the QCA, 22 October.
[109] That is, a 7.6% MRP together with the QCA's 3.1% risk-free rate would produce the same 10.7% market return that was being used by independent experts in the same market conditions.
[110] Lally (2013), p. 23.
[111] AER Rate of Return Guideline – Explanatory Statement, p. 49.

> an equity investment in an ongoing business is long term. They suggest, therefore, that for an ongoing business, the term of the equity should be measured as the duration of the long-term—and potentially infinite—series of cash flows.[112]

and concludes that it will allow a return on equity that is commensurate with the return required by long-term providers of equity capital, consistent with the notion that:

> The term of the return on equity should match the long life of those cash flows and assets.[113]

174. Similarly, IPART concludes that regulators should set the allowed return so as to be consistent with the efficient financing costs of the benchmark entity. IPART concludes that the efficient financing practice of the sorts of infrastructure businesses that are regulated is to raise long-term debt and long-term equity and consequently IPART has adopted a 10-year term for both.[114]

175. In our view, setting the allowed return on equity to a sufficient level to attract the required amount of long-term equity capital is exactly what the regulator should seek to do and we note that the AER has recently re-confirmed the same view.

*There is no evidence that independent experts **are** using a term structure of required returns*

176. One key premise of the equity term structure argument is that independent experts are computing two different cost of equity figures – one that applies to short-term cash flows and one that applies to subsequent cash flows – and that they report only some sort of average of the two. However, this seems quite unlikely for a number of reasons. First, if independent experts were computing two different rates it is likely that they would mention this in their reports. However, the practice of independent experts is to report a single discount rate. Second, the equity term structure argument suggests that independent experts adopt different discount rates depending on whether the project life is 10 years or longer. However, there is no evidence to suggest that independent experts have ever, or would ever, adopt that practice. Third, the average depends on the pattern of cash flows for the project in question. This would imply that an independent expert would use different discount rates for projects in the same industry, and with the same life, if those projects had a different pattern of cash flows. However the evidence contradicts that implication.

The NPV=0 principle for long-term equity

177. Another key premise of the equity term structure argument is that the time horizon for equity investments is equal to the length of the regulatory period. However, the AER and IPART consider long-term equity investments. For example, suppose it was the case that the required return over the regulatory period was 9.5% p.a. and that the long-term required return was 10.6% p.a. (consistent with the Lally (2013) example). Also suppose that this term structure remains constant over time.[115] Now consider the outcome if:

    a) Investors provide long-term equity capital; but

[112] AER Rate of Return Guideline: Explanatory Statement, p. 49.
[113] AER Draft Rate of Return Guideline: Explanatory Statement, p. 182.
[114] IPART, Review of WACC methodology, December 2013.
[115] The use of a constant term structure simplifies the discussion. All that is required to make the relevant point is that the term structure is upward-sloping on average.

b) The regulator sets allowed returns based on the short end of the term structure (consistent with the regulatory period).

178. In this case, investors would require a return of 10.6% p.a. on average over the (long) life of their investment. However, the regulator would allow only 9.5% in every successive determination. Consequently, there would be no way of providing the required return to long-term equity investors.

179. In summary, the evidence suggests that independent expert valuation professionals are computing a single discount rate for each project and that they would use the same discount rate whether the project had a life of 10 years or longer. Consequently, there is no evidence to suggest that, having stated a single discount rate in their report, independent experts would apply a lower rate to cash flows from the first 10 years of the project. Rather, the evidence suggests that the market practice would be to value the cash flows from the first 10 years of the project using the single discount rate that is set out in the report. To the extent that the allowed rate of return is lower than this market rate, the allowed cash flows will be insufficient to support the RAB value and the NPV=0 principle will be violated.[116]

No reason to disregard independent expert evidence entirely

180. Even if there is some merit in the term structure argument, the ERA states that "the resulting difference is likely to be less than 50 bp at most times."[117] That is, even if independent expert estimates are not directly comparable to the ERA's estimate,[118] they can be converted to a comparable basis via an adjustment of "less than 50 bp." Even if this adjustment were made, the adjusted independent expert estimates of the required return on equity would still be materially above the ERA estimate. In our view, this remains relevant evidence and the ERA has erred in not properly having regard to it. By analogy, consider a doctor measuring a patient's temperature with a thermometer that is known to add 0.5 degrees to the true temperature. If the measured temperature was 42°C, would the correct course of action be to admit the patient or to disregard the evidence entirely on the basis that it is irrelevant?

Wright approach

Overview of the issue

181. The ERA considers the relationship between the contemporaneous risk-free rate and the contemporaneous MRP and note that the two extreme end points can be summarised as:

a) Assume that the MRP is constant over all market conditions, in which case the required return on equity rises and falls 1:1 with changes in the risk-free rate; and

b) Assume that the required return on equity is constant over all market conditions, in which case the MRP rises and falls inversely with changes in the risk-free rate.

182. The ERA concludes that there is "inconclusive" and "conflicting" evidence about which of these two cases best describes the historical data.[119] This leads the ERA to further conclude that weight should be given to both approaches when estimating the required return on equity for the market.[120]

[116] Lally (2013), p. 21 notes that Queensland Treasury Corporation has made a similar submission.
[117] ERA Appendix 29, Paragraph 61.
[118] A proposition with which we disagree.
[119] ERA Explanatory Statement, Paragraph 697.
[120] ERA Explanatory Statement, Paragraph 701.

183. In the Australian regulatory setting, the former approach is often called the Ibbotson approach and the latter approach is often called the Wright approach. The ERA notes that it has previously used only the Ibbotson approach.[121] We note that consideration of the Wright approach has been recommended to the QCA by Lally (2013)[122] and has also been adopted in the AER's Guideline.[123]

Ibbotson approach vs. the Wright approach

184. The current ERA approach represents one end of a theoretical spectrum, effectively setting the MRP to the constant value of 6%, in which case the estimate of the required return on equity varies 1:1 with changes in the risk-free rate:

$$r_m = r_f + 6\%.$$

185. The other end of the theoretical spectrum is to assume that the required return on equity is effectively constant, in which case the MRP will vary over time inversely with changes in the risk-free rate.

The Wright approach to estimating the required return on the market portfolio

Implementation of the Wright approach

186. The Wright approach assumes that the real required return on the market (or average stock) is constant. This approach is at the other end of the theoretical spectrum in that it implies that the real risk-free rate and the MRP are perfectly negatively correlated – any increase in the real risk-free rate is exactly offset by a corresponding decrease in the MRP such that the real required return on the market remains constant.

187. The Wright approach involves the following steps:

a) Estimate the real return on the market portfolio each year for some historical period using the Fisher relation:

$$r_{m,t}^{real} = \frac{1 + r_{m,t}^{nominal}}{1 + inflation_t} - 1.$$

b) Take the average real market return over the relevant historical period.

c) Use the Fisher relation, and a contemporaneous estimate of expected (forward-looking) inflation to obtain an estimate of the nominal required return on the market:

$$r_m^{nominal} = \left(1 + \overline{r_m^{real}}\right)\left(1 + E[inflation]\right) - 1.$$

188. The Wright approach produces a direct estimate of the required return on the market. The implied MRP can be determined by deducting the contemporaneous estimate of the risk-free rate.

[121] ERA Explanatory Statement, Paragraph 700.
[122] Lally, M., 2013, Response to submissions on the risk-free rate and the MRP, Report for the QCA, 22 October, p. 6.
[123] AER Rate of Return Guideline, pp. 4, 14, 16.

Recommended use of the Wright approach

189. In a recent report for the QCA, Lally (2013) recommends that the Wright approach should be given material weight:

> I consider that the set of methodologies considered by the QCA should be augmented by one involving estimating the expected real market cost of equity from the historical average actual real return and then…converting the estimate of the expected real market cost of capital to its nominal counterpart.[124]

190. In recommending that the Wright approach should be used, Lally (2013) recognises that the two approaches set out above are the end points of a spectrum. The first assumes that the MRP is constant so that the required return on the market varies one-for-one with the risk-free rate. The second assumes that the (real) expected return on the market is constant so that the MRP varies one-for-one with the risk-free rate. Lally (2013) concludes that the evidence on which end of the spectrum should be preferred is "not decisive"[125] and consequently recommends that both approaches should be given some weight.

191. In its recent Guideline,[126] the AER has stated that it too will have regard to the Wright approach when determining the allowed return on equity. In setting out its reasons for having regard to the Wright approach, the AER noted that the Wright approach is likely to produce allowed returns on equity that are more stable over time than those produced by its previous mechanistic implementation of the Sharpe-Lintner CAPM:

> …the Wright approach for implementing the Sharpe–Lintner CAPM will result in estimates of the return on equity that may be relatively stable over time. The informative use of these implementations of the Sharpe–Lintner CAPM, in addition to other information, is expected to lead to more stable estimates of the return on equity than under our previous approach.[127]

192. The AER also noted that more stability in the allowed return on equity was favoured by a broad cross section of stakeholders and is more likely to properly reflect the efficient financing costs of a benchmark efficient entity.[128]

193. The AER also considers the Wright approach to have the attractive features of transparency and replicability – relative to its previous mechanistic implementation of the CAPM:

> …we consider that implementing the Wright approach is more transparent and replicable than our standard implementation of the Sharpe–Lintner CAPM.[129]

194. Lally (2013) also notes that the Wright approach is used extensively by UK regulators.[130]

[124] Lally (2013), p. 3.
[125] Lally (2013), p. 6.
[126] AER Rate of return guideline, p. 4.
[127] AER Rate of return guideline: Explanatory statement, p. 66.
[128] AER Rate of return guideline: Explanatory statement, p. 66.
[129] AER (2013), Draft rate of return guideline: Explanatory statement, p. 186.
[130] Lally (2013), p. 13.

Current estimates from the Wright approach

195. We have computed the average real return on the market portfolio using:

a) Data from 1883 to 2012, inclusive;

b) The NERA (2013)[131] correction for the inaccuracy of the Brailsford et al (2012) dividend yield adjustment; and

c) An estimate of the value of distributed imputation credits of 0.35, consistent with the recent Tribunal decision.

196. The average real return on the market portfolio (including imputation credits with theta set to 0.35) is 8.8%. If expected inflation is set to 2.5% (the mid-point of the RBA target band), an 8.8% real return is consistent with a nominal return of 11.6% (using the standard Fisher relation). That is, if the current real return is expected to be the same as the long-run historical average, the current nominal required return is 11.6%. If the current risk-free rate is estimated on the basis of the current 10-year government bond yield of 3.97% (as we recommend), the implied MRP is 7.6%.

197. If instead we use the current ERA estimate of the value of distributed imputation credits (0.45) the estimate of the current nominal required return on the market is 11.7%. If we also use the ERA approach of setting the risk-free rate equal to the 5-year government bond yield, the implied MRP is 8.3%.

Comparison of the Ibbotson and Wright approaches

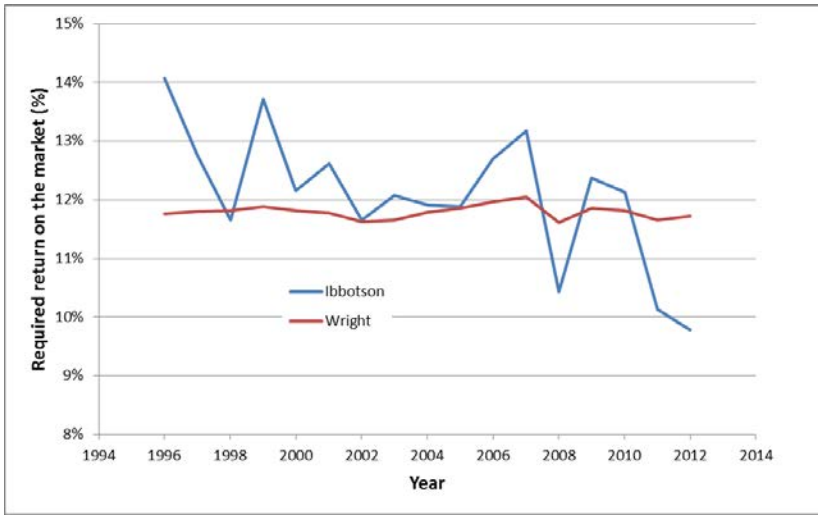
198. The key differences between the Ibbotson and Wright approaches are illustrated in Figure 4 and Figure 5 below. These figures show data from 1996 because the Wright approach requires an estimate of expected inflation and any such estimate prior to 1996 would be controversial. In 1993 the RBA began inflation targeting and since 1996 inflation has generally remained within (or close to) the RBA target band of 2-3%.

199. The Ibbotson approach produces a very stable estimate of MRP, in which case the required return on the market varies directly with the risk-free rate. By contrast, the Wright approach produces a very stable estimate of the required return on the market, in which case the MRP varies inversely with the risk-free rate.

200. Figure 4 shows that the Wright estimate of the required return on the market is stable throughout the period. By contrast the Ibbotson approach implies that equity is more expensive than average during economic expansions and bull markets (the late 1990s and mid 2000s) and cheaper than average during financial crises (the dramatic reduction in 2008). The implausibility of the implications from the Ibbotson approach should be taken into account when considering how much weight it should be afforded.

[131] NERA (2013), The market, size and value premiums, at http://www.aer.gov.au/sites/default/files/Report%2015%20-%20ENAMRPReport28062013%20Final.pdf.

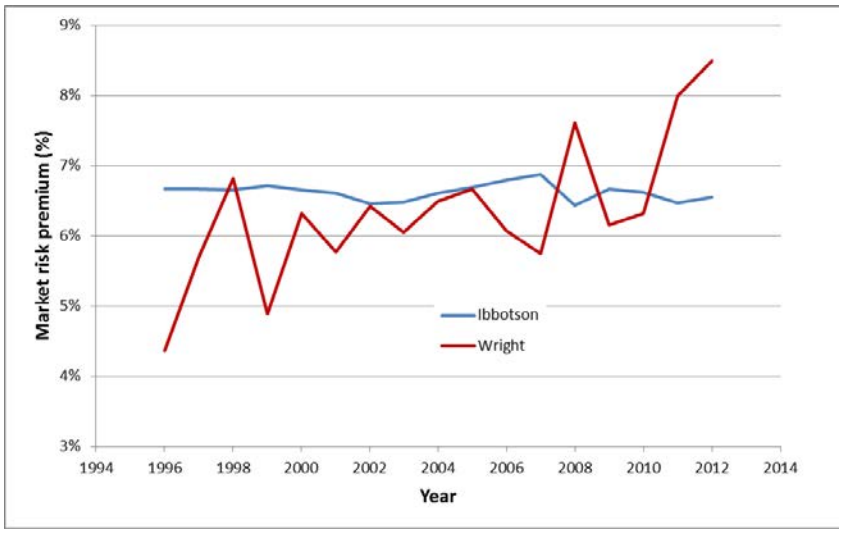
Figure 4
Comparison of Ibbotson and Wright estimates of the required return on the market



Source: SFG calculations.

201. Figure 5 shows that the Wright estimate of the market risk premium varies over different market conditions – the implied MRP is lower than average during economic expansions and bull markets (the late 1990s and mid 2000s) and higher than average during financial crises (the dramatic increase in 2008). This is consistent with the notion that the perceived amount of risk and the price of risk fall during expansions and rise during crises. By contrast, the Ibbotson approach implies that the MRP is essentially constant across all market conditions.

Figure 5
Comparison of Ibbotson and Wright estimates of MRP



Source: SFG calculations.

Conclusions and recommendations on the Wright approach

202. Our primary conclusion from this section of the report is that regulators should have regard to the Wright approach when estimating the required return in the market (or market risk premium) for use in the Sharpe-Lintner CAPM. In this regard, we note that:

a) Lally (2013) recommends that the QCA methodology for estimating MRP should be expanded to include the Wright approach;

b) In its recent Guideline, the AER has indicated that it will have regard to the Wright approach; and

c) The Wright approach is used extensively by UK regulators.

203. We also note that the Ibbotson and Wright approaches lie at opposite ends of a spectrum. The Ibbotson approach effectively assumes that the MRP is constant so that the required return on equity varies one-for-one with changes in the risk-free rate. The Wright approach effectively assumes that the real required return on the market is constant so that the MRP varies inversely with changes in the risk-free rate. In our view, both approaches provide relevant evidence and regulators should have some regard to both.

204. Moreover, in "average" market conditions,[132] both approaches will produce similar estimates of the required return on the market and MRP. When market conditions are not average, careful consideration must be given to the relative weights to be applied to each of the two approaches. For example, in the current market conditions the Ibbotson approach implies that the required return on the market is well below its average level whereas the contemporaneous evidence from dividend discount models and independent expert reports suggests that the reverse is true. This evidence should be relevant when considering the relative weight to be applied to the Ibbotson approach in the current market circumstances.

ERA approach is based on a misconception

205. As set out above,[133] the ERA concludes that there is "inconclusive" and "conflicting" evidence about which of these two cases (i.e., constant MRP or constant required return on equity) best describes the historical data.[134] This leads the ERA to further conclude that weight should be given to both approaches when estimating the required return on equity for the market.[135]

206. The ERA proposes to implement this conclusion by using two approaches to inform its MRP estimate:

a) The "historical risk premium approach," which is consistent with MRP being constant over all market conditions; and

b) The dividend growth model, which the ERA says is consistent with the required return on equity being constant over all market conditions.[136]

207. However, in this context the ERA's interpretation of the dividend growth model is fundamentally wrong. The ERA's approach is based on the notion that:

> The dividend growth model assumes that the market cost of equity never changes over time,[137]

[132] Average market conditions would be characterised as conditions in which the risk-free rate and market risk premiums were close to their long-run means.
[133] See Paragraph 180 above.
[134] ERA Explanatory Statement, Paragraph 697.
[135] ERA Explanatory Statement, Paragraph 701.
[136] ERA Explanatory Statement, Paragraph 701.
[137] ERA Explanatory Statement, Paragraph 701.

which is clearly and demonstrably wrong. The ERA's own implementation of the DGM is based on the observed market dividend yield and GDP growth rate, both of which clearly vary over time as market conditions change. In our view, there can be no doubt that the DGM produces different estimates of the required return on equity in different market conditions. Indeed that is the whole point of having regard to a such a forward-looking model.

208. By contrast, the Wright approach is based on the overall required return on equity being constant across different market conditions. This, having concluded that it should have regard to a Wright-type approach (where the required return on equity is constant over different market conditions) the ERA ultimately has no regard to such an approach.

209. The source of the ERA's error is a fundamental misinterpretation of a sentence in Lally (2013).[138] Lally makes the point that the DGM estimates a single long-run required return rather than a term structure of required returns (whereby the required return over the short-term may differ from the required return over the long-term). Lally does not say that the DGM estimate of the required return on equity is constant across different market conditions. But that is how the ERA has interpreted the particular sentence from Lally's report.

210. By analogy, it is common for banks to set an exchange rate for credit card transactions at the beginning of each day. An Australian traveller in London would then have all of their British Pound purchases converted into Australian dollars at the same rate for the entire day. The rate is the same in the morning as it is in the afternoon. Then a new rate is fixed for the next day, and so on. That is, a different rate is used for each day, depending on market conditions at the time. This means that the rate can vary substantially over time as market conditions change.

211. Lally is making the point that, once set, the exchange rate remains fixed for the day. The ERA interprets Lally as saying that the exchange rate is fixed and does not change from day to day even as market conditions change. The ERA is clearly wrong about this.

212. The effect of this error is that the ERA has in fact given no weight to a Wright-type approach, after concluding that it should have. In our view, the ERA should have regard to evidence from the Wright approach as set out in Section 7 of this report.

Other regulators are allowing materially higher returns

213. For the reasons set out above, our view is that there is circularity in regulators justifying their decisions by pointing to similar decisions from other regulators, who themselves may be justifying their own decisions by pointing to decisions from the first regulator.

214. However, where one regulator is materially out of step with other regulators, the reasons for that difference should at least be addressed. In the case at hand, the ERA, AER and IPART have all recently completed WACC reviews and the ERA's allowed return on equity is materially lower than that of the other two regulators.

215. In its Guideline, the AER has determined that the allowed return on equity should be determined by using the SL CAPM, but with the following parameter values:

    a) Risk-free rate set to the yield on 10-year CGS (4.3% as at December 2013);

[138] Lally M, (2013), The Dividend Growth Model, 4 March.

b) Equity beta of 0.7; and

c) Market risk premium of 6.5%.[139]

216. The AER implementation of the SL-CAPM produces an estimate of the required return on equity of 8.9% compared to the ERA estimate of 7.6%.

217. IPART has also recently announced the results of its own comprehensive WACC review. IPART also proposes to estimate the risk-free rate as the yield on 10-year CGS, but proposes to set MRP to 6.9%.[140] For a firm with an equity beta of 0.7,[141] this implies an allowed return of 9.1%, compared with the ERA's estimate of 7.6%.

218. In summary, the ERA proposes an allowed return on equity (for a firm with equity beta of 0.7) of 7.6%, compared with allowances of 8.9% and 9.1% from the AER and IPART, respectively.

219. Moreover, as set out above, the practice of independent expert valuation professionals is currently to use estimates of the required return on equity that are materially higher than those produced under the AER's approach. Indeed, the ENA has submitted (on behalf of the entire energy network industry) that the AER's approach produces an allowed return on equity that is too low to be considered to be commensurate with the prevailing conditions in the market or with the efficient financing costs of a benchmark efficient entity. The point here is that there is clearly contention about whether the AER approach produces an allowed return on equity that is too low to be considered to be commensurate with the prevailing conditions in the market or with the efficient financing costs of a benchmark efficient entity, yet the ERA approach produces an allowed return on equity that is materially (17%) lower than even the AER estimate. Consequently, if any conclusion can be drawn from the comparison of the regulatory estimates, it is that the ERA estimate of the required return on equity is not commensurate with the prevailing conditions in the market or with the efficient financing costs of a benchmark efficient entity.

The documented relationship between book to market and stock returns

220. The evidence that high book to market firms earn higher than average returns is compelling. The relationship between book to market ratio and subsequent stock returns is consistent over many decades and across many different national markets. It is more statistically and economically significant than the relationship between beta and subsequent stock returns. Indeed, in our view there is no plausible argument against the proposition that there is a well-documented, consistent and significant relationship between book-to-market and stock returns. This is quite independent of arguments about whether the Fama-French model or the SL CAPM is "best" or most consistent with the Rules. It is also independent about arguments about other factors such as size. In our view, the basic point that there is a well-documented, consistent and significant relationship between book-to-market and stock returns is unarguable.

221. Logically, there are two possible explanations for this relationship:

[139] AER Rate of Return Guideline.

[140] IPART, 2013, Review of WACC Methodology: Final Report, December.

[141] For this comparison, we adopt the ERA's 0.7 beta estimate to show the effect of using IPART risk-free rate and MRP estimates. The 0.7 figure is not an IPART estimate. Moreover, this comparison should not be read as an endorsement of the IPART and AER approaches, both of which are focussed on the SL CAPM and neither of which have regard to all of the evidence that we consider to be relevant, as set out below. The point here is that the other two regulators who have recently performed WACC Reviews have both produced estimates of the required return on equity that are materially less extreme than the ERA estimate.

a) It has occurred by random chance (in which case it is unlikely to persist in the future); or

b) It has occurred for some good reason (in which case it is likely to persist in the future).

222. The former explanation seems unlikely given the persistence of the relationship over time and across markets. In particular, the relationship has persisted in the decades since it was first identified.

223. For the present purposes, the relevant question is whether investors require higher returns to invest in high book-to-market stocks. Again, there are logically two possibilities:

a) Investors do not require higher returns for high book-to-market stocks, and the observed higher returns of these stocks is simply due to random chance and represents a windfall gain to the holders of those stocks over many decades in many different markets; or

b) Investors do require higher returns for high book-to-market stocks, which must be priced (in equilibrium) to generate higher returns if they are to attract investors.

224. Again, the former explanation seems unlikely given the persistence of the relationship over time and across markets.

225. If investors do require higher returns for high book-to-market stocks (consistent with the large body of empirical evidence), it logically follows that an estimate of the required return that disregards the book-to-market effect cannot be commensurate with the prevailing conditions in the market or with the efficient financing cost of a benchmark efficient entity.

226. Note that this conclusion does not rely on the adoption of the Fama-French model in addition to or instead of the SL CAPM and it does not require any particular interpretation or theoretical rationale for the relationship between book-to-market and stock returns. Rather, the simple point is that:

a) If investors *do* require higher returns for high book-to-market stocks; and

b) If the allowed return is set on the basis that investors *do not* require higher returns for high book-to-market stocks,

the allowed return cannot be commensurate with the prevailing conditions in the market or with the efficient financing cost of a benchmark efficient entity.

The term of the risk-free rate

227. The SL-CAPM and the Fama-French model both estimate the required return on equity as the sum of a risk-free return plus a premium for risk. Consequently, for an estimate of the required return on equity to be commensurate with the prevailing conditions in the market and with the efficient financing cost of a benchmark efficient entity, it logically follows that both components of the estimate must each be commensurate with the prevailing conditions in the market and with the efficient financing cost of a benchmark efficient entity.

228. The ERA has proposed to estimate the risk-free rate using the yield on 5-year government bonds. Thus, the ERA proposes to estimate the required return on equity by adding its estimate of the risk premium to the 5-year government bond yield. However, this is out of step with evidence suggesting that investors determine their required return on equity by adding their estimate of the risk premium to the 10-year government bond yield.

229. For example, there is broad agreement that the dominant practice of market practitioners and valuation professionals is to set the term of the risk-free rate to 10-years on the basis that this is the longest observable term for Australian government bonds. For example, SFG (2013) note that the overwhelming majority (94%) of expert assessments in the 2012/13 sample group employed a term assumption for the risk-free rate of ten years. Several reports indicated that the use of a 10-year term assumption was standard practice amongst independent experts in Australia. For example, in its report to ING Real Estate Community Living Group, Deloitte stated that:

> The 10-year bond rate is a widely used and accepted benchmark for the risk free rate in Australia.[142]

230. In its report for Hastings Diversified Utilities Fund (a firm with regulated infrastructure investments), Grant Samuel noted that:

> The ten year bond rate is a widely used and accepted benchmark for the risk free rate. Where the forecast period exceeds ten years, an issue arises as to the appropriate bond to use. While longer term bond rates are available, the ten year bond market is the deepest long term bond market in Australia and is a widely used and recognised benchmark. There is a limited market for bonds of more than ten years. In the United States, there are deeper markets for longer term bonds. The 30 year bond rate is a widely used benchmark. However, long term rates accentuate the distortions of the yield curve on cash flows in early years. In any event, a single long term bond rate matching the term of the cash flows is no more theoretically correct than using a ten year rate. More importantly, the ten year rate is the standard benchmark used in practice.[143]

231. The current Australian regulatory practice is also to use a ten year term to maturity when estimating the risk-free rate. For example, in its recent draft Rate of Return Guideline, the AER concluded that:

> On balance, we are more persuaded by the arguments for a 10 year term, than the arguments for a five year term.[144]

232. The AER also notes that the Australian Competition Tribunal advocates the use of a 10-year term:

> The Australian Competition Tribunal (the Tribunal) decided in its 2003 GasNet decision that 10 years is the appropriate term of the risk free rate in the CAPM. The Tribunal came to this view on the basis of two reasons:
> • as the MRP was estimated using a 10 year risk free rate, consistency demands that a 10 year risk free rate be used in the CAPM, and
> • it is a convention of economists and regulators to use a relatively long-term risk free rate where the life of the assets is relatively long.[145]

233. IPART, which has previously adopted a 5-year term to maturity, has recently announced that it will now adopt a 10-year term:

[142] Deloitte (2012), ING Real Estate Community Living Group – Independent expert's report and Financial Services Guide, 24 April 2012, p.93.
[143] Grant Samuel (2012), Hastings Diversified Utilities Fund – Independent Expert's report, 3 August 2012, p.4.
[144] AER Rate of Return Guideline – Explanatory Statement, p. 49.
[145] AER Draft Rate of Return Guideline – Explanatory Statement, p. 182.

> We agree with stakeholder views that increasing the TTM [term to maturity] from 5 years to 10 years for all industries is more consistent with our objective for setting a WACC that reflects the efficient financing costs of a benchmark entity operating in a competitive market.[146]

234. In summary, the independent expert evidence and Australian regulatory determinations support the view that investors determine their required return on equity by adding their estimate of the risk premium to the 10-year government bond yield.

235. Consequently:

    a) If investors determine the required return on equity using the yield on 10-year government bonds; but

    b) The allowed return is set on the basis that investors determine the required return on equity using the yield on 5-year government bonds,

    the allowed return cannot be commensurate with the prevailing conditions in the market or with the efficient financing cost of a benchmark efficient entity. It therefore follows that the allowed return on equity will not be consistent with the Rules, the NGO or the RPP.

Summary and conclusions

236. In our view, the evidence set out in this section is relevant to the question of determining whether or not an allowed return on equity is commensurate with the prevailing conditions in the market and with the efficient financing costs of a benchmark efficient entity. In particular:

    a) Independent expert reports over 2012-13 have adopted estimates of the required return on equity that average 2% p.a. more than the estimates that are obtained from the ERA approach;

    b) The ERA has concluded that it should have regard to the Wright approach for estimating the required return on equity, stating that its use of the dividend growth model achieves that objective. However, this conclusion is based on a fundamental misconception and is wrong. Consequently, having concluded that it should have regard to the Wright approach, the ERA in fact has no such regard to it at all;

    c) Other Australian regulators have recently conducted WACC reviews and their estimates of the required return on equity are materially higher than the ERA estimate;

    d) There is substantial evidence that investors require higher returns for high book-to-market stocks, but the ERA estimates the required return on equity as though investors *do not* require higher returns for high book-to-market stocks; and

    e) Independent valuation professionals, other regulators and the Tribunal have concluded that investors determine their required return on equity with reference to the yield on 10-year government bonds, but the ERA proposes to use the yield on 5-year government bonds.

237. In our view, all of these pieces of evidence are relevant when determining whether or not an allowed return on equity is commensurate with the prevailing conditions in the market and with the efficient

[146] See IPART (2013), Review of WACC Methodology, December, p. 12.

financing costs of a benchmark efficient entity. Consequently, our view is that the ERA has erred in not having regard to this evidence and that the ERA SL CAPM approach does not produce the best possible estimate of the required return on equity. It therefore follows that the allowed return on equity will not contribute to the allowed rate of return objective because it will not reflect the efficient financing costs of the benchmark efficient entity. In turn, an allowed return on equity that does not reflect efficient financing costs will be inconsistent with the NGO and RPP. Our views about *how* the relevant evidence should be considered are set out in Section 7 of this report.

5. Cross checks and "other relevant material"

ERA approach

238. One of the steps in the ERA's proposed process for estimating the required return on equity is the application of a series of cross checks. Step 4 of the proposed process is as follows:

> 4. Conduct cross checks
> a) Consider cross checks of parameters, review if necessary
> b) Consider cross checks of overall return on equity, review if necessary
> c) Review whether the return on equity estimate is likely to achieve the allowed rate of return objective.[147]

239. The Guideline provides no information about:

a) What cross checks would be performed;

b) How the ERA would determine whether a parameter or the allowed return on equity had failed a cross check; or

c) What action the ERA would take in the event of failure of one or more cross checks.

240. The ERA's Explanatory Statement provides only the following two paragraphs about the operation of its cross check step:

> Checks informed by other relevant material would be conducted to determine the reasonableness of the overall return on equity, and its ability to achieve the allowed rate of return objective. Appendix 29 – Other relevant material provides more detail on the additional relevant material that will be considered by the Authority.
>
> Checks would include (see Appendix 30 – An indicative worked example):
>
> - comparison of the risk free rate with the historic return on debt;
> - comparison of the implied return on equity with the historic return on equity.[148]

241. Appendix 29 to the Explanatory Statement provides information about "other relevant material."

Logical implementation issues

242. Before addressing the individual items in the ERA's set of "other relevant material," we consider a number of issues with the logical implementation of the cross checks as set out in Figure 2 of the ERA's Guideline.

What constitutes a failure?

243. The Guideline is silent on how the ERA would determine whether its estimate of the required return on equity has failed a cross check, or indeed whether it is even possible for any cross check to be failed.

[147] ERA Guideline, Figure 2, p. 7.
[148] ERA Explanatory Statement, Paragraphs 652-653.

244. By way of example, in its recent Victorian gas distribution review (**VGDR**) Draft Decisions, the AER noted that the range of broker WACC estimates in its sample was 7.76% – 10.02%, and that its proposed allowed WACC of 7.16% was 173 basis points below the mid-point of the range and 60 basis points below the minimum value in this range. From this, the AER concluded:

> Broker WACC estimates do not demonstrate that the overall rate of return, which is based on the analysis of individual parameters, is not commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services.[149]

245. In response, a number of businesses questioned the purpose of this cross check when the allowed return clearly failed the cross check (by any definition) and nothing was done about it.

246. For the VGDR Final Decisions, the AER identified one broker WACC estimate for one company that was one basis point (0.01%) below its allowed return, with all other estimates above the AER's allowed return. From this, the AER again concluded (in identical terms) that:

> Broker WACC estimates do not demonstrate that the overall rate of return, which is based on the analysis of individual parameters, is not commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services.[150]

247. In summary, it seems that there is no broker WACC evidence that would ever lead the AER to alter its allowed return.

248. In our view, any cross check that would have no impact on the allowed return on equity regardless of its outcome is not a cross check at all – it is meaningless and can be ignored. In our view, using a set of cosmetic cross checks to endorse the same type of mechanistic SL CAPM estimate as the ERA used under the previous Rules would not be consistent with the new Rules.

Are cross checks weighted?

249. If a number of cross checks are to be applied, it is possible that the ERA's estimate of the required return on equity will pass some checks and fail others. The Guideline is silent on what the ERA would do in these circumstances.

250. In our view, it is likely that:

a) Some evidence will be more relevant and more important than other evidence; and

b) Some checks will be stronger and more informative than others.

251. For example, a particular estimate of the required return on equity might fail one cross check in that it is materially below contemporaneous estimates used by independent expert valuation professionals, but it might pass a second cross check that compares the allowed return on equity to the allowed return on debt. In this case, the second cross check is weak in that it establishes an extreme lower bound and will generally be easily satisfied. Consequently, it would be wrong in such a case to conclude that the cross checks produce equivocal outcomes (in that one check was passed and one

[149] AER Envestra Draft Decision, 2012, Appendix B, p. 63.
[150] AER Envestra Final Decision, 2013, Appendix B, p. 64.

was failed) and as a result there is no compelling reason to change the allowed return on equity that was estimated in previous steps of the process.

252. That is, there is a danger that the set of cross checks contains some weak and easily satisfied checks that "cancel out" relevant evidence from other cross checks that indicate that the regulator's estimate of the required return on equity is not commensurate with the prevailing conditions in the market or with the efficient financing costs of a benchmark efficient entity. In our view, not applying appropriate weight to such evidence would be inconsistent with the Rules.

The SL CAPM is locked in, regardless of subsequent evidence

253. The ERA's Guideline indicates that it has selected the SL CAPM as the only relevant approach for estimating the required return on equity in Step 1 of its proposed approach. The flowchart in Figure 2 of the Guideline indicates that the selection of the SL CAPM as the only relevant approach cannot be overturned, regardless of the outcome of the cross checks in Step 4. At most, the cross checks could lead the ERA to reconsider their estimates of the individual SL CAPM parameters in Step 2, but the cross checks could never lead the ERA to reconsider their exclusive use of the SL CAPM.

254. This immunisation of the SL CAPM against any reconsideration presupposes that that one single model alone will always produce the estimate of the required return on equity that best meets the allowed rate of return objective (**ARORO**) – regardless of what is revealed by any cross checks.[151]

255. Suppose, for example, that the cross checks in Step 4 uniformly reject the SL CAPM estimate of the required return on equity from the previous steps. In our view, this should lead the regulator to at least consider whether, in the market conditions prevailing at the time, the SL CAPM alone remains the best way of producing an estimate that (a) has regard to the prevailing conditions in the market, and which (b) best meets the ARORO. However, the ERA's proposed approach rules out, in advance, any possibility of even considering whether the exclusive use of the SL CAPM remains the best way of estimating the required return on equity. Even where the SL CAPM estimate (from Steps 1 to 3) materially fails every single cross check performed in Step 4, the SL CAPM would still be retained as the exclusive model.

256. The extent to which there may be an inconsistency between the results of the cross checks in Step 4 and the retention of the SL CAPM as the exclusive model depends on the nature of the cross checks that are to be performed. In particular:

a) The preceding discussion has considered the case where the cross checks are strong and robust and capable of contradicting the SL CAPM estimate of the required return on equity. In this case, there is some potential for the cross checks to reject the SL CAPM estimate. In such a case, it would be quite unreasonable to not even consider whether the exclusive use of the SL CAPM remains the best way of estimating the required return on equity; however

b) If the cross checks are so weak and cosmetic that there is no possibility that they could ever be said to have contradicted the SL CAPM estimate, the problems set out above do not arise. But in this case, Step 4 is redundant and the proposed process collapses to the mechanistic SL CAPM approach that the ERA employed under the previous Rules, and it was the very use of such an approach that led to the revision of the Rules.

[151] More generally, the ERA's proposed approach requires the relevant models to be selected in Step 1. The selection in this step cannot be revised, regardless of what the cross check evidence suggests. The ERA currently adopts the SL CAPM exclusively in Step 1 of its process. However, the issue here is more general – no cross check evidence can ever call into question whatever it is that the ERA has adopted in Step 1 of its proposed approach.

257. In our view, the pre-emptive immunisation of the SL CAPM[152] against *any* contradictory evidence uncovered in Step 4 of the process is inconsistent with the Rules.

Cross checks can only impact individual parameter estimates

258. Under the ERA's proposed process, cross checks can have an effect only on individual parameter estimates. The cross checks in Step 4 of the ERA's process will either affirm the ERA's estimate of the required return on equity from Steps 1 to 3 (in which case the process is complete) or they will indicate that further action is required. Under its proposed approach, the only further action that is possible is for the ERA to amend one or more of its three SL-CAPM parameter estimates. This is problematic in the case where the cross checks would require parameter values to be moved outside what the ERA considers to be the reasonable range determined in Step 2.

259. Consider, for example, the case where the ERA determines in Step 2 of its process that:

    a) The risk-free rate is 3%;

    b) The reasonable range for beta is 0.5 to 0.7; and

    c) The reasonable range for MRP is 5% to 7%,

    but where all of the cross checks suggest that the required return on equity is at least 9%.

260. In this case, the maximum estimate that can be obtained for the required return on equity is 7.9%.[153] The proposed process appears to provide no way of reconciling these pieces of evidence. There are only two possibilities:

    a) The ERA could disregard the cross check evidence and maintain its SL CAPM estimate – in which case the process set out in Figure 2 of the Guideline collapses to the mechanistic CAPM approach adopted under the previous Rules; or

    b) The ERA could adjust its CAPM parameter estimates outside of what it considers to be the range that is supported by the evidence – in order to obtain an estimate that is consistent with the cross check evidence. But this effectively amounts to replacing the ERA's SL-CAPM estimate with an estimate based on the cross check evidence – which does not seem to be allowed under the ERA's proposed approach.

261. In the case where the preliminary estimate (which is based on a subset of the evidence) is inconsistent with the cross checks (which are based on other relevant evidence), the ERA's proposed approach appears to require the ERA to accept one piece of evidence and to reject the other. This appears to be inconsistent with the requirement of the new Rules that the regulator must have proper regard to all relevant evidence. In our view, an approach that would be consistent with the Rules (and with the clear intention of the AEMC) would be to place some weight on the SL-CAPM estimate and some weight on the other evidence – having regard to the relative strengths and weaknesses of each piece of evidence in the case at hand.

[152] Or whatever model or models the ERA may have selected in Step 1 of its proposed process.
[153] 3%+0.7×7%=7.9%.

Pre-emptive relegation of some evidence

262. Step 2 of the ERA's proposed process indicates that individual parameters will be estimated in a two-step process by first determining an appropriate range and then by selecting a point estimate from within the range. Step 4(a) of the proposed process then indicates that some cross checks will also be applied to the estimates of individual parameters. Thus, it appears that the evidence relevant to the estimation of each parameter is to be divided into three categories:

    a) Primary evidence will be used to determine the range for the parameter;

    b) Secondary evidence will be used to select a point estimate from within the range; and

    c) Tertiary evidence will be used as a cross check.

263. Relevant evidence that is ex ante relegated to the secondary or tertiary level of consideration is automatically down-weighted. In particular, the secondary and tertiary evidence appears to be only capable of having an effect to the extent that it is consistent with the primary evidence.

264. For example, the ERA proposes a range of 0.5 to 0.7 for equity beta based on the following primary data:

> empirical studies conducted by the Authority in 2011 and 2013;
>
> observed equity betas for Australian listed utilities reported by Bloomberg and S&P; and
>
> Henry's advice to the AER in 2009.[154]

265. This range is formed from the point estimates of various forms of regression analysis applied to the tiny set of domestic comparables.

266. In its worked example, the ERA adopts a point estimate of 0.7 from within this range based on the following secondary evidence:

> The Authority considers that relevant empirical evidence supports a view that there is some downward bias in equity beta estimates that are less than one, and upward bias in equity beta estimates that are greater than one. Therefore, for the purposes of this indicative estimate, the Authority will assume a point estimate for the equity beta that is at the top end of the estimated range, at 0.7, so as to account for potential bias in the estimate.[155]

267. Any other evidence that is relevant to the estimation of beta is then applied as a cross check in Step 4. However, the ability of that other evidence to have any effect on the estimate of beta is severely limited by the convoluted process of dividing the relevant evidence into three disjoint subsets. Suppose, for example, that there were four additional pieces of relevant evidence that all pointed towards a beta estimate above 0.7. None of this evidence could have an effect on the beta estimate because it is already set to the top end of the range that was constructed from the first sub-set of evidence. That is, the convoluted three-stage process effectively disregards relevant evidence. In our view, a more logical approach would be to set out all of the relevant evidence together and to consider the relative strengths and weaknesses of each piece of evidence when determining how

[154] ERA Explanatory Statement, Paragraph 641.
[155] ERA Appendix 30, Paragraphs 25-26.

much weight to assign to each. Such an approach would appear to be consistent with the Rules in that it allows the regulator to have proper regard to all relevant evidence.

"Other relevant material"

268. When explaining how it intends to implement the cross checks in Step 4 of its proposed approach, the ERA refers to the list of information set out in Appendix 29 of its Explanatory Statement. This appendix sets out a list of "other relevant material." However, much of this material is not relevant to the operation of cross checks in Step 4 at all, but is rather information that is to be used when estimating parameter ranges and point estimates in Step 2 of the proposed approach. In the following sub-sections of this report, we consider each piece of information that is listed in Appendix 29 and show how it would be used in the ERA's proposed process.

269. In particular, we show that all of the information set out in Appendix 29 is either:

a) Not used anywhere in the ERA's process (because it is considered to be too unreliable or irrelevant); or

b) Used to inform the estimate of individual parameters in Step 2 of the process, rather than as a cross check in Step 4; and/or

c) Used in such a way that it is incapable of having any material effect on the allowed return on equity.

Use of historical data

Conditional and unconditional means

270. The ERA indicates that it intends to have regard to various pieces of historical information. In considering the historical information, the ERA correctly notes that:

> these predictors do not take into account the most up to date forward looking information, such as the position in the economic cycle.[156]

271. For example, the ERA considers the long-run historical average historical return on a broad stock market index. This long-run historical average will obviously reflect the average of the market conditions that prevailed over the historical period. That is, this estimate tells us something about the average return that is required in average market conditions. It cannot tell us anything about the return that might be required in a particular set of market conditions – other "forward-looking" evidence is required for that purpose. There appears to be general agreement about this point.

272. However, the ERA goes on to state that:

> For this reason, it is preferable to use stationary historical data to inform a reasonable 'range of what is possible', in conjunction with data that is current and forward looking. The latter data may be used to inform the selection of a point within the range provided by historical data. [157]

[156] ERA Appendix 29, Paragraph 18.
[157] ERA Appendix 29, Paragraph 19.

273. In our view, the ERA's proposed method for combining historical and forward-looking data is clearly in error. The "range provided by historical data" will reflect the statistical precision of that data. That is, the historical data will be used to compute an average value and a range will be formed around that average value to reflect its statistical precision. It is clearly wrong to interpret that range as a bound for what the forward-looking value might be under particular market conditions.

274. To see this, consider the following simple example. Suppose there are only two types of market conditions that each occur half the time. In particular, half the time (i.e., in certain market conditions) the market index return is 20% and half the time (i.e., in other market conditions) it is 4%. If a 100-year history is obtained, the average will be close to 12% within a 95% confidence interval of 10.4% to 13.6%, reflecting the statistical imprecision of the estimate.[158] In this case, it would clearly be wrong to interpret the range as bounding the returns that might be expected in a particular set of market conditions. That range can only bound an estimate of the average the returns that might be expected in *average* market conditions. For example, if there was compelling forward-looking evidence that the market was currently in the first state, the best estimate of the contemporaneous return would be 20%, not 13.6%.

275. In summary, if the ERA were to use a range reflecting the statistical precision of an *unconditional* historical average to bound the possible values of its *conditional* estimate (conditional on the prevailing conditions in the market for equity funds), it would clearly be in error.

276. By way of analogy, cricketer Ricky Ponting retired with a test batting average of 52. His average in matches played in India was 26. That is, he batted at 52 in *average* conditions and at 26 in *Indian* conditions. A range of 50 to 54 might reflect the statistical precision of the unconditional mean estimate. If predicting his score in Indian conditions, it would clearly be wrong to begin with a fixed range of 50 to 54 and then to select a value at the bottom of the range (50) because he is known to perform less well in Indian conditions.

277. Similarly, it would be wrong to fix a range for MRP based on the statistical precision of the long-run mean which reflects *average* market conditions, and to maintain that range even in light of evidence that the prevailing conditions in the market are not average. But this is exactly what the ERA does in Chapter 11 of its Explanatory Statement.

278. In the remainder of this sub-section, we consider the various pieces of historical data that are set out in Appendix 29.

Historical return on equity

279. The ERA estimates the historical mean return on a broad Australian stock market index to be 11.8% p.a.[159] The ERA correctly interprets this as an estimate of the required return in average market conditions. That is, the ERA correctly interprets this figure to be the *unconditional* average required return. This leads the ERA to compare the unconditional average of its allowed returns (i.e., the long-run average of its allowed returns over many determinations reflecting a wide range of prevailing market conditions) with the unconditional average from the historical data:

> The Authority considers that if the average of its estimates of the return on equity over a number of determinations varied significantly from the long term mean of 11.8 per cent

[158] A sample with 50 observations of 20 and 50 observations of 4 has a mean of 12 and a standard deviation of 8.04. The standard error of the mean is computed by dividing the standard deviation by the square root of the sample size.
[159] ERA Appendix 29, Paragraph 24.

> (Table 48), then it would have cause to question whether its approach to developing the return on equity was achieving the allowed rate of return objective.[160]

280. In theory, this comparison is perfectly appropriate. The long-run unconditional mean suggests that the average required return for the average firm (with beta of 1.0) across a wide range of prevailing market conditions is 11.8%. Consequently, if over a long period of time covering a wide range of prevailing market conditions, the ERA's allowed return on equity (for an average firm with beta of 1.0) was materially below 11.8% it would have to question whether its approach was achieving the ARORO.

281. However, in practice, this data will never have any effect on any determination. Whenever its allowed return is inconsistent with the 11.8% unconditional average, the ERA will simply be able to argue that the prevailing market conditions (which are reflected in its current estimate) differ from the long-run average market conditions (which are reflected in the 11.8% unconditional average). Even if the ERA's allowed returns average less than 10% over the next 100 years, that estimate will still not be statistically different from the 11.8% figure.

282. In our view, the appropriate way to have regard to historical return on equity data is in accordance with the Wright approach as set out in Paragraphs 181 to 197 of this report.

Historical equity risk premium

283. The ERA indicates that it will have regard to historical excess stock returns[161] when estimating MRP.[162] That is, the ERA does not propose to use this data in any form of cross check or reasonableness check under the new Rules. Rather, this data was already used as the basis for the ERA's estimate of MRP under the previous Rules.

Historical cost of debt

284. The Guidelines indicate that the historical cost of debt could be used in three ways:

a) As a lower bound on the expected return on equity. We agree that the allowed return on equity must be higher than the allowed return on debt. However, that comparison must be made at the time of each determination. That is, the allowed return on equity for a particular determination (reflecting the prevailing conditions in the market at the time) must be higher than the allowed return on debt (also reflecting the prevailing conditions in the market at the time). It would be an error to compare the return on equity at a point in time (reflecting the prevailing market conditions at the time) with the long-run average return on debt (reflecting the long-run average market conditions);

b) As a point of comparison for the allowed return on debt over many determinations; and

c) As a point of comparison for the spread between the allowed returns on debt and equity over many determinations.

285. However, the Guidelines indicate that concerns about data quality and availability mean that none of these comparisons will be used in the foreseeable future. The ERA states that:

[160] ERA Appendix 29, Paragraph 24.
[161] The excess stock return for each year is the return on a broad stock market index less the yield on the relevant government bonds that was available at the beginning of the year.
[162] ERA Appendix 29, Paragraphs 25-27.

> In practice the historic market cost of debt is not readily observable,[163]

and

> a long stationary series of return on debt data, if it became available, would be relevant information.[164]

286. Moreover, none of these comparisons were included in the sample application in Appendix 30 to the Final Guideline. Consequently, it appears that no cross checks of this nature will be applied in the foreseeable future.

Historical beta estimates

287. The Guidelines note that historical data will be used to estimate beta.[165] This is the same approach that was applied under the previous Rules.

Use of forward looking information

288. The Guideline materials indicate that the ERA will use a range of forward-looking evidence, as discussed below.

VIX index

289. The Guideline materials indicate that the ERA will use implied volatility estimates (such as the ASX VIX index) to inform its estimate of MRP. Specifically, the ERA proposes to use other information to arrive at a range for MRP and then to use implied volatility information to help select a value from within the range:

> The Authority considers that it is appropriate to use the VIX index calculated by the Australian stock exchange for the purpose of informing investors' perceptions of risk, and hence as a cross check providing relevant information for the position of the market risk premium in its range.[166]

290. That is, the ERA does not propose to use the VIX index as a test of whether its allowed return on equity is commensurate with the prevailing conditions in the market or whether it achieves the ARORO, but rather proposes to use VIX information to inform its estimate of the MRP parameter.

291. In a recent determination, the AER set out a number of reasons why the VIX index should *not* be used for this purpose:

> The AER considered the use of implied volatility to inform the forward looking MRP in the WACC review and its previous decisions. The AER considers it cannot be used directly to estimate the MRP for the following reasons:

[163] ERA Appendix 29, Paragraph 30.
[164] ERA Appendix 29, Paragraph 32.
[165] ERA Appendix 29, Paragraph 33-34.
[166] ERA Appendix 29, Paragraph 39.

> - Term mismatch—the implied volatility measures are short term and there is no reasonable method to extrapolate to a longer term, but the relevant MRP term is 10 years.
> - Measurement problems—different implied volatility measures produce different (and sometimes conflicting) results. Further, there is evidence that these measures are systematically biased (upwards).
> - Contentious assumptions—observing the amount of risk (via implied volatility) does not equate to the price of that risk (which is what is relevant to the MRP). This gap is most commonly breached by assuming a constant ratio (for example, if the current implied volatility is double the long run average, then the MRP will also be double its long run average. This assumption is disputed on theoretical and empirical grounds.[167]

292. The ERA also identifies a number of problems with the use of the VIX index for the purpose of estimating MRP:

> The Authority notes the shortcomings of these measures. The Authority is aware that the VIX is a forward looking indicator of market expectations that is limited to 3 months while the maximum for the call option volatility is 12 months. This contrasts with the expectations horizon for the return on equity in the regulatory context which is 5 years. Expectations over these two different horizons can be very different. It is also noted that while the VIX quantifies volatility using variance, it does not price this volatility.[168]

293. The last point in the preceding quote is an important one – MRP reflects the quantum of market risk *and* the price of risk,[169] whereas the VIX index (at most) provides an indication of quantum.

294. One additional problem is that VIX index data is only available for a short period of time that is dominated by the GFC. Consequently, a comparison of the current VIX with the average historical VIX can be highly misleading.

295. In light of the issues set out above, our view is that evidence from the VIX index should receive very limited weight.

296. We also note that Appendix 30 indicates that VIX information will be used to inform the estimate of MRP in Step 2 of the ERA's process and will not be used as a cross check in Step 4 of the process.

Broker reports and independent expert reports

297. The ERA's Guideline materials jointly deal with broker WACC estimates and independent expert valuation reports. Broker reports are published by stock broking houses and have the ultimate purpose of increasing trading volumes and broker commissions. Independent expert reports are published by independent and certified valuation professionals and have the purpose of providing an independent assessment of value to stakeholders in corporate transactions. These reports are required under the Corporations Law and stock exchange listing rules.

298. The use of broker WACC estimates as a source of evidence with respect to the actual cost of capital faced by regulated businesses is subject to many known limitations, a number of which are set out in the AER's Victorian Gas Distribution Review Final Decisions.

[167] AER Envestra Draft Decision, 2012, Appendix B, p. 45.
[168] ERA Appendix 29, Paragraph 47.
[169] The price of risk the additional return that the market requires as compensation for each additional unit of risk.

> - the broker reports generally do not state the full assumptions underlying their analysis, or provide thorough explanations of how they arrive at their forecasts and predictions. As such, caution should be exercised in the interpretation of these broker reports;
> - the five listed companies considered undertake both regulated and unregulated activities, which are assessed by brokers in aggregate. However, only the regulated activities are directly relevant to the risk in providing reference services…
> - it is generally not clear what assumptions the brokers have relied upon when developing their WACC estimate. Further, variation in WACC estimates suggests that these assumptions are not consistent across the different brokers; and
> - the broker reports do not always provide sufficient information for the AER to calculate a nominal vanilla WACC estimate. Only those brokers who report the WACC in nominal vanilla form or provide sufficient detail to enable conversion to this form were considered. These figures are not necessarily precise estimates of the broker's nominal vanilla WACC, since the AER has relied on its interpretation of the information provided.[170]

299. The Australian Competition Tribunal also noted these limitations in the recent Envestra matter, but determined that the AER's use of broker WACC estimates did not give rise to a reviewable error on the basis that they had no effect on the allowed return. They were not used in the process of estimating the allowed return, and their consideration caused no revision of that estimate – they did no harm.[171]

300. Moreover, the Guideline materials indicate that the ERA does not intend to have regard to broker WACC estimates.

301. By contrast, our view is that the evidence from independent expert valuation reports is relevant evidence that should be considered when estimating the required return on equity. This evidence provides an indication of whether a particular allowed return is commensurate with the prevailing conditions in the market and with the efficient financing costs of a benchmark efficient entity. Our view of how the independent expert valuation evidence should be taken into account is set out in Paragraphs 155 to 180 below.

302. The Guideline materials provide highly qualified support for the use of this evidence[172] and the sample implementation in Appendix 30 makes no reference to it at all. Consequently, it appears that the independent expert evidence will not be used by the ERA in the foreseeable future.

Decisions by other regulators

303. In its Final Guideline materials, the ERA indicates that it will continue its current approach of having regard to the decisions of other regulators:

> Overall, the Authority expects to continue to use the decisions of other regulators to check outcomes from its own decisions. [173]

304. The only other regulator that makes decisions under the NGR is the AER, which states that it too will have regard to the decisions of other regulators.[174] That is, the ERA will have regard to decisions

[170] AER, Envestra Final Decision, Appendix B, p. 63.
[171] Australian Competition Tribunal, Application by Envestra Ltd (No 2) [2012] AComp T 3, 11 January 2012, Paragraph 166.
[172] ERA Appendix 29, Paragraphs 65-66.
[173] ERA Appendix 29, Paragraph 68, p. 203.
[174] AER Guideline, Table 5.2, p. 14.

of the AER, which will have had regard to decisions of the ERA, and so on. The ERA has recognised that, in this regard:

> there is some potential for circularity. [175]

305. We agree that there is circularity in regulators justifying their decisions by pointing to similar decisions from other regulators, who themselves may be justifying their own decisions by pointing to decisions from the first regulator. However, where one regulator is materially out of step with other regulators, the reasons for that difference should at least be addressed and explained.

306. The Final Guideline materials indicate that ERA determinations will be independent of the decisions of other regulators. For example, the AER's Draft Guideline differed in a number of material respects from the positions reached in the ERA's Draft Guideline. However, the ERA's Final Guideline made no references to these material differences. Moreover, the ERA's Final Guideline makes no reference to the ways in which it is inconsistent with the AER's Draft Guideline.

Relationship between the return on equity and the return on debt

307. The Guidelines materials suggest that over the long run:

> it is expected that a spread would become evident between the return on equity and the return on debt[176]

and that:

> the Authority considers that it is relevant to use such spreads as a check to ensure that estimates of return on equity are reasonable.

308. This implies that the ERA does not consider that sufficient data (particularly in relation to the historical return on debt) is available to perform any check at this stage. Consistent with this is the fact that the Guideline materials provide no indication of how this information would be used as a check or about how it could have any impact on allowed returns.

309. The Guidelines materials also state that:

> In addition, prevailing market conditions should also be taken into account when determining whether the relativities between the return on debt and equity are reasonable at the time the regulatory decisions are made.[177]

310. Again, no information is provided about how the prevailing market conditions would be "taken into account." It is likely that this consideration would be implemented by simply ensuring that the allowed return on debt is higher than the allowed return on equity for each determination, which is a weak test that is generally easily satisfied.

[175] ERA Appendix 29, Paragraph 68.
[176] ERA Appendix 29, Paragraph 71.
[177] ERA Appendix 29, Paragraph 72.

Financial metrics

Trading multiples and asset sales multiples

311. In its Guideline materials, the ERA refers to the use of trading multiples and asset sales multiples[178] and we deal with each of these in turn below.

Trading multiples

312. The trading multiple is the ratio of the current share price to the regulatory asset base value of equity. The AER has previously considered the use of trading multiples. For example, in its Final Decision for Envestra,[179] the AER stated that:

> A trading multiple above one may imply that the market discount rate is below the regulated WACC.[180]

313. However, a trading multiple above one does not inevitably establish that the regulatory rate of return exceeds that required by investors. Rather, trading multiples above one could reflect a myriad of factors, including, but not limited to:

a) The contribution of strongly performing non-regulated assets owned by a regulated firm;

b) The ability of the regulated firm to react to the incentive-based regulation framework that operates in Australia. Every regulated firm has an incentive to implement efficiencies to attempt to beat the regulatory benchmark in relation to every component of the building block approach. An efficiency gain in relation to any component of the regulated revenue allowance could explain a trading multiple above one;

c) The possibility that efficiency gains may occur in the future or that allowed returns or other aspects of the regulatory allowance may be higher in the future. The current share price reflects more than just the next five-year regulatory period – it also reflects the market's expectations of all future regulatory periods;

d) The potential for growth in the earnings of the regulated firm, whether arising from non-regulated business units or from efforts to increase the demand for regulated services; and

e) The possibility that an acquirer might be prepared to pay a premium for the firm's assets, for instance, because there may be synergies with the acquirer's existing business or because gaining entry to that particular market is of strategic importance to the acquirer; and

f) Measurement error – the AER notes that it has used broker estimates and that it is unaware of how those estimates have been calculated.[181]

314. That any one or more of these factors could equally explain a trading multiple above one appears to be uncontentious. For instance, McKenzie and Partington (2011) note that:

[178] ERA Appendix 29, Paragraphs 75-79.
[179] We refer to the Envestra Final Decision throughout this section. Similar, or identical, wording is contained in the Final Decisions for the other Victorian gas distribution businesses.
[180] AER, Envestra Final Decision, Appendix B, p. 60.
[181] AER, Envestra Final Decision, Appendix B, p. 60, Footnote 271.

> The source of this value premium could arise from economies of scale and synergies in general, from the opportunities for efficiency gains, from opportunities for growth, from the potential to exploit tax shields, or because the allowed regulated return is above the return really required. It is difficult to attribute the value premium across these components[182]

and Cambridge Economic Policy Associates (**CEPA**) (2013) state:

> we accept, as per the arguments put forward by SFG Consulting, that there are limitations in what can be inferred from this market evidence.[183]

315. CEPA go on to conclude that there is evidence that trading multiples are above one for the four data points that are available, but that:

> The degree to which there is outperformance on the cost of equity is unclear.[184]

316. The AER also acknowledges that such factors limit the inferences that can be drawn from trading multiples. In its recent VGDR Final Decisions, the AER stated:

> The AER acknowledges that there are other factors which may explain a trading multiple above one.[185]

317. Thus it is generally accepted that there are a number of reasons why the trading multiple may exceed one. Logically, to conclude anything about what the trading multiple implies about the allowed return on equity over the next five-year regulatory period, one would first have to quantify the effects of the plethora of other factors that also affect the trading multiple. No regulator has sought to do this.

318. The ERA also recognises the long list of problems involved in using trading multiples and concludes that:

> It would be remiss to attribute too much precision to the results.[186]

Transaction multiples

319. The transaction multiple is the ratio of the asset sales price to the RAB. In the recent VGDR, the AER noted that recent regulated asset sales have generally been at a premium to the regulated asset base, as reflected by a multiple of sale proceeds to RAB exceeding one.[187] The AER concludes, on the basis stakeholder submissions and reports from its own consultants, that:

> A range of factors may contribute to a difference between market and book values.[188]

[182] McKenzie and Partington (2011), p. 34.
[183] CEPA (2013), p. 54.
[184] CEPA (2013), p. 54. CEPA go on to conclude that it is unlikely that the "rates allowed" are too low. But without seeking to quantify any contribution of the other components of the premium, it is not clear how such a conclusion has any basis.
[185] AER, Envestra Final Decision, Appendix B, p. 60.
[186] ERA Appendix 29, Paragraph 76, p. 205.
[187] AER, Envestra Final Decision, Appendix B, p. 57.
[188] AER, Envestra Final Decision, Appendix B, p. 57.

320. In its Final Decisions, the AER sets out a list of some of the factors that might explain a transaction multiple above one. This list includes the reasons why a trading multiple might be above one (as set out above). The AER recognises[189] that its list is not exhaustive and that stakeholders have proposed additional factors including:

    a) The acquirer's expectation of potential future growth in earnings from the operation of the regulated assets, whether because of an increase in demand for regulated services, howsoever arising, or because of an expectation that regulation will be relaxed;

    b) The acquirer's perception that acquiring the asset would confer certain intangible or strategic benefits of value to the acquirer. This could be the case if, for instance, the purchase of a regulated asset granted a foreign investor entry to a market that they perceive to be of strategic importance;

    c) The inclusion of certain non-regulated assets that are of value to the acquirer in the sale;

    d) The acquirer's expectation that they could exploit synergies between their existing business and the regulated asset that lead to increased revenues or reduced costs; or

    e) The possibility that certain efficiencies might be available to the acquirer that are not available to an efficient benchmark service provider.

321. That is, as for trading multiples, it is generally accepted that there are many factors that might result in a transaction multiple above one. Consequently, it is logically impossible to conclude anything about what the trading multiple might imply about the allowed return on equity for the assets that were the subject of the sales without first quantifying the effect of the other factors.

322. Consistent with this view, the ERA concludes that:

> The Authority considers that such a comparison provides only a rough guide as to reasonableness, as there are many factors that influence the degree to which sales prices might exceed the regulated asset base.[190]

Current AER view

323. In its Guideline, the AER concludes that trading and transaction multiples do not constitute relevant evidence and have no part to play in estimating allowed returns:

> We now propose to not apply levels and changes in RAB acquisition and trading multiples as a direct reasonableness check on the overall rate of return at the time of a particular revenue determination or access arrangement. Instead, we propose to use these multiples as part of a set of indicators that we monitor over time and across network businesses to help inform us of potential areas of inquiry and research. This more general use of these multiples reflects the fact that there are many potential influences on RAB acquisition and trading multiples, such as changes in the expectations and the realisations of business revenues, expenditures and rates of return. Given these many potential influences, any changes in these multiples may not be immediately attributable to any one factor. We propose to continue to monitor RAB acquisition and trading multiples to inform us of market outcomes over time and in response to changes in the environment

[189] AER, Envestra Final Decision, Appendix B, p. 57.
[190] ERA Appendix 29, Paragraph 78, p. 205.

> of the network businesses, without making use of them directly in the rate of return determination process.[191]

Summary

324. It appears that the current regulatory view is that transaction and trading multiples would, at most, be used as "a rough guide" as it would be "remiss to attribute too much to the results." That is, seems fair to assume that this data would have no impact on the allowed return on equity.

Dividend yields

325. The Guideline materials indicate that the ERA considers market dividend yields to be relevant information and that:

> the Authority considers this information relevant for informing the selection of a point within a range of expected returns.[192]

326. However, at no stage of its proposed approach does the ERA ever produce "a range of expected returns." Rather, the proposed approach is to produce a range for each parameter, then to select a point estimate for each parameter, then to produce a point estimate of the required return. Moreover, the sample application in Appendix 30 uses dividend yield information to inform its point estimate of MRP. Consequently, it appears that market dividend yield data will be used to estimate MRP (in Step 2) and not as a cross check (in Step 4).

Credit rating metrics

327. The Guideline materials also consider the role of credit rating metrics – the financial ratios that credit rating agencies consider as part of the rating process.[193] The ERA correctly notes that the allowed DRP reflects the benchmark credit rating, which in turn reflects the various financial ratios which led to that credit rating:

> For these reasons the Authority views the default spread [DRP] as a summary measure of the credit metrics.[194]

328. This apparently leads the ERA to give no further consideration to credit metrics. However, there is one very important use of these metrics as a cross check. The ERA assumes that the regulated asset or network will be able to maintain a particular credit rating (e.g., BBB+). This in turn implies that the regulated asset or network will be able to maintain the particular set of credit rating metrics that would support the assumed rating (e.g., minimum interest coverage and FFO to debt ratios). But if the overall allowed return is insufficient to support those credit rating metrics, there is an obvious logical inconsistency. This would (logically) lead the ERA to either adjust its allowed returns or adopt a different credit rating – one that is consistent with the credit rating metrics that flow out of the regulatory model.

[191] AER Explanatory Statement, p. 28.
[192] ERA Appendix 29, Paragraph 84.
[193] ERA Appendix 29, Paragraphs 85-89.
[194] ERA Appendix 29, Paragraph 89.

329. In our view, this use of credit rating metrics as a cross check for internal consistency is important and should be applied. By contrast, the ERA proposes to have no regard to any credit rating metrics at any stage of its process.

Term structure variables

330. The Guideline materials note that the academic literature has established that two term structure variables are associated with required returns:

a) The default spread (between the yields on risky and risk-free bonds); and

b) The term spread (between the yields on long- and short-dated risk-free bonds).

331. The ERA concludes that:

> Given their forward looking nature and sound theoretical and empirical underpinnings outlined above, the Authority considers term structure variables have potential to be relevant information for informing the selection of a point in ranges established expected returns (sic).[195]

332. As noted in the discussion of market dividend yields above, there is no range of expected returns at any stage of the ERA's proposed approach. Rather, Appendix 30 indicates that term structure information will be used to inform the estimate of MRP and will not be used in the cross check step.

Conclusions in relation to cross checks

333. An important element of the ERA's proposed approach for estimating the required return on equity is the application of cross checks in Step 4. Indeed, having determined in Step 1 of its process that the SL CAPM is the only relevant financial model, it is only the cross check step of the ERA's proposed process that differentiates it from the mechanistic implementation of the SL CAPM that it adopted under the previous Rules.

334. In relation to these cross checks, the ERA refers to the data and evidence listed in its Appendix 29. However, as set out above, there are in fact no cross checks anywhere in that appendix. Every item set out in that appendix is either:

a) Not used anywhere in the ERA's process (because it is considered to be too unreliable or irrelevant); or

b) Used to inform the estimate of individual parameters in Step 2 of the process, rather than as a cross check in Step 4; and/or

c) Used in such a way that it is incapable of having any material effect on the allowed return on equity.

335. The sample implementation in Appendix 30 contains no cross checks at all of the allowed return on equity for the benchmark firm.

336. The appendix does, however, note that the ERA's estimate of the required return on equity for the market is materially (20%) below the historical average and that it is materially below the value used

[195] ERA Appendix 29, Paragraph 99.

in independent expert valuation reports. The ERA then concludes that this evidence does not warrant any reconsideration of its approach or estimates.

337. Consequently, it appears that in fact there is no Step 4 to the ERA's proposed approach. In this case, the ERA's approach collapses to the estimation of three parameters – to be mechanically inserted into the SL CAPM formula. In our view, this approach does not produce the best possible estimate of the required return on equity, in which case it is not consistent with the NGO or RPP.

6. Problems with the ERA's implementation of the SL CAPM

Overview

338. For the reasons set out above, our view is that the new Rules require regulators to have regard to evidence beyond the parameterisation of the SL CAPM. Conversely, the ERA's approach is to obtain point estimates of the three SL CAPM parameters, insert them into the SL CAPM formula, and to adopt the output as the allowed return on equity.

339. In this section of the report, we set aside the question of other relevant models, methods, data and evidence and focus solely on the ERA's implementation of the SL CAPM. For the reasons set out below, our conclusion is that the AER has erred in its implementation of the SL CAPM.

Not a single CAPM estimate

340. At the outset, it is important to note that there is not a single SL CAPM estimate of the required return on equity that can then be compared against estimates from other models. Rather, there are many different SL CAPM estimates of the required return on equity. Every different set of parameter estimates will produce a different estimate of the required return on equity.

341. Logically, it is possible that some SL CAPM estimates of the required return on equity (based on some sets of parameter estimates) are commensurate with (a) the prevailing conditions in the market and (b) the efficient financing costs of the benchmark efficient entity, and others are not.

342. Consequently, it would be wrong to pose the regulatory question as:

> Does the SL CAPM generally produce estimates of the required return on equity that are commensurate with the efficient financing costs of the benchmark efficient entity, having regard to the prevailing conditions in the market?

343. That question is impossible to answer because different implementations of the SL-CAPM can produce materially different estimates of the required return on equity from time to time.

344. Rather, the appropriate regulatory question is:

> Does the *regulator's proposed implementation* of the SL-CAPM produce a *current* estimate of the required return on equity that is commensurate with the efficient financing costs of the benchmark efficient entity, having regard to the prevailing conditions in the market?

345. For the reasons set out above, our view is that the ERA's proposed estimate of the required return on equity is not commensurate with the efficient financing costs of a benchmark efficient entity, having regard to the prevailing conditions in the market. In our view, the ERA should have:

    a) Also considered other methods, models, data and evidence, rather than relying exclusively on the SL CAPM; and

    b) Applied a different approach to estimating each of the three SL CAPM parameters.

    It is the second issue that is the focus of this section of the report.

Risk-free rate

346. The ERA proposes to set the risk-free rate to the yield on 5-year government bonds.

347. We show above[196] that this is out of step with the market and regulatory practice of using the yield on 10-year government bonds. Independent expert valuation professionals use the 10-year government bond yield. The AER and IPART use the 10-year government bond yield.

348. The ERA is in error when it claims[197] that IPART uses the 5-year government bond yield. Indeed, IPART justifies its use of a 10-year term in language that is almost identical to the allowed rate of return objective under the NGR when it concludes that a 10-year term:

> …is more consistent with our objective for setting a WACC that reflects the efficient financing costs of a benchmark entity.[198]

349. By contrast, the ERA adopts the 5-year government bond yield, not on the basis that it reflects the efficient financing costs of a benchmark efficient entity, but on the basis of a "present value principle" that is not found anywhere in the Rules:

> The Authority is of the view that the 'present value' principle requires that the term of a risk-free rate of return should be equal to the length of a regulatory control period.[199]

350. Even if the present value principle (which is not in the Rules) did supplant the allowed rate of return objective of having the allowed return commensurate with the efficient financing costs of a benchmark efficient entity (which is in the Rules), the present value principle does *not* require that the term of the risk-free rate must be equal to the length of the regulatory control period.

351. The AER has recently considered this issue in some detail and has provided the following summary of the argument:

> In Lally (2012), the argument for a five year term relies on the 'present value principle'—the principle that the net present value (NPV) of cash flows should equal the purchase price of the investment.
>
> Lally stated that the present value principle is approximately satisfied only if the term of equity matches the regulatory control period. Lally illustrated this point using a numerical example in which there is no risk, so the return on equity equals the risk free rate. The example sets allowed revenues at the beginning of the regulatory control period using the yield to maturity on a five year risk free bond. Lally showed that in this example, the 'present value principle' is approximately satisfied: the NPV of the cash flows is approximately equal to the book value of the assets.
>
> The reason why the principle is satisfied is that the structure of the bond payments and the structure of the regulatory payments are similar…The core intuition behind the argument for a five year term is that the cash flows from the building block model have a similar structure to the cash flows from a five year bond. Put simply, the argument is that an equity investment in a regulated business is—at least in respect of its term—like an investment in a five year bond.

196 Paragraphs 225 to 233.
197 ERA Explanatory Statement, Paragraph 442.
198 See IPART (2013), Review of WACC Methodology, December, p. 12.
199 ERA Explanatory Statement, Paragraph 444.

> The central issue in the debate about the term of equity, therefore, is the extent to which the cash flows from an equity investment in a regulated business are like the cash flows from a five year bond.[200]

352. However, the AER goes on to note that the cash flows from an equity investment in a regulated business are *not* like the cash flows from a five year bond in a very important respect – whereas a bondholder receives a known payment at maturity, the infrastructure equity owner does not. Rather, infrastructure equity (like all equity) is risky and the value of shares five years into the future cannot possibly be known with certainty. In this regard, the AER states that:

> In Lally's calculation above…the assumption is that the investor receives a cash payment equal to the RAB in the final year of the regulatory control period…these assumptions may not hold in reality.[201]

353. The AER goes on to cite a report by Incenta:

> …investors are unlikely to evaluate regulated assets with reference to a 5 year bond because – unlike the case of the bond – the residual value at the end of each 5 year period is inherently risky. This is because the residual value is not returned in cash, but rather comprises a 'value' whose recovery remains at risk from future regulatory decisions and changes in the market (both technological changes and changes to customer preferences).[202]

354. The AER concludes its discussion of this issue with the following summary:

> …the argument for a five year term would be correct only if after five years, in the event that 'they [the owners of the regulated business] choose to walk away from the asset, they would be fully compensated'…however, the owners are not, in reality, guaranteed of such compensation—the problem is that there is no guarantee that the secondary market will deliver a price equal to the value of the equity component of the RAB.[203]

355. In summary, the AER and IPART have recently questioned whether adopting a 5-year term is in fact consistent with the NPV=0 principle and have determined that other factors (such as considerations of efficient financing practice, the internal consistency of their decisions, and the desire to be consistent with best practice valuation) lead them to adopt a 10-year term.

356. In adopting a 10-year term, the AER recently concluded that:

> On balance, we are more persuaded by the arguments for a 10 year term, than the arguments for a five year term.[204]

357. The AER also notes that the Australian Competition Tribunal advocates the use of a 10-year term:

[200] AER Draft Rate of Return Guideline Explanatory Statement, p. 183, and see AER Final Guideline, p. 49.
[201] AER Draft Rate of Return Guideline Explanatory Statement, p. 183, and see AER Final Guideline, p. 49.
[202] AER Draft Rate of Return Guideline Explanatory Statement, p. 183, and see AER Final Guideline, p. 49.
[203] AER Draft Rate of Return Guideline Explanatory Statement, p. 184, and see AER Final Guideline, p. 49.
[204] AER Draft Rate of Return Guideline Explanatory Statement, p. 181, and see AER Final Guideline, p. 49.

> The Australian Competition Tribunal (the Tribunal) decided in its 2003 GasNet decision that 10 years is the appropriate term of the risk free rate in the CAPM. The Tribunal came to this view on the basis of two reasons:
> • as the MRP was estimated using a 10 year risk free rate, consistency demands that a 10 year risk free rate be used in the CAPM, and
> • it is a convention of economists and regulators to use a relatively long-term risk free rate where the life of the assets is relatively long.[205]

358. In our view, the relevant evidence suggests that the 10-year government bond yield should be used to estimate the SL CAPM risk-free rate.

Equity beta

The ERA's proposed approach

359. The ERA proposes to use a three-step approach to estimate equity beta.

360. In the first step, the ERA proposes a range of 0.5 to 0.7 for equity beta based on the following primary data:

> empirical studies conducted by the Authority in 2011 and 2013;
>
> observed equity betas for Australian listed utilities reported by Bloomberg and S&P; and
>
> Henry's advice to the AER in 2009.[206]

361. In the second step, the ERA adopts a point estimate of 0.7 from within this range based on the following secondary evidence:

> The Authority considers that relevant empirical evidence supports a view that there is some downward bias in equity beta estimates that are less than one, and upward bias in equity beta estimates that are greater than one. Therefore, for the purposes of this indicative estimate, the Authority will assume a point estimate for the equity beta that is at the top end of the estimated range, at 0.7, so as to account for potential bias in the estimate.[207]

362. The third step is to apply cross checks to the point estimate, however in the current Guideline the ERA sets out no relevant cross checks and simply adopts the point estimate of 0.7.

The proposed approach effectively excludes relevant evidence

363. By fixing the range at 0.5 to 0.7 in the first step of its approach, the AER severely restricts the ability of any other evidence to have any effect. For example, the ERA uses evidence from the Black CAPM to select a point estimate of 0.7 from within the ERA's primary range. However, the Black CAPM evidence that is before the ERA is the empirical analysis of NERA (2013)[208] who conclude that the appropriate Black CAPM beta estimate is 1.0.

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[205] AER Draft Rate of Return Guideline Explanatory Statement, p. 182, and see AER Final Guideline, p. 49.
[206] ERA Explanatory Statement, Paragraph 641.
[207] ERA Appendix 30, Paragraphs 25-26.
[208] NERA, 2013, *Estimates of the Zero-Beta Premium*, June.

364. That is, to the extent that the secondary evidence is inconsistent with the arbitrarily determined range of 0.5 to 0.7, it is disregarded.

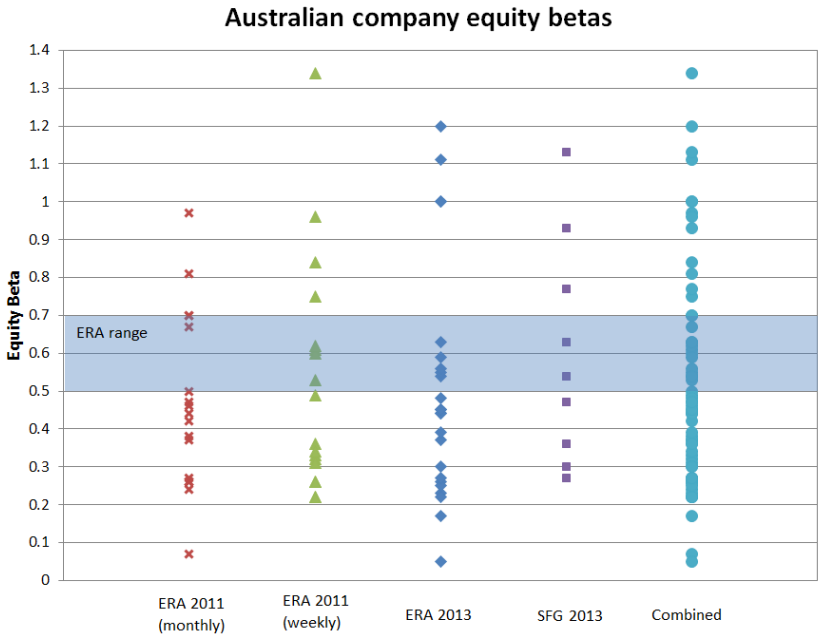
365. As set out below, our view is that the ERA should also have regard to relevant international evidence which suggests a beta estimate of at least 0.9. However, under the ERA's approach, that evidence cannot possibly receive any weight at all. The ERA's point estimate is already at the top of the acceptable range, so any further evidence pointing to a higher value cannot possibly have any effect on the point estimate at all.

366. In our view, an approach that pre-emptively dilutes or eliminates the impact of relevant evidence (before any consideration of the relative strengths and weaknesses of the evidence) is unlikely to produce estimates that are consistent with the ARORO.

Primary range is arbitrary and meaningless

367. The ERA beta analyses use a range of methods to apply statistical regression analysis on the very small set of domestic comparables (currently numbering five). A summary of their results, together with our own estimates from SFG (2013)[209] is set out in the figure below.

Figure 6. Regression-based estimates of Australian-listed energy networks



Source: ERA (2011),[210] ERA (2013),[211] SFG (2013).

368. The figure above sets out re-levered (to 60%) equity beta estimates for the AER's set of comparable firms. The important thing to note is that these are all estimates of the same thing – the regression-based equity beta for an energy network business with 60% leverage. However, the range of point estimates is almost uniformly distributed over a wide range that begins well below 0.5 and ends well above 0.7. The lowest estimate is 0.05 and the highest is 1.34. There is no a priori reason to believe

[209] SFG Consulting, 2013, *Regression-based estimates of risk parameters for the benchmark firm*, Report for the Energy Networks Association, June.
[210] Economic Regulation Authority, 2011, Western Power access arrangement: Draft Decision, March.
[211] Economic Regulation Authority, 2013, Draft Rate of Return Guidelines for Gas Transmission and Distribution Networks – Final Guidelines – Explanatory Statement, August.

that any of these estimates is more reliable than any other – they are all supposed to be equally valid estimates of the same thing.

369. The ERA has provided no basis for why it has constrained the range to 0.5-0.7, nor even explained what the range means. It is not a confidence interval, it is not the minimum-to-maximum, it appears to be an arbitrarily selected band. But the selection of this range is very important because the final value of equity beta is constrained to come from within this range – regardless of any other relevant to the contrary.

370. Moreover, the fact that these estimates cover such a wide range should lead the AER to question the reliability of the beta estimates produced from this small subsample of the available data.

Primary data produces unreliable estimates

371. Another reason to question the use of a primary range based on a subset of the relevant evidence is that the estimates produced by that subset of the relevant evidence have been shown to be unreliable in several respects. The very wide range of estimates in the figure above is one reason to have concern about the reliability of the estimates from the small set of domestic firms. Other reasons are set out below.

Variation in estimates across methodological choices

372. The estimates on which the ERA has relied vary alarmingly depending on the methodological choices of regression technique and sampling period. This is best illustrated in relation to HDF. The AER summarises a number of estimates (on which it relies) in Tables 4.4 and 4.5 of the Issues Paper. Those estimates for HDF are summarized in the following table.

Table 2
Regression-based beta estimates for HDF from ERA (2011) reported by the AER

		Regression Method	
		OLS	**LAD**
Sampling	Monthly	0.07	0.47
Period	Weekly	1.34	0.84

373. The estimates set out in the table above are for the same company for the same time period.

Variation in estimates across time

374. According to the ERA estimates, the average estimate of beta for Envestra increased by 20% between 2011 and 2013. There are two explanations for this:

a) The true systematic risk of Envestra did actually increase by 20% over a two-year period; or

b) The beta *estimates* are unreliable.

375. Moreover, the results also imply that, over the same two year period, the average estimate of beta for Enevstra *increased* by nearly 20% and the beta of DUE *decreased* by 25%. Moreover, of the six firms examined by the ERA in 2013, three had *higher* beta estimates and three had *lower* beta estimates relative to the ERA's estimates two years earlier. Again, there are two possible explanations:

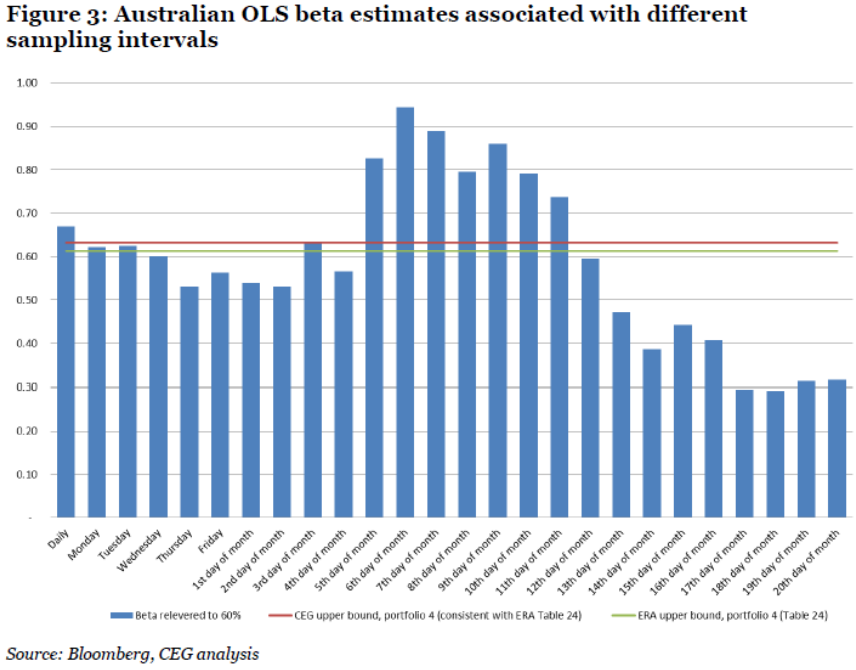
a) The true systematic risk of some of the benchmark firms increased materially over the two-year period and the true systematic risk for others decreased materially (which would call into question whether these firms are all properly included in the same set of "comparables"); or

b) The beta *estimates* are unreliable.

Variation in estimates across sampling days

376. The report by SFG (2013) highlighted the fact that beta estimates can vary materially depending on which day of the month is used as the reference point when determining returns. In a recent submission to the ERA, CEG (2013)[212] has documented a similar pattern in weekly data. The relevant figure from that report is reproduced below. This figure shows the mean (re-geared to 60%) equity beta estimate for the ERA's sample of six domestic comparables (the five that remain listed plus HDF) according to the way returns are measured. The mean estimate of beta can change by a factor of three simply by measuring returns from the sixth day of each month rather than from the 17th.

Figure 7. Australian OLS beta estimates associated with different sampling intervals



Source: CEG (2013), Figure 3.2, p. 26.

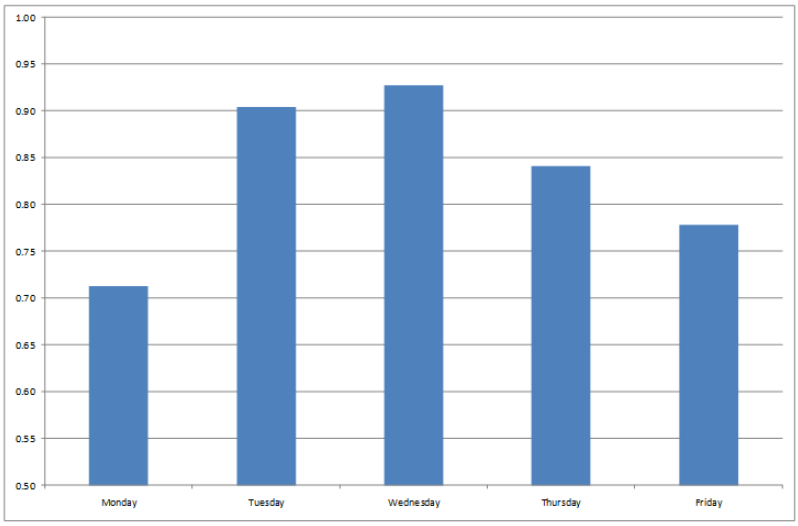
377. Moreover, CEG (2013)[213] show that there is variation in the mean beta of the sample of ten US firms that the AER instructed its consultant to examine in Henry (2008) and Henry (2009). The CEG report demonstrates that the results in Henry (2008) appear to be based on Friday-to-Friday returns and that the results of Henry (2009) appear to be based on Monday-to-Monday returns.[214]

378. The following figure, reproduced from CEG (2013) summarises the mean beta estimates for the Henry sample according to the day of the week that is used to measure returns. CEG conclude that the move from Friday-based returns to Monday-based returns:

[212] CEG (2013), Regression estimates of equity beta.
[213] CEG (2013), AER equity beta issues paper: international comparators.
[214] CEG (2013), Paragraph 127.

> involves a move from the second lowest to the lowest beta. Had Henry moved from Friday to Wednesday rather than Monday the estimated beta would have been 0.21 higher.[215]

Figure 8. Domestic beta estimates by day of week



Source: CEG (2013), Figure 13, p. 44.

379. In our view, this wide variation in returns – caused by nothing more than changing the day of the week (or month) from which returns are measured – is evidence of a lack of reliability. This provides further evidence that adopting a narrow range of 0.5 to 0.7 for equity beta unreasonably restricts the relevance that other information can have in reaching a final decision on equity

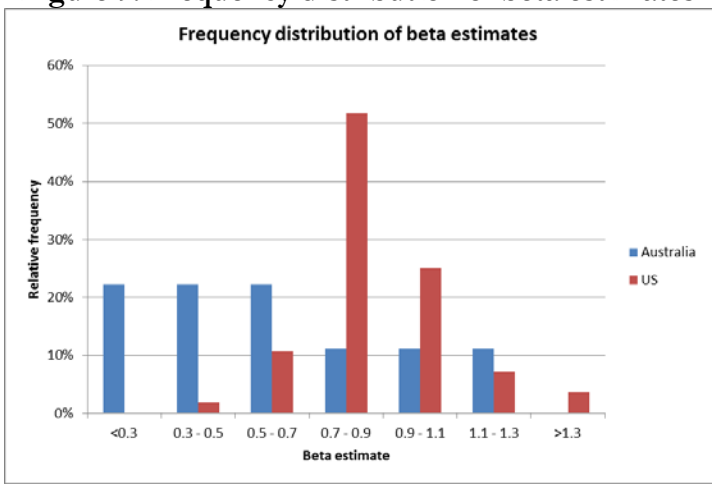
International evidence is richer, more stable and more reliable

380. SFG (2013) presented equity beta estimates for nine domestic firms and 56 US firms. As noted above, the estimates for the Australian firms are disbursed over a very wide range. By contrast, the distribution of beta estimates from the much larger sample of US firms is uni-modal and approximately symmetric with a large majority of estimates within a narrow range. The distributions of the two sets of beta estimates are set out in the figure below.

381. The ERA concludes that the Australian data supports a range of 0.5 to 0.7 (no more, no less) with such a high degree of reliability that the US data is irrelevant. However, the Australian distribution looks like the distribution of a tiny sample of random numbers whereas the US distribution looks like the standard probability distribution of a statistically valid sample of estimates.

[215] CEG (2013), AER equity beta issues paper: international comparators, Paragraph 129.

Figure 9. Frequency distribution of beta estimates



Source: Re-levered equity beta estimates from SFG (2013).

Relevance of evidence from other models

382. Under the ERA's proposed approach the required return on equity is determined exclusively by the SL CAPM. The ERA also concludes that the evidence from the Black CAPM is also relevant data that it should have regard to. But since the Black CAPM has already been omitted from use as a model, the ERA uses the Black CAPM evidence to inform its estimate of beta. In our view, this is an unnecessarily convoluted process that constrains the ability of the ERA to give full and proper effect to the Black CAPM evidence. Moreover, such an approach, where some models are inserted within others, is without precedent or rationale and is inherently internally inconsistent. Nevertheless, it is likely to be better than disregarding the relevant Black CAPM evidence altogether.

383. The ERA accepts that there is evidence that the required return for low-beta stocks is higher than the SL CAPM would suggest. The ERA purports to correct for this documented bias in the SL CAPM by increasing its equity beta value.

384. However, there is also evidence that the required return for high book-to-market stocks is higher than the SL CAPM would suggest. Indeed the evidence for the book-to-market effect is even more extensive and more comprehensive than the evidence of the low-beta effect. Consequently, our view is that – given that the ERA's proposed approach is to be maintained – the beta estimate should be informed by evidence about high book-to-market stocks requiring higher returns.

No explanation for reduction in systematic risk

385. The ERA has adopted an equity beta of 0.8 for ATCO's current access arrangement. The Guideline proposes that beta should be reduced by 12.5% to 0.7, but does not set out any reasons for why the risk of a gas distribution business (relative to the average business) may have declined materially over recent years. The Guideline also does not consider whether its current beta value has resulted in over-investment.

Conclusions in relation to equity beta

386. In our view, there is substantial evidence that the ERA's approach to estimating equity beta (by using regression analysis applied to a very small sample of domestic comparables) produces unreliable estimates. This evidence includes:

a) The ERA's beta estimates vary wildly across firms, with the majority of estimates falling outside the 0.5 to 0.7 range that the ERA adopts;

b) The ERA's beta estimates vary wildly over time with estimates for some firms increasing by 20% and others decreasing by 20% over a short period;

c) The ERA's beta estimates vary wildly depending on which sampling frequency is used;

d) The ERA's beta estimates vary wildly depending on which regression specification is used; and

e) The ERA's beta estimates vary substantially depending on the day of the week on which they are computed.

387. Moreover, the evidence from a larger sample of overseas comparables does not suffer, to nearly the same degree, from the problems set out above. Our view is that the evidence from foreign comparables is relevant and should be considered.

388. In addition, our view is that the ERA's process of setting an initial range, based on a sub-set of the relevant evidence, operates to constrain other relevant evidence from being properly considered. This includes evidence on the extent to which the CAPM underestimates the required returns on low-beta and high book-to-market firms.

Market risk premium

The ERA's proposed approach

389. The ERA proposes to use a three-step approach to estimate MRP.

390. In the first step, the ERA proposes a range of 5% to 7.5% based on:

a) An historical mean estimate in the range of 5-7%; and

b) A DGM estimate in the range of 6-7.5%.

391. In the second step, the ERA adopts a point estimate of 6% from within this range based on:

a) The ERA's assessment that "the level of perceived risk in the equity market appears to be in the lower half of the range at the current time" [216]; and

b) "the evidence suggesting that the return on equity is mean reverting." [217]

392. The third step is to apply cross checks to the point estimate, however in the current Guideline the ERA sets out no relevant cross checks and simply maintains the point estimate of 6%.

Estimate depends on where the relevant data is considered

393. The ERA uses the DGM evidence to inform its range, causing that range to be 0.5% higher than it would otherwise have been. The ERA then concludes that the secondary evidence effectively cancels

[216] ERA Appendix 30, Paragraph 20.
[217] ERA Appendix 30, Paragraph 22.

each other out so that the final estimate of MRP is "towards the mid-point of the range,"[218] and the ERA adopts a point estimate of 6%. Thus, the DGM evidence apparently has no effect at all since the extension of the upper boundary by 0.5% is lost to rounding error.

394. Another way to see this is to note that it seems clear that if the ERA had given no regard to the DGM evidence at all, it would have adopted a primary range of 5-7% based on the historical mean of excess returns and would have selected a point estimate of 6% from within that range.

395. By contrast, if the ERA had included the DGM evidence in the second stage, it would very likely have adopted an MRP estimate above 6% since:

    a) The range would be 5-7%;

    b) Other evidence would already suggest an estimate towards the mid-point of the range; and

    c) The DGM evidence would point towards a value exclusively above 6% (6%-7.5%).

396. Moreover, the convoluted approach of the ERA serves to disregard relevant evidence. When interpreting the DGM evidence in the second stage, it is highly relevant that the ERA's DGM estimate is unambiguously above the 6% value – in the range of 6%-7.5%. However, by including it in the first stage, the outcome is the same whether the DGM evidence suggests an unambiguously higher-than-average value (6%-7.5%) or an effectively neutral value (5%-7.5%). In both cases, the only observable effect would be to increase the primary range to 7.5%, even though the proper interpretation of the evidence is quite different in these two cases.

The primary range is arbitrary and meaningless and mis-specified

397. As set out above, the primary range of 5% to 7.5% is formed by aggregating:

    a) An historical mean estimate in the range of 5-7%; and

    b) A DGM estimate in the range of 6-7.5%.

398. There are two fundamental logical problems with this approach:

    a) As set out in Paragraphs 205 to 212 above, the ERA has formed this range on the basis that weight should be given to two approaches – one where the MRP is considered to be constant across different market conditions and one where the overall required return on equity is considered to be constant across market conditions. The historical mean is an estimate that is consistent with the former approach, but the ERA is operating under the misconception that the DGM estimate is consistent with the latter approach because it is not. Hence, the range does not represent what the ERA intends it to represent; and

    b) As set out in Paragraphs 270 to 278 above, the range from the historical mean reflects the statistical precision of the return on the market in average market conditions (i.e., the average conditions over the long period of historical data that was used to estimate the mean). It does not represent the possible range of returns that might be required in different market conditions. That is, the proper interpretation of the range is that the required return in average market conditions could be as low as 5% or as high as 7%. It does *not* imply that the required return might be as low as 5% in certain market conditions and as high as 7% in other market conditions. To use a range that applies to average market conditions *only*

[218] ERA Appendix 30, Paragraph 23.

prevents the MRP estimate from being commensurate with the prevailing market conditions unless the prevailing conditions happen to be close to the long-run average conditions (which would not seem to be the present case, given that government bond yields are currently at the extreme end of their historical distribution).

The primary range has been mis-estimated

Historical mean estimate

399. A recent report by NERA (2013)[219] identifies and corrects a number of errors and inaccuracies in the adjustments that were made in the Brailsford et al (2008, 2012) calculations that form the basis of the ERA's historical mean estimate. The data for part of the period examined by Brailsford et al was sourced from Lamberton (1958). The Lamberton data reported the mean dividend yield where the mean was taken only over those companies that paid dividends. Consequently, it overstated the dividend yield in that it excluded from the calculation those companies that did not pay any dividends at all. This led Brailsford et al to adjust all of the Lamberton data points using an adjustment based on the proportion of firms that paid no dividends in 1966. NERA show that the proportion of firms that paid no dividends in 1966 was materially different to the proportion that paid no dividends during each of the years actually covered by the Lamberton data. That is, the Brailsford et al adjustment is inaccurate and it creates a systematic downward bias.

400. NERA (2013) correct the bias in the Brailsford et al (2008, 2012) estimates and go on to make a more accurate and appropriate adjustment according to the proper contemporaneous proportion of non-dividend-paying stocks. NERA report an historical estimate of 6.5% based on a 0.35 (theta) value assigned to distributed imputation credits.

401. In summary, the historical mean estimate should be centred around 6.5%, not 6.0%.

DGM estimate

402. The ERA follows the AER approach of making a number of "adjustments" to the data when compiling their DGM estimates. For example, the ERA estimates long-run dividend growth by applying a non-standard downward adjustment to long-run GDP growth. Then, having determined the long-run required return on equity, the ERA makes a further downward adjustment based on the assumption that the market will require a lower return over the forthcoming regulatory period than over subsequent periods. All of these adjustments have the effect of reducing the estimate of the required return.

403. By way of comparison, IPART has recently examined a range of DGM estimates that do not make these non-standard adjustments, including the approaches of Damodaran (2013), Bank of England (2002) and Bank of England (2010). IPART concludes that these models indicate a contemporaneous MRP of 7.9%.

The selection of a point estimate is not properly justified

404. Even if the primary MRP range did reflect (a) the lowest return that would be required at one end of the spectrum of market conditions and (b) the highest return that would be required at the other end of the spectrum of market conditions (which it does not, as explained in Paragraph 398 above), the ERA's selection of a point estimate from within the range is not properly justified.

[219] NERA, 2013, *Estimates of the Zero-Beta Premium*, June.

405. In particular, the ERA is led to select a point estimate below the mid-point of its range based on its analysis of three indicator variables.[220] The ERA's analysis indicates that each of the "normalised" variables is currently in the lower half of its historical range. However, the way the ERA performs this analysis produces results that are misleading at best. Specifically, the ERA selects an historical period, determines the minimum and maximum values of the variable during that period, and then reports the location of the current value within that range.

406. For the purposes of the Guideline, the ERA has selected a short period that coincides with the GFC. At the peak of the GFC, the three indicator variables increased to many times their previous levels. Consequently, the maximum value of the range is set at the peak of the GFC. This means that the indicator variable will only be above the mid-point of the range if it is higher than 50% of the value set at the peak of the GFC.

407. To see why this is a problem, consider a variable that has varied between 10% and 20% for more than 20 years, averaging 15%. It then increases to 70% at the peak of the GFC. It is now at 25%. The ERA range in this case would be 10% to 70%, and the current 25% would be at the 25th percentile of the range.[221] The ERA would conclude that this is strong evidence that the current required return is below the long-run average level. However, a more reasonable interpretation is that the current required return is well above the long-run average level (of 15%), but not at the "extreme crisis" level (of 70%).

Conclusions in relation to MRP

408. This section of the report sets out a number of issues relating to the ERA's estimation of MRP. We note that the SL CAPM requires the MRP to be the difference between the required return on the market and the risk-free rate. In Paragraphs 428 to 430 below, we set out our preferred approach for using all relevant evidence to estimate the required return on the market that is commensurate with the prevailing conditions.

Conclusions on implementation of the SL CAPM

409. For the reasons set out above, our view is that the ERA's proposed implementation of the SL CAPM is deficient in that:

a) The risk-free rate should be estimated using 10-year government bonds, consistent with the approach that is adopted in practice and by other regulators;

b) When estimating beta, the ERA has disregarded relevant evidence and failed to have proper regard to the lack of reliability of its own estimates; and

c) When estimating MRP, the ERA has disregarded relevant evidence and has used a convoluted approach that constrains the ability of some relevant evidence to be given appropriate weight.

410. In our view, the ERA SL CAPM approach does not produce the best possible estimate of the required return on equity. It therefore follows that the allowed return on equity will not contribute to the allowed rate of return objective because it will not reflect the efficient financing costs of the benchmark efficient entity. In turn, an allowed return on equity that does not reflect efficient financing costs will be inconsistent with the NGO and RPP.

[220] Appendix 30, Paragraphs 20-21.
[221] (25-10)/(70-10)=0.25.

7. What approach should be used to estimate the required return on equity?

Relevant considerations

411. The National Gas Rules require that:

> The allowed rate of return is to be determined such that it achieves the allowed rate of return objective.[222]

where:

> The allowed rate of return objective is that the rate of return for a service provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect of the provision of reference services (the allowed rate of return objective).[223]

412. The Rules also require that:

> In determining the allowed rate of return, regard must be had to:
>
> (a) relevant estimation methods, financial models, market data and other evidence;
>
> (b) the desirability of using an approach that leads to the consistent application of any estimates of financial parameters that are relevant to the estimates of, and that are common to, the return on equity and the return on debt; and
>
> (c) any interrelationships between estimates of financial parameters that are relevant to the estimates of the return on equity and the return on debt.[224]

413. In relation to the required return on equity, the Rules also require that:

> (6) The return on equity for an access arrangement period is to be estimated such that it contributes to the achievement of the allowed rate of return objective.
>
> (7) In estimating the return on equity under subrule (6), regard must be had to the prevailing conditions in the market for equity funds.[225]

414. In its Final Determination, the AEMC set out what it was trying to achieve from its changes to the Rules:

> The Commission is of the view that any relevant evidence on estimation methods, including that from a range of financial models, should be considered to determine whether the overall rate of return objective is satisfied.[226]

and:

[222] NGR 87(2).
[223] NGR 87(3).
[224] NGR 87(3).
[225] NGR 87(6-7).
[226] AEMC Final Determination, p. 48.

> The Commission considered that no one method can be relied upon in isolation to estimate an allowed return on capital that best reflects benchmark efficient financing costs,[227]

and:

> A major concern expressed in numerous submissions is that under the proposed changes the regulator would still be able to, in effect, make exclusive use of the CAPM when estimating a rate of return on equity. The Commission understands this concern is potentially of considerable importance given its intention is to ensure that the regulator takes relevant estimation methods, models, market data and other evidence into account when estimating the required rate of return on equity.[228]

415. The National Gas Objective (NGO) is also relevant:

> The objective of this Law is to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.[229]

as are the Revenue and Pricing Principles, which include the requirements that:

> A service provider should be provided with a reasonable opportunity to recover at least the efficient costs the service provider incurs in providing reference services[230]

and:

> A service provider should be provided with effective incentives in order to promote economic efficiency with respect to reference services the service provider provides. The economic efficiency that should be promoted includes
>
> (a) efficient investment in, or in connection with, a pipeline with which the service provider provides reference services[231]

and:

> A reference tariff should allow for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates.[232]

416. The AEMC also explicitly linked the consideration of a range of models to the production of the best possible estimate of the efficient financing costs as required by the NGO and RPP:

[227] AEMC Final Determination, p. 49.
[228] AEMC Final Determination, p. 57.
[229] National Gas Law, Section 23.
[230] National Gas Law, Section 24(2)(a).
[231] National Gas Law, Section 24(3)(a).
[232] National Gas Law, Section 24(5).

> Achieving the NEO, the NGO, and the RPP requires the best possible estimate of the benchmark efficient financing costs. The Commission stated that this can only be achieved when the estimation process is of the highest possible quality. The draft rule determination stated that this meant that a range of estimation methods, financial models, market data and other evidence must be considered.[233]

417. That is, the AEMC's clear view is that the NGO and RPP require the regulator to produce the best possible estimate of the required return on equity,[234] which in turn requires the consideration of a range of financial models.

418. Our understanding of the requirements of this body of law, insofar as it relates to the allowed return on equity, is that all relevant evidence must be used in an internally consistent manner to estimate a required return on equity that has regard to the prevailing conditions in the market for funds and is commensurate with the efficient financing costs of a benchmark efficient entity.

Summary of reasons for departure from the ERA's proposed approach

419. Under the ERA's proposed approach, the allowed return on equity is estimated using the SL CAPM with:

    a) The risk-free rate set to the contemporaneous yield on 5-year Commonwealth Government bonds;

    b) Beta determined from regression analysis applied to a small sample of domestic firms; and

    c) Market risk premium set to 6%,

    which is the same approach that the ERA adopted under the previous Rules.

420. In our view, the ERA's proposed approach:

    a) Wrongly concludes that only the Sharpe-Lintner CAPM is relevant;

    b) Does not have regard to all relevant evidence;

    c) Is internally inconsistent;

    d) Does not produce an allowed return on equity that is commensurate with the prevailing conditions in the market; and

    e) Does not produce an allowed return on equity that is commensurate with the efficient financing costs of a benchmark efficient entity.

421. In particular, the ERA proposes an approach in which information from some models (DGM and Black CAPM) is used to inform the estimates of parameters in a different model (SL CAPM). The ERA's implementation of this approach severely constrains the ability of any non-SL CAPM evidence to have any material effect.

[233] AEMC Rule Change Final Determination, p. 43.
[234] The required return on equity is a key component of the efficient financing costs.

422. Moreover, the ERA's proposed approach produces materially different outcomes depending on which pieces of evidence are pre-assigned to the primary, secondary and cross check stages of the process, which highlights the lack of internal consistency of the approach.

423. Furthermore, Section 3 of this report establishes that the ERA has had no regard to relevant financial models, all of which suggest that the ERA's allowed return on equity is not commensurate with the prevailing conditions in the market or with the efficient financing costs of a benchmark efficient entity.

424. In addition, Section 146 of this report establishes that the ERA has had no real regard to several pieces of evidence, all of which suggest that the ERA's allowed return on equity is not commensurate with the prevailing conditions in the market or with the efficient financing costs of a benchmark efficient entity.

425. Finally, Section 6 of this report establishes that, even if the exclusive use of the SL CAPM was an approach that was capable of being consistent with the NGR and NGL, the ERA's estimation of each parameter is flawed.

An approach that is consistent with the NGR and NGL

426. In the remainder of this section, we set out an approach that is consistent with the NGR and NGL in that it gives appropriate weight to all relevant evidence.

Risk-free rate

427. The risk-free rate is set to the yield on 10-year government bonds for the reasons set out in Paragraphs 346 to 358 above. We adopt an estimate of 4.06%, which is the 20-day average ending on 18 November 2013. This would be updated to reflect the most recent data at the time of the determination.

Required return on the market (or average firm)

428. In our view, four approaches can be used to estimate the required return on equity for the market (or average firm), as set out below. All of the following estimates embed an assumed gamma of 0.25, with theta set to 0.35. Where an adjustment is required to reflect this assumed value of imputation credits, we use the approach set out in Officer (1994) as recently endorsed by IPART (2013):

    a) DGM: SFG (2013) employ a dividend growth model applied at the broad market level and estimate the contemporaneous required return on the market to be 11.3%;

    b) Wright: We have updated estimates of the Wright approach using the most recently available data and report an estimate of the required return on the market of 11.7%;

    c) Ibbotson: We have also updated estimates of the historical mean excess stock return and the resulting historical mean MRP estimate is 6.6%. Adding to this the 4.06% estimate of the risk-free rate yields an estimate of the required return on the market of 10.7%;

    d) Independent experts: The evidence surveyed from independent experts in Paragraphs 160 to 168 above shows that over the last two years the practice of independent experts has been to use an estimate of the required return on equity that is materially higher than the estimate that would be obtained from the approach in the previous paragraph. One very recent independent expert report is particularly relevant. Grant Samuel (2014) present a discounted

cash flow valuation of Envestra Ltd, a company that is primarily engaged in gas distribution and transmission. Grant Samuel adopt a return on equity for the average firm (ex-imputation credits) of 10.2%, which corresponds to a with-imputation return of 11.3% for gamma of 0.25.[235] This 11.3% value is on the same basis as the regulatory estimates of the required return on the market. We give this estimate of 11.3% some weight in our estimate of the required return on the market below, although we consider this to be a conservative estimate for the following reasons:

i) The Grant Samuel estimate of the required return on equity for the average firm is 70 basis points above the Ibbotson estimate, which is small in the context of the evidence set out in Figure 3 above;

ii) Grant Samuel note that "alternative approaches for estimating the cost of equity such as the Gordon Growth Model suggest higher rates";[236]

iii) Grant Samuel note that "equity investors have repriced risk since the global financial crisis and that acquirers are pricing offers on the basis of hurdle rates above those implied by theoretical models"[237] and go on to consider "an increase in the market risk premium of 1%,"[238] which would increase the with-imputation regulatory estimate to 12.4%;

iv) Grant Samuel note that government bond yields are at historical lows, in which case it may be "inappropriate to add a "normal"[239] market risk premium (e.g. 6%) to a temporarily depressed bond yield, and go on to consider the use of a higher estimate for the risk-free rate, which would increase the with-imputation regulatory estimate to 12.2%; and

v) Grant Samuel have indicated that the return on equity estimate that they have adopted is "towards the lower end"[240] of the reasonable range "in order to ensure that the fairness assessment for the Proposal is robust (i.e. higher NPV's are generated)".[241]

429. In our view, all of these approaches have relative strengths and weaknesses:

a) We agree with the ERA's assessment that DGM evidence is relevant and should be considered when estimating the required return on the market. The DGM is theoretically sound in that simply equates the present value of future dividends to the current stock price and it is commonly used for the purpose of estimating the required return on the market. The ERA identifies some concerns with the DGM, primarily around the need to forecast future dividend growth.[242] However, our DGM estimates are based on the approach of

[235] In particular, under the Australian regulatory approach the with-imputation required return is adjusted downwards by a factor of $\frac{1-T}{1-T(1-\gamma)}$ to determine the return that the firm will be able to pay to its shareholders. For a gamma of 0.25 and a corporate tax rate of 30%, a regulatory return on equity of 11.3% would be adjusted down such the regulated firm would be able to pay a return of 10.2% to its shareholders: $11.3\%\left[\frac{1-0.3}{1-0.3(1-0.25)}\right]=10.2\%.$ We note that IPART have recently formally endorsed this approach for converting between with-imputation and without-imputation imputation estimates of the required return on equity.

[236] Grant Samuel (2014), Appendix 3, p. 8.

[237] Grant Samuel (2014), Appendix 3, p. 9.

[238] Grant Samuel (2014), Appendix 3, p. 9.

[239] Grant Samuel (2014), Appendix 3, p. 9.

[240] Grant Samuel (2014), Appendix 3, p. 9.

[241] Grant Samuel (2014), Appendix 3, p. 9.

[242] ERA Final Guideline, Appendix 8.

Fitzgerald, Gray, Hall and Jeyaraj (2013)[243] which circumvents most of the concerns that the ERA has raised in relation to other DGM methodologies – as explained in more detail in SFG (2013).

b) The Wright and Ibbotson approaches each represent end points of a spectrum when using historical data to estimate the required return on the market. The Wright approach assumes that the real required return on equity is constant across different market conditions and the Ibbotson approach assumes that the MRP is constant so that the required return on equity rises and falls directly with changes in the risk-free rate. We agree with the ERA that there is no compelling statistical evidence to support one or the other of these assumptions and that regard should be had to both. We also note that both approaches are used in practice, including regulatory practice. We also note that it is also common in practice to have some regard to long-run historical data when estimating the required return on the market.

c) Independent expert valuation reports provide an indication of the value of the required return on equity that is being used in the market for equity funds. We agree with the ERA's conclusion that this information is relevant and should be considered. However, we do not agree with all of the ERA's concerns about this evidence. In particular, the ERA appears to have confused broker reports (which have a marketing purpose) and independent expert reports (which have a valuation purpose based on statutory obligations) when it considers issues such as bias.[244] Nevertheless, we recognise that the process of extracting information about the required return on the market from these reports is still evolving, which is why we have adopted a conservative estimate and why we also consider the other approaches set out above.

430. Because all of these approaches have different strengths and weaknesses, all of which are equally valid considerations, we propose to give all four approaches equal weight and to adopt the mean value of 11.2%.[245] We note that if no weight is placed on the independent expert report estimate, the mean remains at 11.2%.[246]

SL CAPM

431. Our implementation of the SL CAPM adopts the following parameter estimates:

a) As set out above, we adopt a risk-free rate of 4.06%;

b) We adopt an estimate of the required return on the market of 11.2% for the reasons set out in the preceding paragraphs; and

c) We adopt the SL CAPM beta estimate of 0.82 from SFG (2013). That estimate is based on a range of regression analyses applied to domestic and international comparables, with the domestic comparables receiving twice as much weight as the international comparables. As set out above and in SFG (2013), our view is that this is an appropriate estimate of beta because it has regard to all relevant evidence and because the alternative "domestic only" estimate is unstable and unreliable.[247]

[243] This paper has been published in a high-quality peer-reviewed international journal that has an A* rating in the Australian Business Deans Council rating system.
[244] ERA Final Guideline, Appendix 29.
[245] That is, the four estimates are 11.3%, 11.7%, 10.7% and 11.3%, the mean of which is 11.2%.
[246] That is, the three estimates in this case would be 11.3%, 11.7% and 10.7%, the mean of which is 11.2%.
[247] Our primary reason for adopting the approach and the estimate set out in SFG (2013) is that the domestic data set is too small (currently only five firms) to produce any sort of reliable estimates. Evidence in support of the unreliability of estimates

432. These parameter estimates produce an estimate of the required return on equity of:

$$\begin{aligned} r_e &= r_f + \beta\left(r_m - r_f\right) \\ &= 4.06\% + 0.82\left(11.2\% - 4.06\%\right) = 9.9\%. \end{aligned}$$

Fama French

433. For the Fama French model, SFG (2013)[248] sets out the most recently available estimates of beta (in relation to the market factor) and the size and book-to-market premiums. SFG report the following estimates:

a) Market beta of 0.79;[249]

b) Risk premium in relation to the size factor $\left(s \times SMB\right)$ of -0.17%; and

c) Risk premium in relation to the book-to-market $\left(h \times HML\right)$ of 1.23%.

434. Using these estimates in the Fama-French model, together with the same estimates of the risk-free rate and market risk premium as above, yields an estimate of the required return on equity of 10.8%, as set out below:

$$\begin{aligned} r_e &= r_f + \beta\left(r_m - r_f\right) + s \times SMB + h \times HML \\ &= 4.06\% + 0.79\left(11.2\% - 4.06\%\right) - 0.17\% + 1.23\% = 10.8\%. \end{aligned}$$

435. This is 0.9% higher than the SL CAPM estimate, due primarily to the book-to-market factor. The comparable firms tend to be high book-to-market firms and the Fama-French model accommodates the fact that such firms consistently generate (require) returns that are above SL CAPM estimates.

Industry DGM

436. SFG (2013)[250] apply the DGM approach of Fitzgerald, Gray, Hall and Jeyaraj (2013) to a broad market index and also to the same set of comparable firms that the ERA uses to estimate beta. They compare the DGM estimates of the required returns of the comparable firms with those of the broad market index. They report that the risk premium for the comparable firms (i.e., the difference

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from this tiny sample is set out in Section 6 above and includes the fact that the range of estimates is very wide such as the vast majority of estimates do not even fall within the ERA's proposed range, the estimates are unstable and vary dramatically over short periods of time, movement in the estimates is inconsistent over time with estimates for some comparables materially increasing over the same period that estimates for other comparables materially decrease, and the estimates vary materially depending on which day of the week is used to measure returns. By contrast, the sample of 56 international comparables is much larger and not affected by small-sample issues to nearly the same degree. Moreover, the international comparables were carefully selected to ensure that they are primarily engaged in regulated distribution and transmission activities, as set out in SFG (2013). Our final estimate is based on an average that includes the domestic and international comparables (to obtain a sample size that is sufficient to produce meaningful results) but with domestic comparables receiving twice as much weight as the international comparables to reflect their greater comparability.

[248] http://www.aer.gov.au/sites/default/files/Report%207%20-%20Beta%20Parameter%20Estimates%20%28Final%29%20-%2024%20June.pdf.

[249] Note that this estimate will only be exactly equal to the SL CAPM beta estimate if the market factor is statistically orthogonal to the other two Fama-French factors, so a different estimate is not evidence of inconsistency. In any event, this case, the estimate of 0.79 is very close to the SL CAPM estimate of 0.82.

[250] http://www.aer.gov.au/sites/default/files/Report%203%20-%20DGM%20Estimate%20%28Final%29%20-%2027%20June.pdf.

between the DGM estimate of the required return and the risk-free rate) averages 96% of the risk premium of the market. This implies a DGM estimate of the required return of the benchmark comparable firm of 10.9%.

Aggregation of available evidence

437. The estimates of the required return of the benchmark firm that are set out above are as follows:

a) The estimate of the required return of the average firm is 11.2%;

b) The SL CAPM estimate is 9.9%;

c) The Fama-French estimate is 10.8%; and

d) The DGM estimate is 10.9%.

438. All of these approaches have different strengths and weaknesses. For example:

a) Asset pricing models (such as the various forms of CAPM and the Fama French model) all begin with an estimate of the required return on the market and then make adjustments for the extent to which the firm in question is considered to be different from the average firm. In the case of the SL CAPM, an adjustment is made for the market beta and for the Fama-French model adjustments are also made for two additional factors. There is debate in the literature and in regulatory practice about (i) how many, and which, factors must be adjusted for, and (ii) the extent to which the benchmark firm differs from the average firm. For a regulated gas network, there is no a priori reason to expect that the required return would be higher or lower than that for the average firm. Some factors suggest a lower-than-average required return (asset beta) whereas others suggest a higher-than-average return (leverage, book-to-market). Consequently, our view is that an estimate of the required return of the average firm is relevant evidence and some regard should be given to it.

b) The SL CAPM has the disadvantage of producing estimates of expected returns that have little or no relationship with actual returns – that is, although it may be fine in theory it doesn't work in practice. However, the CAPM is commonly used in practice, albeit often in a modified form. Also, Australian regulatory practice has been to use the SL CAPM exclusively. Consequently, our view is that the SL CAPM estimate of the required return is relevant evidence and some regard should be given to it.

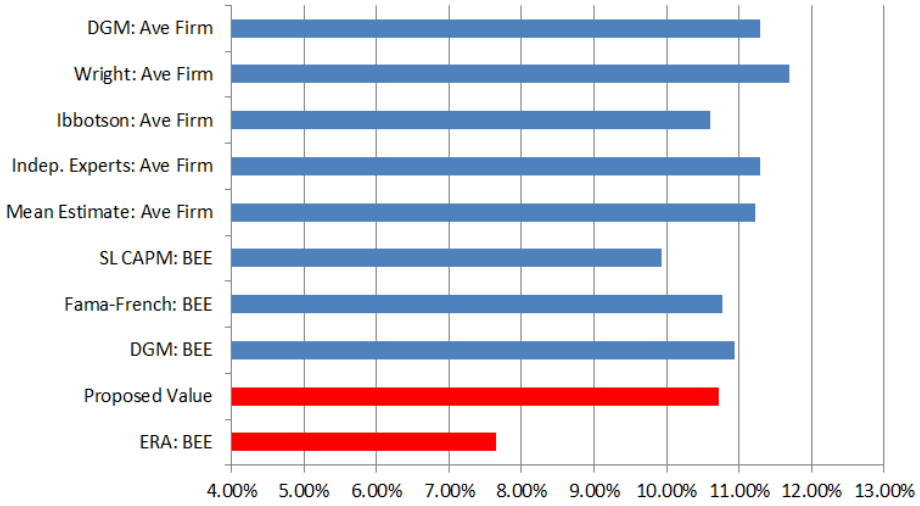
c) The Fama-French model has the advantage of providing an unambiguously better fit to the data than the SL CAPM. However, whereas it is commonly used as an estimate of required returns in academic studies, it is less commonly used in valuation and regulatory practice. Our view is that the Fama-French estimate of the required return is relevant evidence and some regard should be given to it.

d) The DGM approach has the advantage of not requiring any assumptions about what factors drive required returns – it simply equates the present value of future dividends to the current stock price. It is also commonly used in industry and regulatory practice. Whereas the ERA has identified some concerns with the DGM, the specification adopted in this report addresses most of those concerns. Consequently, our view is that the Fama-French estimate of the required return is relevant evidence and some regard should be given to it.

439. Because all of these approaches have different strengths and weaknesses, all of which are valid considerations, we propose to give all four approaches equal weight and to adopt the mean value of 10.7%.

440. We set out a summary of the above estimates of the required return on equity in Figure 10 below.

Figure 10. Estimates of the required return on equity



Departure from the Guideline

441. For the reasons set out above, our view is that the ERA approach does not produce the best possible estimate of the required return on equity. It therefore follows that the allowed return on equity will not contribute to the allowed rate of return objective because it will not reflect the efficient financing costs of the benchmark efficient entity. In turn, an allowed return on equity that does not reflect efficient financing costs will be inconsistent with the NGO and RPP.

442. A key part of the NGO is to:

> promote efficient investment in…natural gas services…for the long term interests of consumers."[251]

443. An allowed return on equity that is materially above (below) the efficient financing costs of the benchmark efficient entity will create incentives for over (under) investment, neither of which are in the long-term interests of consumers.

444. Similarly, the RPP require that:

> regard should be had to the economic costs and risks of the potential for under and over investment, [252]

and that:

> a reference tariff should allow for a return commensurate with the regulatory and commercial risks involved.[253]

445. It is difficult to see how these principles can be complied with if the allowed return does not reflect the efficient financing costs of the benchmark efficient entity.

[251] National Gas Law, s. 23.
[252] National Gas Law, s. 24(6).
[253] National Gas Law, s. 24(5).

446. The RPP also require that

> a service provider should be provided with a reasonable opportunity to recover at least the efficient costs the service provider incurs,[254]

which would seem to require that the allowed return must be at least commensurate with the efficient financing costs of the benchmark efficient entity.

447. Our view is that the ERA approach does not produce an allowed return that is commensurate with the efficient financing costs of the benchmark efficient entity, that it does not (therefore) comply with the Rules, and that it should (therefore) be departed from.

448. In our view, the approach set out in Section 7 of this report does have regard to all relevant evidence and does produce the best possible estimate of the required return on equity, and it should be used in place of the ERA SL CAPM approach.

Declaration

449. I confirm that I have made all the inquiries that I believe are desirable and appropriate and no matters of significance that I regard as relevant have, to my knowledge, been withheld from the Court.

Professor Stephen Gray

[254] National Gas Law, s. 24(2).

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Appendix 1: Historical comparison of risk-free rates

450. In its Guideline materials, the ERA concludes that:

> the Authority is of the view that it is unclear that the current level of the risk free rate is at an historical low. The Authority remains unpersuaded that the current level of the risk-free rate is at a historical low.[255]

451. This conclusion is based primarily on advice that McKenzie and Partington (2013)[256] provided to the AER. McKenzie and Partington seek to show that, whereas current government bond yields are materially lower than at any time in the previous 50 years, they are not materially lower than yields in the late 1800s and early 1900s. This has led the ERA to conclude that:

> one conclusion that may be drawn is that the current level of interest rate is a return to the 'normal' long run interest rate regime.[257]

452. In a more recent report for the Queensland Resources Council (**QRC**), McKenzie and Partington (2013)[258] compare the current 10-year CGS yield with the average from the 1883-1972 period, noting that the current yield at the time of their report (4.02%) "is reasonably close to the long run average (4.23%)."[259] This leads McKenzie and Partington to conclude that:

> The current environment is nothing more than a return to the 'normal' long run interest rate regime.[260]

453. In our view, there are a number of reasons to reject this conclusion. Generally, a comparison with the most recent 40 years would be more relevant than a comparison with a period that begins in the 1880s and ends more than 40 years ago. But this is particularly the case for CGS yields which were set on an entirely different basis during the historically dated period that McKenzie and Partington prefer. In particular, prior to August 1982, CGS yields were not market rates at all. Prior to 1982, the so-called TAP system was used whereby the Australian government fixed the yield and then issued as many government bonds as the market demanded at the set rate. Thus, the yields were not a market rate at all, but a number that was set from time to time by the government of the day. The current tender system (whereby government fixes the supply of bonds to be issued and a market clearing price is determined) was introduced in August 1982. The Australian Office of Financial Management (**AOFM**) notes that:

> The Australian Government first introduced competitive price tenders for Treasury Bonds in August 1982. The key feature of this approach is that the issuer sets the volume of securities issued while the market determines the issuance yield.[261]

454. The AOFM explains the historical system as follows:

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[255] ERA, Explanatory Statement, Paragraph 686.
[256] McKenzie, M. and G. Partington, 2013, Review of the AER's overall approach to the Risk free rate and Market Risk Premium, A report to the AER, 28 February.
[257] ERA, Explanatory Statement, Paragraph 685.
[258] McKenzie, M. and G. Partington, 2013, Review of Aurizon Network's draft access undertaking, Report for the Queensland Resources Council, 5 October.
[259] McKenzie and Partington (2013), p. 16. The current yield on 10-year CGS at the time of this report was 3.97%.
[260] McKenzie and Partington (2013), p. 16.
[261] AOFM Annual Report 2010-2011, p. 1.

> Prior to tenders, the Australian Government borrowed through individual cash loans and a more flexible continuous offer mechanism known as the TAP system. Under these arrangements the Government set the yield and the market would determine how much was purchased.
>
> The financial environment in which the TAP system operated was very different to that of today. [262]

455. Moreover, the historical system was not compatible with the free and flexible interest rates that are available today and it caused the intertwining of monetary policy and government debt management:

> The TAP mechanism was not sustainable with increasingly flexible interest rates. As a result, a tender system was first adopted for short-term Treasury Notes in December 1979 and for Treasury Bonds in August 1982. The move to a tender approach supported the Government moving to fully funding its Budget without recourse to central bank financing. This effectively separated monetary policy from debt management.[263]

456. The AOFM concludes that the key risk-free market yield was not "freed up" until the tender system was put in place in 1982:

> The adoption of tenders for debt issuance was critical in freeing up the key risk-free market yield in the economy. This proved essential for the financial innovation that was to occur in the financial markets in the following years.[264]

457. McCray (2000) notes that under the TAP system, the majority of government bonds were issued to institutions that were effectively forced (by government regulation) to buy and hold:

> The market was essentially 'buy and hold' in its orientation and distinguished by a variety of 'captive market' arrangements, which obliged financial institutions to hold specified proportions of their assets in the form of government securities. In like manner, life insurance offices and pension funds were provided with significant tax concessions in return for holding 30 per cent of their assets in public securities.[265]

458. The captive market had two effects. First, it resulted in there being no effective secondary market, since the institutions that bought at issuance were required to hold through to maturity:

> One consequence of these captive market arrangements was that there was only a very limited secondary market in government securities. Derivatives markets as they are known today did not exist…In summary, captive investor arrangements discourage the taking of positions in the market and, in doing so, act to inhibit liquidity and secondary market development.[266]

459. The captive market also had the effect of artificially reducing the yield:

[262] AOFM Annual Report 2010-2011, p. 1.
[263] AOFM Annual Report 2010-2011, p. 1.
[264] AOFM Annual Report 2010-2011, p. 1.
[265] McCray (2000), p. 5.
[266] McCray (2000), p. 9.

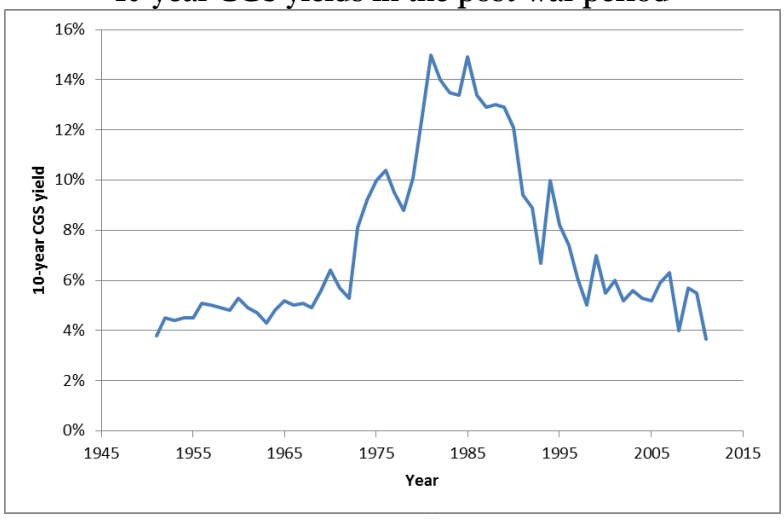
> …the arrangements also ensured a continued demand from growing financial institutions for government securities and doubtless assisted the authorities to issue government bonds at lower interest rates than would otherwise have been the case.[267]

460. McKenzie and Partington (2013) now conclude that the current low CGS yields may be "nothing more than a return to the 'normal' long run interest rate regime." [268] In summary, McKenzie and Partington now conclude that, although current CGS yields are lower than at any time in the last 40 years, they are "reasonably close" to the yields that were artificially set by government 50 or more years ago.

461. Our view is that a more careful and appropriate interpretation of the relevant evidence is that CGS yields have not been this low since governments ceased artificially fixing them and allowed them to become market prices.

462. Even setting aside the McKenzie and Partington (2013) comparison of apples and oranges, the fact remains that CGS yields in the period since the onset of the GFC have been lower than at any time since World War Two, as illustrated in Figure 11 below.

Figure 11
10-year CGS yields in the post-war period



Source: RBA

463. Consequently, it is a fact that the approach of estimating the required return on equity by using the SL-CAPM with a fixed MRP of 6% leads inevitably to the conclusion that equity capital has been cheaper since the onset of the GFC than at any other time since WWII.

[267] McCray (2000), p. 9.
[268] McKenzie and Partington (2013), p. 16.

Appendix 2: Instructions

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Our Ref: B1299
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Doc ID: 65554676.1

30 January 2014

Professor Stephen Gray
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Dear Sir

ATCO GAS AUSTRALIA PTY LTD- ERA Price Determination

We act for ATCO Gas Australia Pty Ltd (ATCO Gas) in relation to the Economic Regulation Authority's review of the Gas Access Arrangement for ATCO Gas under the National Gas Law and Rules.

ATCO Gas owns and operates the Mid West and South West Gas Distribution System in WA. ATCO Gas wishes to engage you to prepare an expert report in connection with the ERA's review of the access arrangement for the period 2015-2020.

This letter sets out the matters which ATCO Gas wishes you to address in your report and the requirements with which the report must comply.

Terms of Reference

Legal Framework

The terms and conditions upon which ATCO Gas provides access to its gas network are subject to five yearly reviews by the ERA. The ERA undertakes that review by considering the terms and conditions proposed against criteria set out in the *National Gas Law* and *National Gas Rules*.

Rule 76 of the *National Gas Rules* provides that the total revenue for each regulatory year is determined using a building block approach, which building blocks include a return on the projected capital base and depreciation on the projected capital base.

Rule 87 provides for the determination of a rate of return on the projected capital base. The amended Rule 87 now in force requires a rate of return to be determined on a *nominal* vanilla basis. Rule 87 now requires that the allowed rate of return be determined such that it achieves the allowed rate of return objective, being:

…that the rate of return for a service provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applied to the serviced provider in respect of the provision of reference services.

Rule 87(5) requires that in determining the allowed rate of return, regard must be had to, *inter alia, relevant estimation methods, financial models, market data and other evidence.*

In respect of the return on equity, it is to be estimated such that it contributes to the achievement of the allowed rate of return objective. Regard must also be had to the prevailing conditions in the market for equity funds (Rule 87(6) and (7)).

Rule 74(2) requires a forecast or estimate to be arrived at on a reasonable basis and must represent the best forecast or estimate possible in the circumstances.

As you are aware, Rule 87(13) also provides for the making of rate of return guidelines. The ERA published its Final Rate of Return Guidelines on 16 December 2013. The ERA proposes to apply the approach set out in the Guidelines to ATCO Gas. The Guidelines are no mandatory but if there is a departure from the Guidelines, the reasons for the departure must be given in the ERA's decision (Rule 87(18)).

Also relevant is the overarching requirement that the ERA must, in performing or exercising its economic regulatory function or power perform or exercise that function or power in a manner that will or is likely to contribute to the achievement of the national gas objective (**NGO**).

The NGO is to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.

You should also have regard to the Revenue and Pricing Principles (**RPP**) in section 24 of the National Gas Law.

In preparing your report you should consider the relevant sections of the National Gas Rules and Law and the ERA's Guidelines and Explanatory Statement.

Return on Equity

In respect of the return on equity, the ERA in its Final Rate of Return Guidelines has determined that, for the purposes of Rule 87(5) *"only the Sharpe Lintner CAPM model is relevant for informing the Authority's estimation of the prevailing return on equity for the regulated firm, at the current time*." (page 22 of the Guidelines and 127 of the Explanatory Statement).

The ERA proposes to give weight to relevant outputs from the DGM when estimating the market risk premium (see page 22). Otherwise it proposes to take the same approach historically taken by Regulators of estimating the return on equity using the Sharpe Lintner CAPM

It also proposes to consider cross-checks of parameters and the overall return on equity using information such as broker reports (See further Appendix 29 and 30 to the Explanatory Statement).

Opinion

In this context ATCO Gas wishes to engage you to prepare an expert report which provides:

1. An assessment of the ERA's approach to estimating the return on equity set out in the Rate of Return Guidelines, including a critique of the ERA's reasoning for finding that only the Sharpe Lintner CAPM is relevant and the proposed use by the ERA of cross-checks.
2. Your opinion on whether the ERA's proposed approach to the cost of equity results in the best estimate that contributes to the achievement of the allowed rate of return objective.
3. Your opinion on whether the return on equity estimate using the ERA approach results in a cost of equity consistent with prevailing conditions in the market for equity funds.
4. Your opinion on whether the return on equity estimate using the ERA approach is consistent with the achievement of the NGO and the RPP.
5. If in your opinion the ERA's approach does not meet the requirements of the Rules identified above, what method for estimating the cost of equity (having regard to "*relevant estimation methods, financial models, market data and other evidence"*), should be used in order to produce the best estimate possible in the circumstances that complies with the Rule 87(5), (6) and (7) and the achievement of the NGO and RPP and why?

Use of Report

It is intended that your report will be submitted by ATCO Gas to the ERA with its Access Arrangement Proposal. The report may be provided by the ERA to its own advisers. The report must be expressed so that it may be relied upon both by ATCO Gas and by the ERA.

The ERA may ask queries in respect of the report and you will be required to assist in answering these queries. The ERA may choose to interview you and if so, you will be required to participate in any such interviews.

The report will be reviewed by ATCO Gas' legal advisers and will be used by them to provide legal advice as to its respective rights and obligations under the *National Gas Law* and *National Gas Rules*.

If ATCO Gas was to challenge any decision ultimately made by the ERA, that appeal will be made to the Australian Competition Tribunal and your report will be considered by the Tribunal. ATCO Gas may also seek review by a court and the report would be subject to consideration by such court. You should therefore be conscious that the report may be used in the resolution of a dispute between the ERA and ATCO Gas Due to this, the report will need to comply with the Federal Court requirements for expert reports, which are outlined below.

Timeframe

ATCO Gas's Access Arrangement proposal must be submitted by ***16 March 2014.*** Your report will need to be finalised by mid February 2014.

Compliance with the Code of Conduct for Expert Witnesses

Attached is a copy of the Federal Court's Practice Note CM 7, entitled "*Expert Witnesses in Proceedings in the Federal Court of Australia*", which comprises the guidelines for expert witnesses in the Federal Court of Australia (**Expert Witness Guidelines**).

Please read and familiarise yourself with the Expert Witness Guidelines and comply with them at all times in the course of your engagement by the Gas Businesses.

In particular, your report prepared for the Gas Businesses should contain a statement at the beginning of the report to the effect that the author of the report has read, understood and complied with the Expert Witness Guidelines.

Your report must also:

1 contain particulars of the training, study or experience by which the expert has acquired specialised knowledge;

2 identify the questions that the expert has been asked to address;

3 set out separately each of the factual findings or assumptions on which the expert's opinion is based;

4 set out each of the expert's opinions separately from the factual findings or assumptions;

5 set out the reasons for each of the expert's opinions; and

6 otherwise comply with the Expert Witness Guidelines.

The expert is also required to state that each of the expert's opinions is wholly or substantially based on the expert's specialised knowledge.

It is also a requirement that the report be signed by the expert and include a declaration that "*[the expert] has made all the inquiries that [the expert] believes are desirable and appropriate and that no matters of significance that [the expert] regards as relevant have, to [the expert's] knowledge, been withheld from the report*".

Please also attach a copy of these terms of reference to the report.

Terms of Engagement

Your contract for the provision of the report will be directly with ATCO Gas. You should forward ATCO Gas any terms you propose govern that contract as well as your fee proposal.

Please sign a counterpart of this letter and return it to us to confirm your acceptance of the engagement.

Yours faithfully

Johnson Winter & Slattery

Enc: Federal Court of Australia Practice Note CM 7, "Expert Witnesses in Proceedings in the Federal Court of Australia"

……
Signed and acknowledged by Professor Stephen Gray

Date ……..

Appendix 3: Curriculum Vitae of Professor Stephen Gray

Stephen F. Gray

University of Queensland
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Academic Qualifications

1995 Ph.D. (Finance), Graduate School of Business, Stanford University.
Dissertation Title: Essays in Empirical Finance
Committee Chairman: Ken Singleton
1989 LL.B. (Hons), Bachelor of Laws with Honours, University of Queensland.
1986 B.Com. (Hons), Bachelor of Commerce with Honours, University of Queensland.

Employment History

2000-Present Professor of Finance, UQ Business School, University of Queensland.
1997-2000 Associate Professor of Finance, Department of Commerce, University of Queensland and Research Associate Professor of Finance, Fuqua School of Business, Duke University.
1994-1997 Assistant Professor of Finance, Fuqua School of Business, Duke University.
1990-1993 Research Assistant, Graduate School of Business, Stanford University.
1988-1990 Assistant Professor of Finance, Department of Commerce, University of Queensland.
1987 Specialist Tutor in Finance, Queensland University of Technology.
1986 Teaching Assistant in Finance, Department of Commerce, University of Queensland.

Academic Awards

2006 Outstanding Professor Award, Global Executive MBA, Fuqua School of Business, Duke University.
2002 Journal of Financial Economics, All-Star Paper Award, for Modeling the Conditional Distribution of Interest Rates as a Regime-Switching Process, JFE, 1996, 42, 27-62.
2002 Australian University Teaching Award – Business (a national award for all university instructors in all disciplines).
2000 University of Queensland Award for Excellence in Teaching (a University-wide award).
1999 Outstanding Professor Award, Global Executive MBA, Fuqua School of Business, Duke University.
1999 KPMG Teaching Prize, Department of Commerce, University of Queensland.
1998 Faculty Teaching Prize (Business, Economics, and Law), University of Queensland.
1991 Jaedicke Fellow in Finance, Doctoral Program, Graduate School of Business, Stanford University.
1989 Touche Ross Teaching Prize, Department of Commerce, University of Queensland.
1986 University Medal in Commerce, University of Queensland.

Large Grants (over $100, 000)

- Australian Research Council Linkage Grant, 2008—2010, Managing Asymmetry Risk ($320,000), with T. Brailsford, J.Alcock, and Tactical Global Management.
- Intelligent Grid Cluster, Distributed Energy – CSIRO Energy Transformed Flagship Collaboration Cluster Grant, 2008-2010 ($552,000)
- Australian Research Council Research Infrastructure Block Grant, 2007—2008, Australian Financial Information Database ($279,754).
- Australian Research Council Discovery Grant, 2006—2008, Capital Management in a Stochastic Earnings Environment ($270,000).
- Australian Research Council Discovery Grant, 2005—2007, Australian Cost of Equity.
- Australian Research Council Discovery Grant, 2002—2004, Quantification Issues in Corporate Valuation, the Cost of Capital, and Optimal Capital Structure.

- Australian Research Council Strategic Partnership Grant, 1997—2000, Electricity Contracts and Securities in a Deregulated Market: Valuation and Risk Management for Market Participants.

Current Research Interests

Benchmark returns and the cost of capital. Corporate Finance. Capital structure. Real and strategic options and corporate valuation. Financial and credit risk management. Empirical finance and asset pricing.

Publications

Gray, S., I. Harymawan and J. Nowland, (2014), "Political and government connections on corporate boards in Australia: Good for business?" *Australian Journal of Management,* forthcoming.

Brailsford, T., S. Gray and S. Treepongkaruna, (2013), "Explaining the bid-ask spread in the foreign exchange market: A test of alternate models," *Australian Journal of Management,* forthcoming.

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Teaching

Fuqua School of Business, Duke University, Student Evaluations (0-7 scale):

- Financial Management (MBA Core): Average 6.5 over 7 years.
- Advanced Derivatives: Average 6.6 over 4 years.
- Empirical Issues in Asset Pricing: Ph.D. Class

1999, 2006 Outstanding Professor Award, Global Executive MBA, Fuqua School of Business, Duke University.

UQ Business School, University of Queensland, Student Evaluations (0-7 scale):

- Finance (MBA Core): Average 6.6 over 10 years.
- Corporate Finance Honours: Average 6.9 over 10 years.

2002 Australian University Teaching Award – Business (a national award for all university instructors in all disciplines).
2000 University of Queensland Award for Excellence in Teaching.
1999 Department of Commerce KPMG Teaching Prize, University of Queensland.
1998 Faculty Teaching Prize, Faculty of Business Economics and Law, University of Queensland.
1998 Commendation for Excellence in Teaching, University-wide Teaching Awards, University of Queensland.
1989 Touche Ross Teaching Prize, Department of Commerce, University of Queensland.

Board Positions

2002 - Present: Director, Financial Management Association of Australia Ltd.
2003 - Present: Director, Moreton Bay Boys College Ltd. (Chairman since 2007).
2002 - 2007: External Risk Advisor to Board of Enertrade (Queensland Power Trading Corporation Ltd.)

Consulting

Managing Director, Strategic Finance Group: www.sfgconsulting.com.au.

Consulting interests and specialties, with recent examples, include:

- **Corporate finance**
  - ⇒ **Listed multi-business corporation:** Detailed financial modeling of each business unit, analysis of corporate strategy, estimation of effects of alternate strategies, development of capital allocation framework.

- **Capital management and optimal capital structure**
  - ⇒ **State-owned electricity generator:** Built detailed financial model to analyze effects of increased leverage on cost of capital, entity value, credit rating, and stability of dividends. Debt of $500 million issued.

- **Cost of capital**
  - ⇒ **Cost of Capital in the Public Sector:** Provided advice to a government enterprise on how to estimate an appropriate cost of capital and benchmark return for Government-owned enterprises. Appearance as **expert witness** in legal proceedings that followed a regulatory determination.
  - ⇒ **Expert Witness:** Produced a written report and provided court testimony on issues relating to the cost of capital of a cable TV business.
  - ⇒ **Regulatory Cost of Capital:** Extensive work for regulators and regulated entities on all matters relating to estimation of weighted-average cost of capital.

- **Valuation**

⇒ **Expert Witness:** Produced a written report and provided court testimony. The issue was whether, during a takeover offer, the shares of the bidding firm were affected by a liquidity premium due to its incorporation in the major stock market index.

⇒ **Expert Witness:** Produced a written report and provided court testimony in relation to valuation issues involving an integrated mine and refinery.

- **Capital Raising**
  - ⇒ Produced comprehensive valuation models in the context of capital raisings for a range of businesses in a range of industries including manufacturing, film production, and biotechnology.

- **Asset pricing and empirical finance**
  - ⇒ **Expert Witness:** Produced a written report on whether the client's arbitrage-driven trading strategy caused undue movements in the prices of certain shares.

- **Application of econometric techniques to applied problems in finance**
  - ⇒ **Debt Structure Review:** Provided advice to a large City Council on restructuring their debt portfolio. The issues involved optimisation of a range of performance measures for each business unit in the Council while simultaneously minimizing the volatility of the Council's equity in each business unit.
  - ⇒ **Superannuation Fund Performance Benchmarking:** Conducted an analysis of the techniques used by a large superannuation fund to benchmark its performance against competing funds.

- **Valuation of derivative securities**
  - ⇒ **Stochastic Volatility Models in Interest Rate Futures Markets:** Estimated and implemented a number of models designed to predict volatility in interest rate futures markets.

- **Application of option-pricing techniques to real project evaluation**
  - ⇒ **Real Option Valuation:** Developed a framework for valuing an option on a large office building. Acted as arbitrator between the various parties involved and reached a consensus valuation.
  - ⇒ **Real Option Valuation:** Used real options framework in the valuation of a bio-tech company in the context of an M&A transaction.