Jemena Gas Networks (NSW) Ltd

2015-20 Access Arrangement

Response to the AER's draft decision and revised proposal

Appendix 7.1 – Return on equity response

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GLOSSARY

AEMC	Australian Energy Markets Commission
AER	Australian Energy Regulator
CGS	Commonwealth Government Securities
DDM	Dividend Discount Model
ERP	Equity Risk Premium
FFM	Fama-French Three-factor Model
JGN	Jemena Gas Networks
MRP	Market Risk Premium
NGL	National Gas Law
NGR	National Gas Rules
NGO	National Gas Objective
SLCAPM	Sharpe Lintner Capital Asset Pricing Model

1. SUMMARY

1. The National Gas Rules (**NGR**) requires the return on equity to be estimated such that it contributes to the achievement of the rate of return objective, having regard to prevailing conditions in the market for equity funds. The NGR also require that regard be had to relevant estimation methods, financial models, market data and other evidence.

2. The rules relating to the return on equity have recently been amended, most importantly with the explicit intention of ensuring that the AER takes relevant estimation methods, models, market data and other evidence into account when estimating the required return on equity.[1] In making these changes to the rules, the Australian Energy Markets Commission (**AEMC**) considered that a high quality rate of return estimate would be one that uses all relevant evidence and methods, and that such an approach would be best placed to achieve the National Gas Objective (**NGO**) and the revenue and pricing principles.[2]

3. We consider that it is clear that what is now required under the NGR is an approach to estimating the return on equity that is not tied to a single model or estimation procedure—as was previously required under the NER, being the CAPM[3]—or does not depend upon the adoption of one model or estimation procedure—as was previously required under the NGR, being one well accepted financial model, of which the example given was the CAPM. There is no longer any requirement or predisposition to using the CAPM to estimating the return on equity. Not only do the amendments to the NER and NGR remove such a requirement or predisposition, the amendments and the reasons given for them indicate that there should not be continued exclusive reliance on the CAPM.[4]

4. The approach to estimating the return on equity must take into account all relevant evidence, and where that evidence is relevant and probative as to the required return on equity, give it a direct role in the estimation process. This is the interpretation that best achieves the NGO, as it ensures that the return on equity properly reflects the return required to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers.

5. The method that the Australian Energy Regulator (**AER**) proposes to adopt in its draft decision for Jemena Gas Networks (**JGN**) will not deliver a return on equity estimate that reflects prevailing market conditions—including those faced by JGN and its private owners—and which contributes to the achievement of the rate of return objective and the NGO because it does not give all relevant evidence a direct role in the estimation process. The AER's approach is affected by critical errors of fact and errors of logic, including:

   • **One superior model.** The AER's foundation model approach appears to proceed on the incorrect assumption that one return on equity model will be superior to others. By seeking to identify one model that is superior to others, the AER has asked itself the wrong question. The proper inquiry is whether the rate of return objective is more likely to be promoted by use of one model alone or a combination of models.

   • **SLCAPM as the superior model.** The AER has erred in concluding that the Sharpe Lintner Capital Asset Pricing Model (**SLCAPM**) is superior to other relevant return on equity models.

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[1]   AEMC, *Rule Determinations: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012; National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012*, 29 November 2012, p. 57.

[2]   AEMC, *Rule Determinations: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012; National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012*, 29 November 2012, p. 56-57.

[3]   NGR version 13.

[4]   See in particular: AEMC, *Rule Determinations: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012; National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012*, 29 November 2012, p. 57.

- **Bias in the SLCAPM.** The AER has incorrectly concluded that its application of the SLCAPM will deliver an unbiased return on equity estimate. Alternatively, to the extent that the AER acknowledges that the SLCAPM estimate will be biased, it has failed to properly account for this bias.

- **Regard to relevant evidence.** The AER has failed to adequately have regard to all relevant estimation methods, financial models, market data and other evidence—specifically, the AER has identified certain material as relevant but then failed to give it any meaningful role in its estimation of the return on equity. This is in large part due to the convoluted process used by the AER for assessing evidence, whereby different pieces of relevant evidence are considered in different ways at different stages of the process. For some pieces of evidence, the AER has applied a *de facto* persuasive evidence—requiring persuasive evidence to depart from a previously adopted method or parameter value. At the same time, in some cases, the AER's method and reasons for rejecting this other evidence (or relegating it to an indirect role) are illogical and unreasonable. For example, the AER's concern that the dividend discount model (**DDM**) leads to 'very high' estimates (relative to the SLCAPM) reflects an unreasonable treatment of this evidence.

- **Equity beta estimate.** The AER has erred in its estimation of the SLCAPM equity beta. Neither the AER's range, nor its point estimate, are supported by empirical evidence.

- **Same equity beta applied to gas and electricity networks.** The AER has erred in concluding that gas transmission and electricity networks face the same or very similar risks to gas distribution networks—this is not supported by the evidence before the AER.

- **Adjustment for SLCAPM deficiencies.** An implicit or necessary finding made by the AER is that adopting the top of its range for the SLCAPM equity beta will adequately correct for any bias or other deficiencies in the SLCAPM. There is no evidentiary basis for this finding and this range was determined independently of any estimate of low beta bias in the SLCAPM.

- **Market risk premium evidence.** The AER has failed to take into account relevant and current evidence in relation to the market risk premium (**MRP**), and therefore its estimate of this parameter will not reflect prevailing market conditions.

- **Role of Wright approach.** The AER has misinterpreted evidence from the Wright approach, by treating this as an alternative implementation of the CAPM rather than as evidence in relation to the MRP.

- **Imputation credit adjustment.** The AER's method of adjusting for the value of imputation credits is incorrect and is inconsistent with the adjustment for imputation credits that is embedded within the AER's PTRM. As a result, the AER's return on equity estimate is not consistent with the estimate of the value of imputation credits.

- **Consistency with other market evidence.** The AER has erred in concluding that its return on equity estimate is consistent with other market evidence.

6. The AER's specification of the return on equity in the draft decision results from the AER largely adopting its traditional approach and, in practical terms, disregarding other sources of evidence on the basis that those sources do not meet certain evidence and reliability thresholds and therefore do not compel a different conclusion. However the AER does not apply those thresholds to its traditional approach.

7. In terms of the practical effect of its approach, the return on equity calculated under the AER's approach has fallen in recent years as a result of the decline yields on Commonwealth Government Securities (**CGS**), combined with a relatively inflexible market risk premium, now specified by the AER at 6.5 per cent. The yield on 10 year CGS is now at fresh historic lows of approximately 2.5 per cent. Information before the AER suggests that CGS yields have been driven down by, inter alia, a flight to quality and the recognition of Australian CGS as a safe haven investment. These matters are unlikely to be impacting on the required return on equity for a benchmark entity—and indeed are likely to be increasing the MRP—but the effect of the AER's approach of using the SLCAPM together with a largely historical MRP is to drive down the return on equity to a very low level.

8. By way of illustration, the yield on 10 year CGS, and thus the return on equity calculated using the AER's approach, has declined by approximately 1.8 per cent over the past 14 months, since the AER's rate of return guideline was published (see Figure 1–1). The return on equity calculated using the AER's approach has likewise declined by approximately 1 per cent over the past four months alone. There is no reason to think that the true return on equity for the benchmark entity has declined by these amounts over these periods. There is nothing in the wider economic or commercial environment to suggest that. Rather, the result is a particular and idiosyncratic consequence of demand for CGS.

Figure 1–1: 10 year CGS yield, 2009–2015
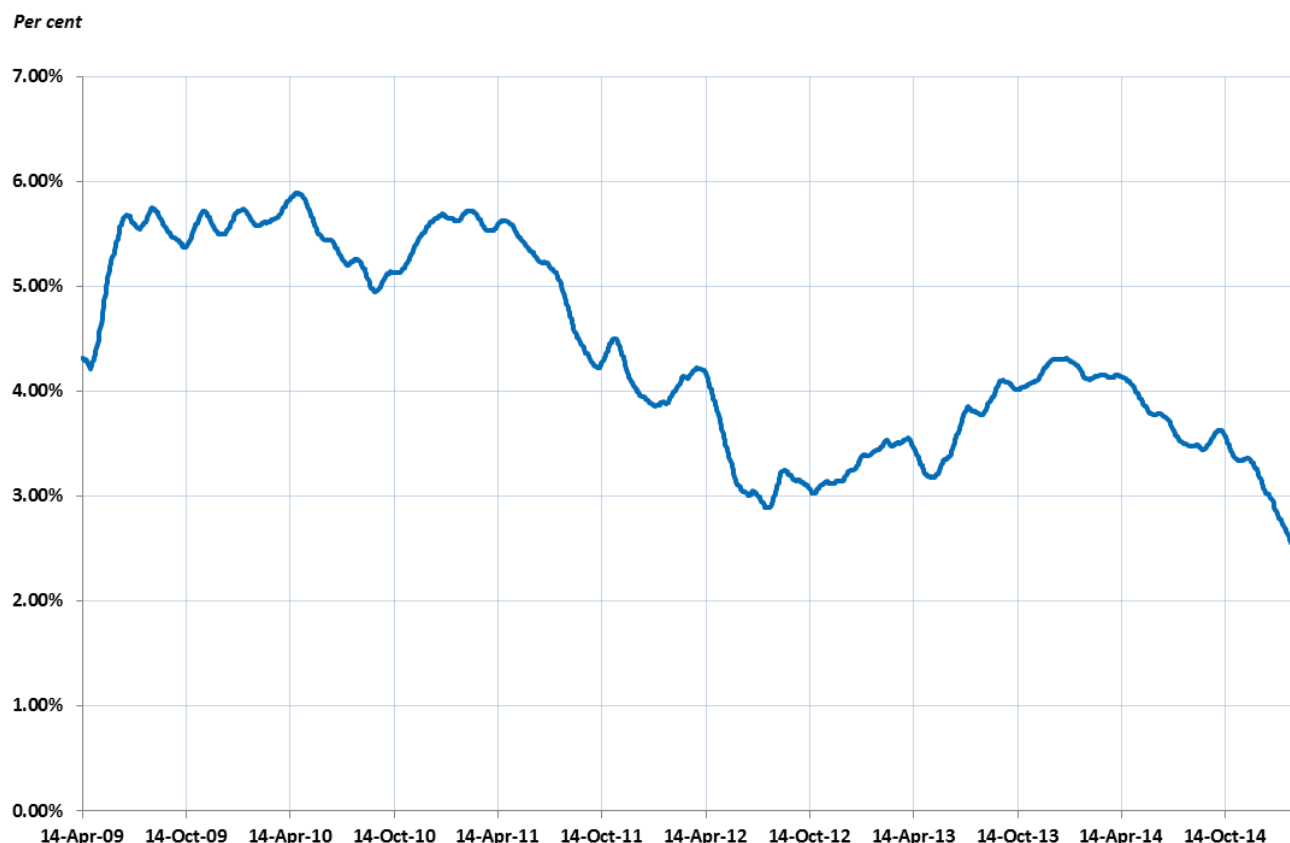
Source: Reserve Bank of Australia.

9. What this means is that an approach of using a largely fixed MRP (of 6.5 per cent) coupled with a prevailing risk free rate under the SLCAPM cannot be said to be a reliable means of calculating the return on equity. This is in addition to the significant evidence that the SLCAPM is downward biased for low beta stocks. It is imperative, in these circumstances, for the AER to consider and take into account other measures of the return on equity.

10. The recent downward compression of CGS yields suggests that the return on equity determined by the AER is likely to be too low. Other evidence before the AER also suggests that it is likely to be too low, including:

• strong evidence that the SLCAPM is downward biased for low beta stocks

• evidence from three other models that the return on equity is higher than the output of the AER's approach, and

• the AER's 'cross check' evidence, when properly understood.

11. The AER's only concession to the considerable body of evidence suggesting that its approach will understate the return on equity is to take a figure for equity beta from the top of the AER's equity beta range. However:

   - as carefully analysed by SFG, the AER's equity beta range is itself erroneous and the product of artificial and contrived filters of relevant information,[5] and

   - the AER has undertaken no analysis of whether its selection of an equity beta at the top of its range makes up the deficit.

12. The correct approach to estimating the return on equity is as set out in JGN's original proposal. This approach has regard to all relevant models and evidence, and uses this material for its proper purpose. Each of the relevant return on equity models is independently used to derive an estimate of the required return on equity, while other relevant evidence is used to determine the best estimate of each parameter within these models.

13. We consider that our proposed approach provides for a return on equity estimate that reflects prevailing market conditions and which contributes to the achievement of the rate of return objective. In contrast to the AER's approach, JGN's approach provides for a return on equity that is sufficient to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers.

14. Accordingly, we consider that our proposed approach to estimating the return on equity is clearly preferable in terms of in making a contribution to the achievement of the NGO.

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[5]   SFG, *Beta and the Black Capital Asset Pricing Model*, 13 February 2015.

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2. REQUIREMENTS OF THE RULES AND LAW

15. We identified the key aspects of the NGR and National Gas Law (**NGL**) relating to the return on equity in JGN's original proposal. In summary:

   - **Rate of return objective.** Rule 87 of the NGR requires that the return on equity be estimated such that it contributes to the achievement of the rate of return objective. The 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.

   - **Prevailing conditions.** In estimating the return on equity, regard must be had to the prevailing conditions in the market for equity funds.[6]

   - **Other matters.** Regard must also be had to several relevant matters, including:[7]

     - relevant estimation methods, financial models, market data and other evidence

     - 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

     - any interrelationships between estimates of financial parameters that are relevant to the estimates of the return on equity and the return on debt.

   - **Consistency.** Rule 87 of the NGR requires consistency between the approaches to estimating the rate of return and the value of imputation credits.[8]

   - **National Gas Objective.** As with all of its economic regulatory functions and powers, when assessing JGN's proposal under the NGR and NGL, the AER is required to do so in a manner that will or is likely to contribute to the achievement of the NGO.[9] Further, where there are two or more possible decisions in relation to JGN's proposal that will or are likely to contribute to the achievement of the NGO, the AER is required to make the decision that the AER is satisfied will or is likely to contribute to the achievement of the NGO to the greatest degree.[10]

   - **Revenue and pricing principles.** To the extent the AER's decision on the return on equity involves the exercise of discretion, the AER must take into account the revenue and pricing principles in section 24 of the NGL.[11] The revenue and pricing principles include that a service provider should be provided with a reasonable opportunity to recover at least its efficient costs and reference tariffs should allow for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates.

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[6]   NGR, Rule 87(7).

[7]   NGR, Rule 87(5).

[8]   NGR, Rule 87(4)(b).

[9]   NGL, s 28(1)(a).

[10]   NGL, s 28(1)(b)(iii).

[11]   NGL, s 28(2)(a)(i).

- **Relevant evidence.** Rule 87 of the NGR was amended in November 2012 to remove any requirement or preference in favour of a particular model. These changes to the NGR were directed at ensuring that all relevant models and market data are taken into account, in order to ensure that best estimate of the rate of return is arrived at. The AEMC was clearly seeking to avoid formulaic rate of return estimation driven by a single model or estimation method, such as the SLCAPM.[12] The AEMC observed that all financial models (including the SLCAPM) are based on certain theoretical assumptions and all have varying degrees of weaknesses, and as such, no one model can be said to always provide the right answer in all market conditions.[13] The AEMC therefore considered that estimates are likely to be more robust and reliable if they are based on a range of estimation methods, financial models, market data and other evidence.

- **No single model.** We consider that it is clear that what is now required under the NGR is an approach to estimating the return on equity that is not tied to a single model or estimation procedure. It is now clearly unreasonable for the AER to continue its 'pick a winner' approach amid this deliberate rule refinement by the AEMC. The approach to estimating the return on equity must take into account all relevant evidence, and where that evidence is relevant and probative as to the required return on equity, give it a direct role in the estimation process.

- **Conclusion.** This is the interpretation that best achieves the NGO, as it ensures that the return on equity properly reflects the return required to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers.

16. It is in this context that JGN presents its response to the AER's draft decision and revised proposal in relation to the return on equity.

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[12] AEMC, *Draft Rule Determinations: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012; National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012*, August 2012, p. 47.

[13] AEMC, *Draft Rule Determinations: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012; National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012*, August 2012, p. 48.

3. RESPONSE TO THE AER DRAFT DECISION

3.1 OUTLINE OF THE AER'S REASONING

17. The AER's draft decision in relation to the return on equity is based on the following reasoning:

- **Return on equity model.** The AER considers that the SLCAPM should be used as the foundation model to estimate the return on equity. JGN understands that the AER's reasons for adopting this approach are as follows:

    − the SLCAPM model is the current standard asset pricing model of modern finance both in theory and in practice[14]

    − the SLCAPM is superior to all other models considered by the AER, in terms of estimating the return on equity of the benchmark efficient entity[15]

    − use of the SLCAPM as the foundation model will not result in a downward biased estimate of the return on equity[16]

    − use of alternative models will not lead to an outcome which better achieves the rate of return objective[17]—the AER expresses a number of concerns in relation to these alternative models.

- **Equity beta estimate.** An equity beta of 0.7, when applied in the SLCAPM, will deliver a return on equity that contributes to achievement of the rate of return objective. The AER considers that:[18]

    − a reasonable range for the equity beta is 0.4 to 0.7

    − additional information taken into account by the AER—specifically empirical estimates for international energy networks and the theoretical principles underpinning the Black CAPM—indicate that an equity beta at the top of this range is appropriate.

- **MRP estimate.** An MRP of 6.5 per cent reflects prevailing market conditions and contributes to achievement of the rate of return objective.[19] The AER's approach differs from JGN's in that:

    − the AER does not agree that the Wright approach should be used to estimate the MRP—this is because the AER considers that the Wright approach is an alternative implementation of the CAPM, designed to produce information at the return on equity level

    − the AER does not agree that independent valuation reports should inform MRP estimation (only the overall return on equity)

    − the AER adopts a different interpretation of the historical excess returns data

    − the AER does not agree with SFG's construction of the DDM

    − the AER takes into account survey evidence and conditioning variables.

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[14]   Draft decision, [3-27].

[15]   Draft decision, [3-27], [3-47].

[16]   Draft decision, [3-47].

[17]   Draft decision, [3-27].

[18]   Draft decision, [3-30]

[19]   Draft decision, [3-29].

- **Cross-checks.** The return on equity estimate from the SLCAPM is broadly supported by:[20]

    − estimates using the Wright approach

    − estimates from other market participants, including practitioners and regulators, particularly estimates used in Grant Samuel's recent report for Envestra

    − the fact that it is above the prevailing return on debt, and

    − the fact that the regulatory regime to date has been supportive of investment.

18. This reasoning is based on a number of errors of fact and logic, which are described in detail below. As a consequence of these errors, the return on equity determined by the AER will not contribute to the achievement of the rate of return objective and does not reflect prevailing conditions in the market for equity funds.

19. For reasons discussed below, the return on equity derived from the AER's approach will be below what is required to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers.

3.2   CHOICE OF RETURN ON EQUITY MODELS

3.2.1   THE FOUNDATION MODEL APPROACH

20. The AER's 'foundation model' approach appears to proceed on the assumption that one return on equity model will be demonstrated to be clearly superior to others, such that it can be used as the 'foundation model'. This can be seen from the AER's rate of return guideline, which, for the return on equity, provides that a model be used as a 'foundation model'.[21] This approach may be characterised as being 'cart before horse' as whether or not one model or estimation method will emerge as standing 'head and shoulders' above all others cannot be determined until all relevant material has been identified and assessed.

21. The assumption that there will be one model or estimation method that is clearly superior to all others at all times in all market conditions, and the finding that in fact there is one such model (the SLCAPM), is not supported by the evidence before the AER. On the contrary, a detailed examination and comparison of the sources of information reveals that each return on equity model has strengths and weaknesses, and that no one model can be said to be always superior to all others. In such circumstances, where there is no basis upon which to distinguish between the sources of information, it is incorrect and unreasonable to adopt a 'foundation' model approach. It is particularly unreasonable to adopt such an approach ex ante, prior to the consideration of the relevant evidence in the prevailing market conditions. Persisting to rely on the SLCAPM—notwithstanding the new rules and evidence—suggests a degree of bias in the AER's approach to exercising discretion that will ultimately hurt consumers.

22. After considering the strengths and weaknesses of various models, SFG concludes:[22]

    Because all of the models have different strengths and weaknesses along different dimensions, it is impossible to identify one superior model that alone would out-perform the combined evidence of all of the relevant models.

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[20]   Draft decision, [3-32]–[3-34].

[21]   AER, *Rate of return guideline*, December 2013, pp. 12–13.

[22]   SFG, *The required return on equity for regulated gas and electricity network businesses*, June 2014, [370].

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23. The recent changes to Rule 87 of the NGR were at least partly driven by recognising that the rules should not prescribe a particular model, because no one model can be said to be clearly superior. The AEMC explicitly recognised that all financial models (including the SLCAPM) are based on certain theoretical assumptions and all have varying degrees of weaknesses, and as such, no one model can be said to provide the right answer.[23] The AEMC therefore considered that estimates of the return on equity are likely to be more robust and reliable if they are based on a range of estimation methods, financial models, market data and other evidence.[24]

24. We agree with the AEMC. Faced with a range of imperfect models, prudence suggests adopting a consensus forecast derived from a proper consideration of each model—not 'picking a winner' as the AER's foundation model approach does.

25. The AER's foundation model approach—which presupposes the superiority of one model—appears to run contrary to the AEMC's intent. Through its foundation model approach the AER seeks to lock in one model, largely to the exclusion of others. While the AER states that it has taken into account information from two other models, it is done so only to inform its estimation of foundation model parameters. Ultimately the AER has only had regard to the return on equity estimate from one model—its foundation model—while the return on equity estimates of all other relevant models have been disregarded.

26. In summary, we consider that the AER's starting premise—that a superior model can be identified—is, at least at this stage given the existing models and their various stages of development, both factually incorrect and contrary to the stated intent of the recent rule changes. There is no evidence to support this premise, and the evidence before the AER points to a contrary conclusion.

3.2.2   THE AER HAS ERRED IN FINDING THAT THE SLCAPM IS THE CLEARLY SUPERIOR MODEL

27. The AER states that the SLCAPM is the clearly superior model to use as the foundation model.[25] However, no evidence is cited in support of this statement, and we are not aware of any evidence that supports this view.

28. The evidence before the AER in fact shows that the SLCAPM has known weaknesses. In particular, as discussed below, the SLCAPM is known to produce downward biased estimates of the required return on equity for low-beta stocks.

29. We note that neither Handley nor McKenzie and Partington, in their reports for the AER, state that the SLCAPM is superior to other models. We are not aware of any expert report before the AER which expresses this view.

30. Indeed McKenzie and Partington observe:[26]

> …the [SLCAPM] has its weaknesses, but these are well documented and in many cases can either be diagnosed or perhaps compensated for in empirical practice.

31. As discussed below, it is not clear whether the AER has sought to compensate for the known weaknesses of the SLCAPM, as suggested by McKenzie and Partington, or whether it has simply ignored them. To the extent that the AER has sought to compensate for these weaknesses, by taking the upper bound of its equity beta range, it cannot reasonably be satisfied it has adequately compensated for their effect, because it does not seek to analyse or quantify this effect. Further, such an approach would be incorrect because of problems with the AER's equity beta range, as discussed below, including that it was derived without regard to any weaknesses of

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23   AEMC, *Draft Rule Determinations: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012; National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012*, August 2012, p. 48.

24   AEMC, *Draft Rule Determinations: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012; National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012*, August 2012, p. 48.

25   Draft decision, [3-171].

26   Michael McKenzie and Graham Partington, *Report to the AER – Part A: Return on Equity*, October 2014, p. 9.

the SLCAPM—and so there is no reason to think that selecting a figure (of 0.7) from within that range overcomes such weaknesses.

32. McKenzie and Partington also state:[27]

> *The final estimate of the expected return on equity may have regard to a broad range of relevant material including a range of multifactor models such as the Fama and French (1993) and the APT of Ross (1976), inter alia. Many of these competing models nest this foundation model and so potentially make more use of available information.*

33. Certainly McKenzie and Partington do not appear to view the SLCAPM as superior to all other models. Rather they acknowledge the weaknesses of the model and recommend that any estimate of the return on equity may take into account a wider range of models, including the Fama French three-factor model (**FFM**).

34. Associate Professor Handley also acknowledges the critical weakness of the SLCAPM, noting:[28]

> *An apparent weakness of the Sharpe-CAPM is the empirical finding, for example by Black, Jensen and Scholes (1972) and Fama and French (2004), that the relation between beta and average stock returns is too flat compared to what would otherwise be predicted by the Sharpe-CAPM – a result often referred to as the low beta bias.*

35. The weaknesses and limitations of the SLCAPM were identified in JGN's original proposal and the supporting expert reports. In particular, SFG referred to the large body of empirical evidence which shows that the SLCAPM will tend to produce biased estimates of the required return on a low-beta stock or a value stock, and may not fully capture all factors affecting stock returns.[29] SFG's reports also explained how other models such as the Black CAPM and FFM were developed specifically to overcome these known weaknesses in the SLCAPM design.

36. Some of the key empirical evidence demonstrating weakness in the SLCAPM is summarised in Table 3–1 below.

Table 3–1: Summary of key empirical evidence in relation to SLCAPM performance

Study	Key conclusions
Black, Jensen and Scholes (1972)[30]	Black, Jensen and Scholes (1972) tested the SLCAPM theory against empirical data. Their results indicated that the empirical relationship between systematic risk exposure and returns was not consistent with SLCAPM theory. The relationship in the empirical data indicated a higher intercept and flatter slope than that indicated by the SLCAPM. The authors conclude that their results appeared to be strong evidence favouring rejection of the traditional form of the asset pricing model (i.e. the SLCAPM).
Friend and Blume (1970)[31]	The empirical analysis by Friend and Blume (1970) indicates that low-beta stocks generate higher returns than the SLCAPM would suggest and high-beta stocks tend to generate lower returns than the SLCAPM predicts.

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[27] Michael McKenzie and Graham Partington, *Report to the AER – Part A: Return on Equity*, October 2014, p. 9.

[28] John C Handley, *Advice on the Return on Equity: Report prepared for the Australian Energy Regulator*, 16 October 2014, p. 5.

[29] SFG, *The required return on equity for regulated gas and electricity network businesses*, June 2014, [46]–[60]. Importantly, a 'low-beta' stock is not the same as a 'value stock'. A stock can be either, both or neither of these.

[30] Black, F., M.C. Jensen, and M. Scholes, 1972, "The Capital Asset Pricing Model: Some empirical tests," in *Studies in the Theory of Capital Markets*, Michael C. Jensen, ed., New York: Praeger, 79–121.

[31] Friend, I., M. Blume, 1970, "Measurement of Portfolio Performance under Uncertainty," *American Economic Review*, 60, 561–75.

Study	Key conclusions
Fama and Macbeth (1973)[32]	Fama and French (1992) demonstrated that market capitalisation and book-to-market ratio explain why some stocks earn higher returns than others, which is inconsistent with the SLCAPM.
Rosenberg, Reid and Lanstein (1985)[33]	The study by Rosenberg, Reid and Lanstein, as well as other studies identified a number of SLCAPM anomalies, where stock-specific characteristics seemed related to differences in returns. In particular, the book equity value divided by the market equity value (book-to-market ratio) appeared to be related to variation in returns.
Fama and French (1992)[34]	Fama and French (1992) demonstrated relationships between returns and book-to-market and size factors which are not accounted for in the SLCAPM.
Fama and French (1993)[35]	Fama and French (1993) demonstrated that stock returns can be explained by returns to portfolios formed on the basis of market capitalisation and book-to-market ratio. These portfolio returns are referred to as size and book-to-market factors. According to the SLCAPM, only the market factor has a role in explaining stock returns.
Brealey, Myers and Allen (2011)[36]	The results reported by Brealey, Myers and Allen confirms the findings of earlier studies—such as the study by Black, Jensen and Scholes (1972)—that the pattern of empirical data is not consistent with what the SLCAPM would predict.
NERA (2015)[37]	Based on Australian data, and using both in-sample and out-of-sample tests, NERA conclude that there is evidence of bias in the SLCAPM. NERA states that the evidence indicates that the SLCAPM significantly underestimates the returns generated by low-beta portfolios and overestimates the returns generated by high-beta portfolios. In other words, the model has a low-beta bias. The extent to which the SLCAPM underestimates the returns to low-beta portfolios is both statistically and economically significant.

37. The body of empirical literature relating to identified weaknesses in the SLCAPM, and the development of alternative models to overcome the well-recognised deficiencies in this model, is discussed at some length by the Nobel Prize Committee, in the explanatory material accompanying the award of the Nobel Prize for contributions to this field.[38] The Committee observes that by the end of the 1970s, the empirical support for the SLCAPM was increasingly being questioned in a number of studies, including those referred to above.

38. In light of the above evidence, the AER cannot rationally conclude that the SLCAPM is always superior to all other models and that a foundation model approach, with the SLCAPM as the foundation model, should be adopted. The evidence clearly shows that the SLCAPM has weaknesses and that there are alternative models available, some of which have been designed to address such weaknesses.

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[32] Fama, E.F., J.D. MacBeth, 1973, "Risk, return, and equilibrium: Empirical tests," *Journal of Political Economy*, 81, 607–636.

[33] Rosenberg, B., K. Reid, and R. Lanstein (1985), "Persuasive evidence of market inefficiency," *Journal of Portfolio Management* 11, 9–17.

[34] Fama, E.F., and K.R. French (1992), "The cross-section of expected stock returns," *Journal of Finance* 47, 427–466.

[35] Fama, E.F., and K.R. French (1993), "Common risk factors in the returns on stocks and bonds," *Journal of Financial Economics* 33, 3–56.

[36] Brealey, R.A., S.C. Myers, and F. Allen, 2011, *Principles of Corporate Finance*, 10th ed., McGraw-Hill Irwin, New York, NY, USA.

[37] NERA, *Empirical Performance of Relevant Models for Estimating the Return on Equity*, February 2015.

[38] Economic Sciences Prize Committee of the Royal Swedish Academy of Sciences, *Understanding Asset Prices: Scientific Background on the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2013*, 14 October 2013, section 7.

3.2.3   THE AER HAS ERRED IN FINDING THAT THE SLCAPM WILL PRODUCE UNBIASED ESTIMATES

39.   The AER considers the issue of potential bias in the SLCAPM in the draft decision, but concludes:[39]

> *We do not consider the use of the SLCAPM as the foundation model will result in a downward biased estimate of the cost of equity capital.*

40.   Elsewhere in the draft decision the AER states that:[40]

> *There is no compelling evidence [that] the return on equity estimate from the SLCAPM will be downward biased given our selection of input parameters.*

41.   It is not entirely clear from these statements whether the AER has found that:

1.   in general, the SLCAPM will produced unbiased estimates of the required return on equity (**Finding 1**), or

2.   to the extent that the SLCAPM may produce biased estimates, the AER's selection of input parameters adequately corrects for any bias (**Finding 2**).

42.   It must be that the AER has made Finding 1 or Finding 2, in order for it to be satisfied that its approach will deliver a return on equity which contributes to achievement of the rate of return objective.

43.   We consider that Finding 1 would involve a critical error of fact. Empirical evidence clearly demonstrates that use of the SLCAPM will lead to downward biased estimates of the return on equity for low-beta stocks. This empirical evidence was referred to in the expert reports supporting JGN's original proposal and includes the work of Black, Jensen and Scholes (1972), Friend and Blume (1970) and Fama and Macbeth (1973) referred to above.[41]

44.   Further evidence of bias in SLCAPM estimates of the return on equity is provided with this revised proposal. The accompanying expert report by NERA, using Australian data, demonstrates that that there is evidence of bias in the SLCAPM as applied by the AER.[42] NERA concludes that the evidence indicates that the SLCAPM significantly underestimates the returns generated by low-beta portfolios and overestimates the returns generated by high-beta portfolios. In other words, the model has a low-beta bias. The extent to which the SLCAPM underestimates the returns to low-beta portfolios is both statistically and economically significant.

45.   If the AER has made Finding 2—i.e. if the AER acknowledges that there is bias in the SLCAPM but believes that it has corrected for this bias—JGN considers that there can be no reasonable basis for such a finding. The AER does not seek to quantify the effect of such bias, nor does it make any transparent adjustment to its SLCAPM parameter estimates to correct for bias.

46.   The AER does make an adjustment to its equity beta estimate, from what it refers to as 'the best empirical estimate' of this parameter. However, it is not clear whether this adjustment is intended to correct for bias in the SLCAPM. In any event, given that the AER does not seek to quantify the effect of SLCAPM bias, it cannot reasonably be satisfied that this adjustment adequately corrects for such bias.

47.   Indeed the AER appears to acknowledge that its equity beta estimate should be adjusted upwards to correct for bias in the SLCAPM, but says it cannot ascertain by how much it needs to adjust its estimate. The AER does

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[39]   Draft decision, [3-171].

[40]   Draft decision, [3-47].

[41]   SFG, *The required return on equity for regulated gas and electricity network businesses*, June 2014, [46]–[60].

[42]   NERA, *Empirical Performance of Relevant Models for Estimating the Return on Equity*, February 2015.

not calculate a specific uplift to its beta to correct for SLCAPM bias, but instead makes an arbitrary upward adjustment in the hope that this will adequately account for the issue that it has identified. The AER states:[43]

> *We consider the theoretical principles underpinning the Black CAPM demonstrate that market imperfections could cause the true (unobservable) expected return on equity to vary from the SLCAPM estimate. For firms with an equity beta below 1.0, the Black CAPM may predict a higher expected return on equity than the SLCAPM. We use this theory to inform our equity beta point estimate, and consider it supports an equity beta above the best empirical estimate implied from Henry's 2014 report.* **However, while the direction of this effect may be known, the magnitude is much more difficult to ascertain.** *We do not consider this theory can be used to calculate a specific uplift to the equity beta estimate to be used in the SLCAPM.* [emphasis added]

48. Ultimately, the AER adopts the top of its selected range for the SLCAPM equity beta—in effect, the AER makes an upward adjustment to the equity beta, from what it refers to as the 'best empirical estimate' to the upper limit of its range. However, given that the AER has not sought to quantify the effect of SLCAPM bias, it cannot reasonably be satisfied that choosing the top of its equity beta range will adequately correct for such bias. This is particularly the case given that the AER's range for beta is arbitrarily selected and inconsistent with the recommendation of its own consultant report.

49. We consider that selecting the top of the AER's equity beta range will not adequately correct for the bias in the SLCAPM indicated by Black CAPM theory. If the AER's parameter estimates are used in the Black CAPM along with the best available estimate of the zero-beta premium, the return on equity estimated by the Black CAPM is above the return on equity estimated by the AER using the SLCAPM (and adopting the upper limit of its equity beta range).

50. Table 3–2 below shows that even if the AER's lower bound beta value is used in the Black CAPM, the resulting return on equity estimate is still above the AER's SLCAPM estimate using the upper bound beta value. If the AER's 'best empirical estimate' of beta is used in the Black CAPM, the resulting return on equity estimate is significantly above the AER's SLCAPM estimate using the upper bound beta value. This indicates that if the AER were to properly adjust its SLCAPM beta estimate to account for the bias in the SLCAPM indicated by Black CAPM theory, the resulting beta would need to be higher than 0.7.

Table 3–2: Comparison of SLCAPM and Black CAPM return on equity estimates. Per cent.

Model	Return on equity estimate (%)
SLCAPM—equity beta 0.7; MRP 6.5%	8.1
Black CAPM—equity beta 0.4 (AER lower bound); MRP 6.5%	8.2
Black CAPM—equity beta 0.5 (AER 'best estimate'); MRP 6.5%	8.5
Black CAPM—equity beta 0.7 (AER upper bound); MRP 6.5%	9.1

(1) All calculations are based on a risk-free rate of 3.55 per cent (as used in the draft decision) and a Black CAPM zero-beta premium of 3.34 per cent (as estimated by SFG).

51. In its original proposal, JGN put forward two methods for estimating the return on equity which would take into account the effect of bias in the SLCAPM:

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[43]   Draft decision, [3-266].

- **By combining relevant models.** Our primary position was that the SLCAPM should be used in combination with other models, some of which have been developed to overcome this issue. This approach appropriately accounts for the fact that each of the models (including the SLCAPM) has strengths and weaknesses. While this approach may not fully correct for the effect of bias in the SLCAPM (because the biased SLCAPM estimate is still one input), this issue is at least recognised in the way that evidence from various models is taken into account.

- **By properly adjusting the equity beta.** Our alternative position was that the SLCAPM should be used with an equity beta that is properly adjusted up to account for the limitations of the SLCAPM.[44] Based on advice from SFG, the equity beta was effectively adjusted so that the limitations of the SLCAPM are accounted for in the same way as in the other relevant models.

52. JGN considers that either of these approaches would be preferable to the AER's approach, which clearly does not properly account for the effect of SLCAPM bias.

53. This is consistent with the findings of NERA, based on its review of the empirical performance of the SLCAPM and Black CAPM. After presenting the results of empirical analysis, which provide clear evidence of bias in the SLCAPM, NERA concludes that:[45]

> …an estimator that relies solely on the SL CAPM or the AER CAPM to the exclusion of other asset pricing models, as the AER has done in its recent draft decisions, will produce a materially worse estimate of the cost of equity in terms of bias than an approach that combines estimates that these models provide with estimates provided by other models that are not similarly affected by bias, such as the Black CAPM.

3.2.4   MATTERS CONSIDERED BY THE AER IN ASSESSING SLCAPM BIAS

54. The AER does not undertake any empirical testing for bias in the SLCAPM, nor does it appear to consider the available research on this issue (i.e. the research referred to above and in the expert reports supporting JGN's original proposal).

55. Rather, the AER states that in considering the issue of potential bias in its SLCAPM estimate, it took into account:[46]

- whether there is evidence that previously determined rates of return have discouraged investment

- whether the equity risk premium appears appropriate

- if anything the AER is doing appears inconsistent with common practice

- if input parameters appear reasonable.

56. The first of these considerations—whether previously determined rates of return have discouraged investment—is irrelevant and does not provide any basis for finding that the SLCAPM is unbiased. This is not an approach that is used in academic studies or market practice to test for model bias. Rates of return in previous periods have been estimated with different input parameters (in particular, a higher equity beta) and in different market conditions (with higher prevailing risk-free rates). Therefore levels of investment in past periods under different rate of return settings does not provide a rational basis for concluding that the SLCAPM, as applied by the AER in the draft decision, will produce unbiased estimates of the return on equity for the forthcoming period.

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44   Based on JGN's initial proposal, this adjustment raised the SLCAPM equity beta from 0.82 to 0.91. For the revised proposal, the adjustment is 0.82 to 0.89.

45   NERA, *Empirical Performance of Relevant Models for Estimating the Return on Equity*, February 2015, p. vi.

46   Draft decision, [3-50].

57. The appropriateness of the equity risk premium and consistency with common practice (the second and third considerations) are discussed in section 3.1 below. In short, we do not consider that the evidence presented in the draft decision supports the AER's view that its allowed equity risk premium is reasonable and consistent with market practice.

58. Finally, the reasonableness of input parameters used by the AER is discussed in sections 3.3 and 3.4. For reasons set out below, we do not consider that the AER's choice of parameter evidence is supported by the empirical evidence. However, even if these parameter estimates were reasonably based, this would not alleviate the issue of bias in the SLCAPM. The empirical evidence shows that the SLCAPM will produce biased estimates of the return on equity even with the best estimates of each parameter.

59. In short, none of the considerations referred to by the AER support a finding that its SLCAPM estimate of the return on equity will be unbiased.

3.2.5 THE AER HAS ERRED IN ITS FINDINGS IN RELATION TO OTHER AVAILABLE MODELS

60. The AER raises a number of concerns with the other available return on equity models. Given these concerns, the AER decides to give these alternative models either no role in its determination of the return on equity, or a very limited role.

61. The key concerns raised by the AER are:

- alternative models are sensitive to input assumptions and choices around estimation periods and methodologies

- some alternative models are not empirically reliable

- some alternative models are not designed to estimate ex ante returns

- some alternative models (particularly the FFM) lack theoretical foundation

- some alternative models (particularly the Black CAPM) are not widely used by market practitioners, academics or regulators

- some alternative models produce return on equity estimates that appear 'very high'.

62. For reasons discussed below, we consider that each of these concerns is unfounded. In several cases, the AER's method and reasons for rejecting this other evidence (or relegating it to an indirect role) are illogical and unreasonable and/or apply equally to the SLCAPM.

3.2.5.1 Complexity and sensitivity of models to assumptions

63. A key concern raised by the AER in relation to alternative return on equity models is that they are sensitive to input assumptions and methodological choices. For example the AER considers that the DDM is highly sensitive to assumptions around the risk free interest rate and growth rate of dividends.[47] In relation to the FFM, the AER identifies a range of different methodological choices which might lead to different results.[48]

64. Simply observing that a return on equity model is sensitive to input assumptions and methodological choices does not provide a basis for rejecting that model or giving it a very limited role. All return on equity models— including the SLCAM—are sensitive to input assumptions. This is why it is important to estimate all model

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[47] Draft decision, [3-60].

[48] Draft decision, [3-55].

parameters as accurately as possible. It is also a reason for using multiple models – any residual estimation error is likely to offset across different models.

65. As noted by SFG, the same concern could be expressed in relation to the SLCAPM.[49] Clearly the results produced by the SLCAPM could vary widely depending on one's choice of input parameters and the methodologies used to estimate those parameters. Just based on the AER's ranges for the equity beta and MRP set out in the draft decision (and holding the risk-free rate constant), the return on equity produced by the SLCAPM could range from 5.6 per cent to 9.1 per cent.[50] This wide range of values arises due to different approaches that could be taken to estimating the MRP, and different methodological and data choices which could be made in estimating the MRP or beta.

3.2.5.2 Reliability of empirical estimates

66. A particular concern raised by the AER in relation to the Black CAPM is that estimates of the return on equity will be unreliable, because there is no reliable method to obtain an estimate of the zero-beta premium.

67. The AER's concern appears to be that, because different estimation techniques have produced differing estimates of the zero-beta premium, it cannot rely on any empirical estimates of this parameter. The AER states:[51]

> *While we consider SFG's latest estimate of the zero beta premium appears more plausible, we remain of the view that the large range of zero beta estimates by consultants for the NSPs indicates the model is unsuitable to use to estimate the RoE (return on equity) of our benchmark efficient entity.*

68. Besides noting that it is 'plausible', the AER has not sought to test the robustness or reliability of SFG's proposed value for the zero-beta premium. Instead, the AER has dismissed SFG's estimate on the basis that there are other differing estimates, some of which are 'implausible'.

69. We consider that this is an illogical and unreasonable approach to assessment of the proposed Black CAPM parameter values and return on equity estimate. The AER cannot reasonably conclude that *all* estimates of the zero-beta premium are unreliable, just because *some* estimates of this parameter appear implausible. The same logic could be used to dismiss just about any return on equity model, including the SLCAPM, to the extent that some estimates of the MRP or equity beta are considered unreliable.

70. We proposed using SFG's estimate of the zero-beta premium and required return on equity from the Black CAPM in estimating the return on equity. If the AER is to reject this proposal, it must consider SFG's estimates and assess whether adopting these estimates would (either alone or in combination with other models or methods) contribute to the achievement of the rate of return objective. The AER cannot simply reject JGN's proposal on the basis that there are other estimates of Black CAPM parameters (which we have not sought to rely on) which the AER considers to be implausible.

71. In any event, the reason why SFG's estimate of the zero-beta premium differs from some other estimates of this parameter has been clearly explained. SFG explains that unlike previous analyses, its analysis was done in such a way that high returns to high book-to-market stocks did not affect the estimate of the zero-beta premium.[52]

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[49]   SFG, *The required return on equity for the benchmark efficient entity*, 13 February 2015, [64].

[50]   That is, adopting a range for the MRP of 5.1 per cent – 7.8 per cent and a range for the equity beta of 0.4–0.7.

[51]   Draft decision, [3-183].

[52]   SFG, *Beta and the Black Capital Asset Pricing Model*, 13 February 2015, [65]; SFG, *Cost of equity in the Black Capital Asset Pricing Model*, May 2014.

72. Instead of seeking a reliable estimate of the Black CAPM zero-beta premium, the AER has effectively assumed this to be zero (by relying solely on the SLCAPM to estimate the return on equity). We consider that this is an unreasonable approach, in circumstances where the AER has identified the Black CAPM to be a relevant model. Given that the Black CAPM is clearly a relevant model, a proper examination should be undertaken into what the best estimate for the zero-beta premium is and this value should be used unless it is so unreliable that assuming a value known to be incorrect (a zero value) is a preferable outcome.

3.2.5.3 Lack of theoretical foundation

73. The AER has again raised a concern in relation to the theoretical foundation for the FFM—but this just does not fit with the evidence before it, including recent discussion by the Novel Prize Committee. We are concerned that the AER is using this 'concern' to filter out relevant evidence when estimating the return on equity, which goes against the AEMC's intent behind the new rules.

74. This concern has been addressed in JGN's original proposal and the supporting expert reports of SFG.[53] As explained by SFG, the general theoretical foundation for the FFM is the same as for the SLCAPM, in that both models posit that there is a linear relationship between the expected return of a particular stock and the expected return of a mean-variance efficient portfolio. The only difference is that the CAPM (as implemented in practice) assumes that the relevant stock market index is mean-variance efficient, whereas the FFM posits that the stock market index needs to be supplemented by two additional factor portfolios to produce a mean-variance efficient benchmark.

75. The basis for development of the FFM was in studies documenting the empirical failings of the SLCAPM. These studies documented that when the stock market index is used as the only factor the model does not fit the data, but when the additional FFM factors are included the model does fit the data.

76. The theoretical and empirical foundation for the FFM is discussed at some length by the Nobel Prize Committee, in the explanatory material accompanying the award of the Nobel Prize to Eugene Fama for contributions to this field.[54]

3.2.5.4 Models not designed to estimate ex ante returns

77. The AER expresses a concern in relation to the FFM that the model 'is not clearly estimating ex ante required returns'.[55]

78. It is curious that this criticism is only levelled at the FFM, given that theoretical foundation for the FFM is the same as for other asset pricing models, including the SLCAPM and Black CAPM. The key objective of all asset pricing models is to explain the cross section of stock returns. The term 'explain the cross section of stock returns' means to explain why some stocks earn higher returns than others. The basis for development of the FFM (and also the Black CAPM) was in studies documenting the failure of the SLCAPM to adequately explain why some stocks earn higher returns than others.

79. The reason for using any asset pricing model is that the historically observed relationships between returns, risk and other factors may be expected to continue in future. In this regard, the rationale for using the FFM is no different to the rationale for the SLCAPM or Black CAPM.

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53 SFG, *The Fama-French model*, 13 May 2014, pp 27-30; SFG, *Using the Fama-French model to estimate the required return on equity*, February 2015.

54 Economic Sciences Prize Committee of the Royal Swedish Academy of Sciences, *Understanding Asset Prices: Scientific Background on the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2013*, 14 October 2013, section 7.

55 Draft decision, [3-52].

3.2.5.5 Models not widely used

80. The AER's concern that alternative models are not widely used was also addressed in JGN's original proposal and supporting expert reports.

81. SFG notes that the FFM has gained acceptance among corporate finance practitioners and courts, as well as academics.[56] SFG also observes that both the Black CAPM and DDM are commonly used in rate of return regulation cases in other jurisdictions.[57]

82. In relation to the FFM, the Nobel Prize Committee recently observed that:[58]

    Empirically, the Fama-French approach has provided an effective way to simplify and unify the vast literature on the cross section of stock returns, and their method has been widely used both as a reference model for academic research and as a practical guide for professional investors.

83. While it is true that these alternative models are yet to gain acceptance among Australian regulators, it is clear that they are widely used by academics, market practitioners and overseas regulators and that they are market respected.

84. By ignoring the FFM because it considers it not 'widely used', the AER is essentially applying the 'well accepted' criterion that formed part of the NGR before the recent rule change. But the AEMC was explicit here. It removed that criterion to ensure that all relevant evidence, including other models, are used to estimate the return on equity. It appears biased for the AER to use a 'well used' criterion to circumvent the AEMC's intent.

3.2.5.6 'Very high' return on equity estimates

85. A further concern raised by the AER in relation to the DDM (referred to as the DGM here) is that:[59]

    The very high RoE estimates from SFG's DGM model, equating to an equity beta of 0.94 in the SLCAPM, appear inconsistent with the low risk nature of regulated natural monopoly businesses with very low elasticity of demand for their services, and the results in Professor Olan Henry's 2014 report.

86. The AER appears to be suggesting that, because the return on equity estimates produced by the DDM are higher than those produced by the SLCAPM (with the AER's preferred parameter values), the DDM estimates cannot be relied on.

87. This is an irrational and illogical approach to assessing the reliability of DDM estimates of the return on equity. This approach assumes that the SLCAPM estimates are accurate and reliable, and thus can be used as the benchmark to test the plausibility or reliability of estimates from other models. Adopting similar logic, one could conclude that the SLCAPM is unreliable because it produces estimates that are 'very low' when compared to the DDM and other models.

88. Alternatively, it may be that the AER considers that an implied equity beta of 0.94 would be 'too high', because it is above its own estimate of that parameter. However, there are two problems with such reasoning.

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56   SFG, *The Fama-French model*, 13 May 2014, pp. 17–22.

57   SFG, *The required return on equity for regulated gas and electricity network businesses*, 6 June 2014, p. 40.

58   Economic Sciences Prize Committee of the Royal Swedish Academy of Sciences, *Understanding Asset Prices: Scientific Background on the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2013*, 14 October 2013, p. 40.

59   Draft decision, [3-189].

- **First**, this assumes that the AER's equity beta analysis is correct, and that any estimate which differs from its estimate of 0.7 must be incorrect. The AER appears to consider that its estimate is more likely to be correct, because it accords with their assumption that energy businesses are in general 'low risk'.

  However, simply asserting that energy businesses are generally 'low risk' does not provide a basis for preferring one equity beta estimate over another, particularly where both of these estimates are less than one. If the AER believes that energy network businesses are 'low risk', all this would indicate is that the equity beta is likely to be less than one.

  In any event, we do not agree that low elasticity of demand for energy services indicates that network businesses are 'low risk'. It is well recognised that the equity beta depends on both operating risk and leverage. Even if the AER considers the operating risk of energy networks to be relatively low (compared to the average firm), it must be recognised that leverage is approximately double that of the average firm. Therefore the AER cannot reasonably conclude that overall, energy network businesses are 'low risk'.[60]

  This is particularly so in the case of gas distribution businesses such as JGN. As discussed below, the evidence indicates that gas distribution businesses face greater exposure to risk that gas transmission and electricity network businesses.

- **Second**, and more fundamentally, there is an implicit assumption that the SLCAPM will deliver unbiased estimates of the return on equity. If the SLCAPM is in fact delivering downward biased estimates (as indicated by the empirical evidence referred to above) then the implied equity beta needed to deliver a DDM-equivalent result must include an uplift to account for this bias. In other words, if there is a bias in the SLCAPM that is not accounted for in the AER's equity beta of 0.7, then this will contribute to a higher equity beta being needed to deliver a DDM-equivalent result.

89. The AER is required to have regard to all relevant estimation methods, financial models, market data and other evidence.[61] The AER cannot reject relevant financial models simply on the basis that the results they produce are inconsistent with the results of the AER's preferred model and with the AER's parameter estimates based on their favoured subset of the relevant estimation methods applied to their favoured subset of the relevant data —to do so would suggest bias in the AER's approach. Where two or more relevant models produce conflicting results, it is incumbent on the AER to assess each of the models on their merits and on that basis decide how their results are to be taken into account in determining the return on equity.

90. When faced with two models which produce differing results there are three possible hypotheses:

1. The model producing the lower estimate is accurate and unbiased, while the other model is upwardly biased or has been incorrectly applied

2. The model producing the higher estimate is accurate and unbiased, while the other model is downward biased or has been incorrectly applied, or

3. There is a degree of error or imperfection in both models and the correct outcome lies somewhere between or outside the two.

91. The AER has clearly not tested these possible hypotheses. Rather, the AER appears to have assumed that the first hypothesis is correct—i.e. that the SLCAPM is reliable and the DDM is not—without any rational basis. This is despite other evidence that suggests that either the second or third hypothesis is more likely to be

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[60] This issue is discussed further in the ENA's submission to the AER equity beta issues paper (ENA, *Response to the Equity Beta Issues Paper of the Australian Energy Regulator*, 28 October 2013, pp. 14–20).

[61] NGR, rule 87(5)(a).

correct. As noted above, there is empirical evidence that the SLCAPM will produce downward biased estimates of the SLCAPM for low-beta stocks.

92. In any event, it is not clear that the DDM return on equity estimate is 'very high', when compared to the results of other relevant models. As shown in Figure 3–1 below, SFG's updated DDM estimate is only 0.6 per cent above the FFM and Black CAPM estimates. It should be noted that the AER's SLCAPM estimate—with JGN's proposed parameter estimates—is below the FFM and Black CAPM estimates by the same margin (0.6 per cent). The SLCAPM estimate based on the AER's proposed parameter estimates is nearly 3 per cent below the FFM and Black CAPM estimates. Thus, it could similarly be said that the SLCAPM estimate appears 'very low' when compared to the results of the other three models, particularly if the AER's proposed parameter values are used.

Figure 3–1: Return on equity estimates from relevant models, compared with the AER and JGN estimates
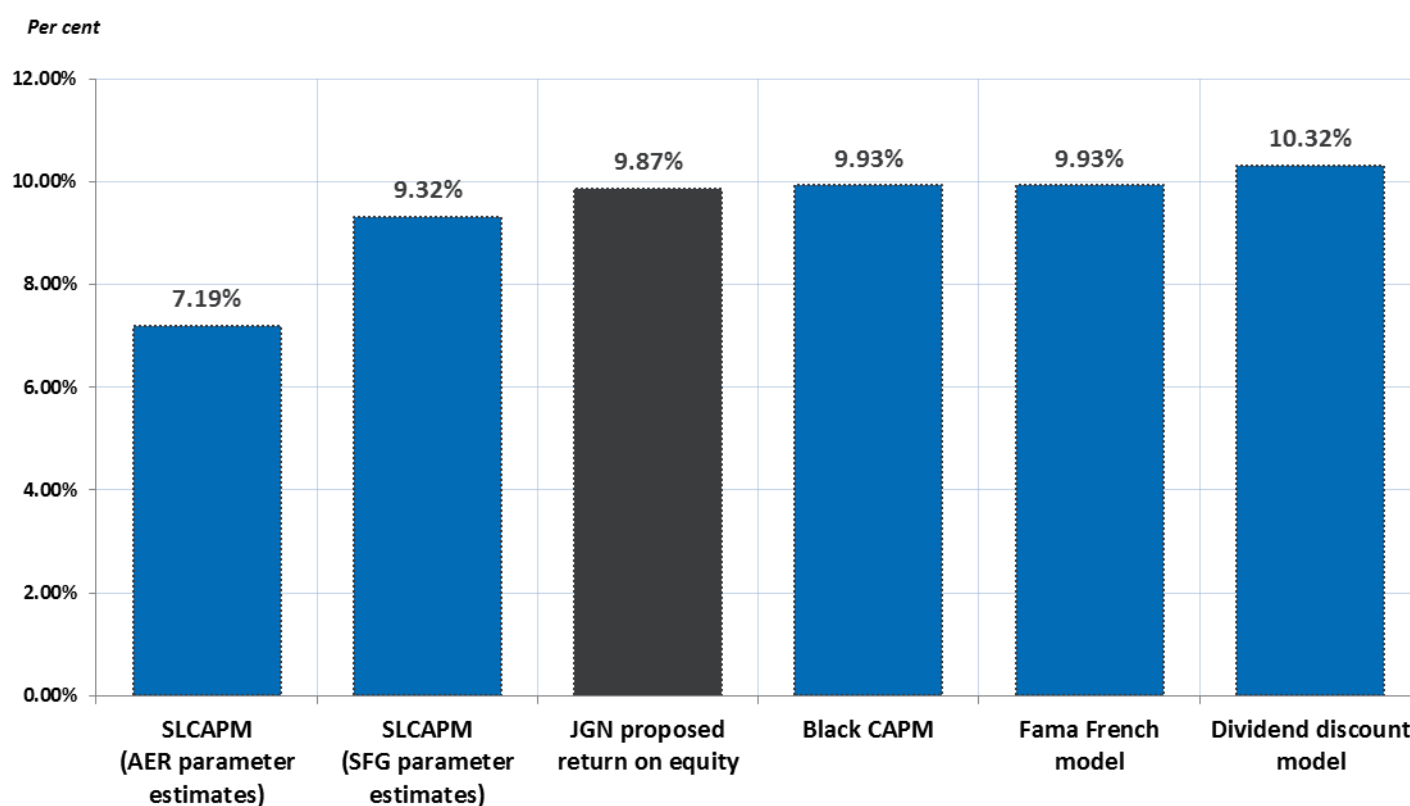
Source: SFG.[62]

3.3 DETERMINATION OF THE SLCAPM EQUITY BETA

93. The AER concludes that an equity beta of 0.7, when applied in the SL-CAPM, will deliver a return on equity that contributes to achievement of the rate of return objective. The AER finds that:

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[62] SFG, *The required return on equity for the benchmark efficient entity*, February 2015, section 5. Note: all estimates are based on the risk free rate for a placeholder averaging period of 2–30 January 2015 (risk-free rate of 2.64 per cent).

- the risks faced by gas distribution businesses is similar to that faced by gas transmission and electricity businesses

- a reasonable range for the equity beta for energy network businesses is 0.4 to 0.7

- additional information taken into account by the AER—specifically empirical estimates for international energy networks and the theoretical principles underpinning the Black CAPM—indicate that an equity beta at the top of this range is appropriate.

94. This section addresses each of these findings.

3.3.1   GAS DISTRIBUTION BUSINESSES ARE MORE RISK EXPOSED

95. The AER considers that the relevant risks between all energy network service providers—including gas and electricity, distribution and transmission network service providers—are sufficiently similar for there to be a single benchmark efficient entity.[63] The AER therefore determines an equity beta to apply to all energy network businesses based on a common risk profile.

96. JGN considers that applying an equity beta based on a broad sample of energy network businesses—including both gas and electricity businesses—is likely to be highly conservative. If anything, using this estimate for JGN—a gas network business—would likely lead to an under-estimate of the required return on equity. This is because gas businesses such as JGN are generally more risk-exposed than electricity businesses, and would therefore be expected to have a higher equity beta.

97. JGN considers that the AER has not properly taken into account the information provided by JGN in relation to the differences in risk exposure between gas and electricity businesses. When properly considered, this information does not support a conclusion that the risk profiles of gas and electricity businesses are 'sufficiently similar'.

98. In its initial proposal, JGN noted that gas distribution network businesses are generally more risk-exposed for a number of reasons, including:

- **Demand risk**. Gas distribution businesses such as JGN are generally subject to price cap regulation and are therefore more exposed to demand risk, compared to electricity network businesses, many of which are subject to revenue cap regulation.

  In a recent submission to the Senate inquiry into performance of electricity businesses, the AEMC observed that businesses under a price cap will be more exposed to demand risk, compared to those businesses operating under a revenue cap. The AEMC emphasised that these variations in the allocation of risk should be reflected in how the AER determines the allowed rate of return.[64]

  In its draft decision the AER states that JGN is shielded from demand risk because it operates under a revenue cap pricing regime.[65] This is simply not correct—JGN operates under a price cap, and therefore is not shielded from demand risk by the form of regulation which applies to it.

- **Sensitivity to other risk factors**. Demand for capacity on gas distribution networks is directly related to demand from end-users, which can fluctuate depending on various factors, including weather, the final delivered price of gas, economic conditions, and availability and price of substitute fuels.

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[63]   Draft decision, [3-299].

[64]   AEMC, *Submission to the Senate Inquiry Into the Performance and Management of Electricity Network Companies (submission 41)*, 18 December 2014, p. 6.

[65]   Draft decision, [3-68] and [3-235].

- **Fuel of choice risk**. Gas in NSW, unlike electricity, is a fuel of choice which means that consumers can (and do) switch away from using gas if wholesale prices are too high.

- **Wholesale price risk**. Gas wholesale prices are expected to rise over the near and medium term, raising demand (and therefore cash flow) uncertainty.

- **Supply shortfall risk**. There is also potential for gas supply shortfalls in NSW over the next AA period, particularly if production in Queensland and South Australia is prioritised for export. The potential gas supply shortfalls similarly increases the degree of uncertainty around future demand on gas distribution networks.

99. The extent of competition from alternative fuels is discussed further in the expert report of HoustonKemp (Appendix 1.1). HoustonKemp notes:[66]

> *The Australian energy sector is undergoing profound change driven in part by the fall in electricity demand placing downward pressure on costs across the supply chain, significant investment in domestic solar PV capacity, and the emergence of a liquefied natural gas export industry in Queensland. While the implications for the electricity sector have been well acknowledged, less consideration has been given to how these factors are affecting the gas sector. In particular:*
>
> - *customers are more aware of the choices they have between energy products and suppliers;*
>
> - *technological, market and policy developments have increased the attractiveness of alternative energy sources for space and water heating; and*
>
> - *the changes in relative prices of electricity and gas are increasing the competitiveness of electricity for many energy consumers.*
>
> *…*
>
> *In short, competition from electricity as an energy fuel for gas consumers is becoming stronger. This is expected to be ongoing, leading to increasing potential for substitution from gas to electricity.*

100. For these reasons, we expect that gas distribution businesses such as JGN would be relatively more exposed to movements in the broad economy compared to other energy network businesses. Given this higher risk exposure, application of an equity beta and other measures of risk based on a broad sample of energy businesses is likely to be conservative—that is, such an approach is likely to understate the equity beta and other risk measures for a gas distribution network like JGN.

3.3.2   THE AER HAS ERRED IN ITS DETERMINATION OF THE EQUITY BETA RANGE

101. The AER considers that the empirical studies show 'an extensive pattern of support' for an equity beta for energy network businesses within a range of 0.4 to 0.7.[67] This finding is inconsistent with the body of evidence before the AER, including evidence from the AER's own consultant.

102. Professor Henry, in his report for the AER, does not recommend a range for the equity beta of 0.4 to 0.7. Rather, Professor Henry concludes, based on his analysis of Australian data only (as instructed by the AER):[68]

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[66]   HoustonKemp, *Implications for Jemena Gas Networks (NSW) of Increasing Competition in the Consumer Energy Market: A Report for Jemena Gas Networks*, February 2015, pp. ii–iii.

[67]   Draft decision, [3-267].

[68]   Olan T Henry, *Estimating β: An update*, April 2014, p. 63.

In the opinion of the consultant, the majority of the evidence presented in this report, across all estimators, firms and portfolios, and all sample periods considered, suggests that the point estimate for β lies in the range 0.3 to 0.8.

103. We note that Professor Henry does not appear to have been asked for his opinion as to the best estimate of the equity beta for the relevant benchmark business. Rather, Professor Henry appears to have been asked to undertake a confined empirical analysis using a defined dataset containing nine specified Australian businesses.[69] However, even this confined analysis does not support the AER's equity beta range. By constraining the upper bound of its range to 0.7 and then selecting this as its point estimate, the AER appears to bias its beta estimate down. If the upper bound was not so constrained, then relevant evidence suggests the point estimate should be higher than 0.7.

104. The AER's finding as to appropriate beta range is also inconsistent with estimates from SFG based on a larger sample of businesses. SFG estimates an equity beta of 0.82 based on a broader sample of businesses, including international businesses.[70]

105. For reasons previously explained, we consider that the dataset used for estimating the equity beta should include international businesses. As noted by the AER, there is a trade-off between increasing the sample size (thus improving the reliability of estimates) and ensuring that only businesses that are comparable to the benchmark entity are included. In this case, we consider that it is clearly preferable to broaden the sample to include international businesses. As noted by SFG:[71]

- **Small domestic sample.** A sample including domestic businesses only is too small, meaning that the resulting statistical estimates are likely to be unreliable. The set of Australian businesses that Professor Henry was instructed to use includes only nine businesses, of which five are no longer listed—and therefore can no longer be used to estimate beta. Professor Henry reports some evidence of instability in his study based on Australian data only, possibly due to the small sample size.[72] SFG states that the estimates based exclusively on the small sample of domestic comparators are statistically unreliable.[73]

- **Larger international sample.** Due consideration has been given to the comparability of international businesses, and SFG has concluded that the businesses included in its sample are sufficiently comparable such that they can be appropriately used as part of the dataset to estimate the equity beta range.

106. We further note that simply confining the dataset to businesses operating in Australia may not lead to the most representative sample. A number of the businesses in the AER / Henry sample bear characteristics which do not align with the AER's conceptual definition of the benchmark efficient entity. For example, as noted by the AER in the draft decision, several of the businesses in the sample derive a significant portion of their revenues from unregulated activities (e.g. the APA Group, which derives only 23 per cent of revenue from regulated tariffs) and/or activities outside the energy sector or Australia.[74] This makes it all the more important that the sample be broadened to ensure robust and reliable estimates of the equity beta.

107. The AER states that it has taken into account international evidence in its determination of a point estimate for beta. However, it is clear from the draft decision that international evidence has at best a marginal role in the AER's decision. Rather than seeking to determine the best estimate from international evidence, or even a reasonable range, the AER derives a very wide range of estimates from a variety of international studies and then cross-checks its chosen point estimate against this wide range.

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[69]   Olan T Henry, *Estimating β: An update*, April 2014, p. 4.

[70]   SFG, *Beta and the Black Capital Asset Pricing Model*, February 2015, section 4;   SFG, *Equity beta*, 12 May 2014.

[71]   SFG, *Regression-based estimates of risk parameters for the benchmark firm*, 24 June 2013.

[72]   Olan T Henry, *Estimating β: An update*, April 2014, p. 62.

[73]   SFG, *Beta and the Black Capital Asset Pricing Model*, February 2015, [31].

[74]   Draft decision, [3-243]-[3-244].

108. Given the paucity of data for Australian businesses, international data should be given a direct role in estimation of the equity beta. This means that comparable international businesses should be included in the sample used to estimate beta, alongside domestic businesses.

109. We consider that the best evidence of the SLCAPM equity beta for the benchmark efficient entity is SFG's estimate based on a broader sample, including both Australian and international businesses. This evidence does not support the AER's range for the equity beta of 0.4 to 0.7.

3.3.3   THE AER HAS ERRED IN ITS DETERMINATION OF THE BETA POINT ESTIMATE

110. In relation to the point estimate for the equity beta, the AER concludes: [75]

   • 'the best empirical estimate' of the SLCAPM equity beta from Henry's report is 0.5

   • the theory of the Black CAPM points to an estimate of the SLCAPM beta that is above the best estimate indicated by Henry's analysis

   • international empirical estimates also provide 'limited support' for an equity beta point estimate towards the top of the AER's range.

111. This conclusion is affected by several errors of fact and logic, which are discussed below.

3.3.3.1 The AER's view as to the 'best empirical estimate' is not supported by evidence

112. The AER's statement that 'the best empirical estimate' of the SLCAPM equity beta is 0.5 is not supported by the weight of the expert evidence before it.

113. Professor Henry does not recommend that a value of 0.5 be adopted, nor does his report refer to 0.5 as the 'best empirical estimate'. Rather, as noted above, Professor Henry recommends a range of 0.3 to 0.8, based on his analysis of Australian data only (as instructed by the AER). [76]

114. As discussed above, we consider that the best empirical estimate of the SLCAPM equity beta is SFG's estimate of 0.82, based on a broader sample including both Australian and international businesses.

3.3.3.2 The AER's adjustment to the 'best empirical estimate' is highly arbitrary

115. The AER states that the theory of the Black CAPM points to an estimate of the SLCAPM beta that is above the best estimate indicated by Henry's analysis. This appears to be the reason for the AER's adjustment from the 'best empirical estimate' of 0.5 to a final point estimate of 0.7.

116. It should be noted that the theory of the Black CAPM does not say anything about the equity beta to be used in the SLCAPM, *per se*. What the theory of the Black CAPM indicates is that one of the key assumptions of the SLCAPM—that all investors can borrow or lend as much as they like at the risk-free rate—may not hold. It is this constraining assumption of the SLCAPM which appears to lead to the empirical result that the SLCAPM will tend to underestimate the required return on equity for low-beta stocks and overestimate the required return on equity for high-beta stocks.

117. The theory of the Black CAPM is illustrated in Figure 3–2 below. The Black CAPM line indicates the relationship between beta and the expected return where the constraining assumption of the SLCAPM is relaxed.

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[75]   Draft decision, [3-268]–[3-269].

[76]   Olan T Henry, *Estimating β: An update*, April 2014, p. 63.

Figure 3–2: Illustration of SLCAPM and Black CAPM relationships
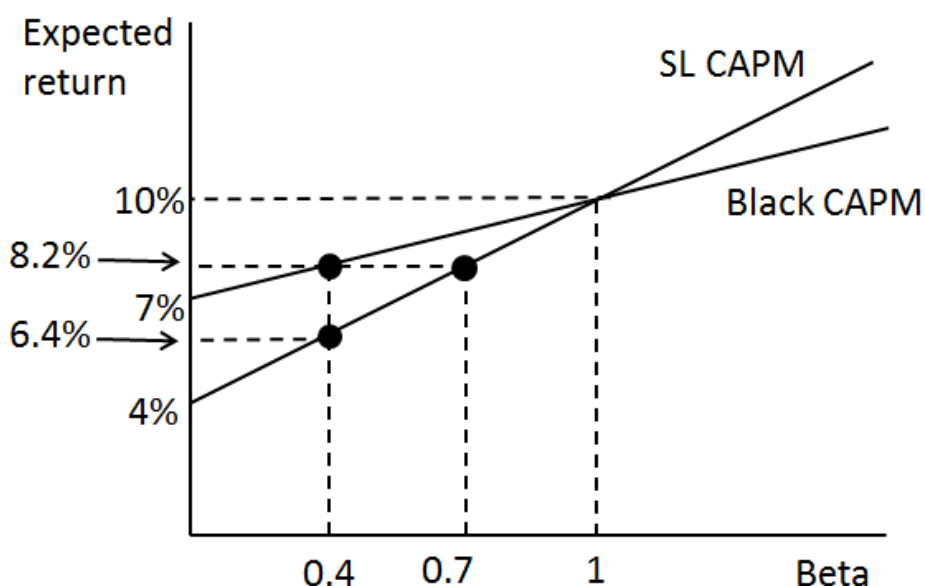
Source: SFG.[77]

118. We understand that what the AER is in fact doing is seeking to make an adjustment to the equity beta to account for the SLCAPM bias that is indicated by Black CAPM theory. That is, while Black CAPM theory does not say anything about adjusting the equity beta to account for SLCAPM bias, this parameter is being used by the AER as the adjustment tool to account for this bias. In the example in Figure 3–2 above, if the best estimate of the equity beta was 0.4, the AER would use an equity beta of 0.7 in the SLCAPM because this would deliver the return corresponding to an equity beta of 0.4 used in the Black CAPM.

119. However, in this case the adjustment made to the AER's 'best empirical estimate' estimate of beta is highly arbitrary. The AER cannot reasonably be satisfied that adjusting the equity beta estimate from 0.5 to 0.7 will adequately account for bias in the SLCAPM, because it has not sought to quantify the effect of this bias.

120. Indeed the AER acknowledges that it does not know by how much it needs to adjust its equity beta estimate to account for the issues indicated by Black CAPM theory—i.e. the effects of low-beta bias in the SLCAPM. The AER notes that 'while the direction of this effect may be known, the magnitude is much more difficult to ascertain'.[78]

121. Clearly the magnitude of the AER's adjustment is limited by its definition of the equity beta range. Since the AER caps its range at 0.7, the adjustment to the equity beta can take the point estimate no higher than 0.7. Of course if the AER had adopted the recommendation of its consultant for an equity beta range of 0.3 to 0.8, its adjustment to account for Black CAPM theory and international evidence would have taken the point estimate to 0.8. Thus, the problem of arbitrariness in the AER's adjustment is compounded by the error in its construction of the equity beta range.

122. In fact, the evidence shows that the AER's arbitrary adjustment to its equity beta estimate is not sufficient to address the issues it has identified. As noted above, it is clear that choosing the top of the AER's equity beta range will not correct for the low-beta bias in the SLCAPM indicated by Black CAPM theory—if the AER's

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[77] See SFG, *The required return on equity for regulated gas and electricity network businesses*, June 2014, Figure 27.

[78] Draft decision, [3-266].

parameter estimates are used in the Black CAPM along with the best available estimate of the zero-beta premium, the return on equity estimated by the Black CAPM is above the return on equity estimated by the AER using the SLCAPM (see Figure 3–2 above). Similarly, if international evidence were to be properly taken into account, this would yield an equity beta well above 0.7—SFG estimates an equity beta of 0.82 based on a sample including both domestic and international businesses.[79]

123. Further, the international empirical estimates do not provide support for an equity beta point estimate towards the top of the AER's range (i.e. an equity beta of 0.7), as claimed by the AER. In fact, as noted by SFG, the international evidence is uniformly consistent with a regeared equity beta materially above 0.7.[80]

124. Therefore, the AER cannot reasonably be satisfied that its equity beta estimate of 0.7, when used in the SLCAPM, will lead to a return on equity that contributes to the allowed rate of return objective. The AER's determination of its point estimate is highly arbitrary and is affected by errors in the interpretation of key evidence. The evidence shows that the best estimate of the SLCAPM equity beta is in fact higher than 0.7.

3.4   DETERMINATION OF THE MRP

125. The AER's approach to determining the MRP differs from that proposed by JGN, in that:

- the AER does not agree that the Wright approach should be used to estimate the MRP

- the AER does not agree that independent valuation reports should inform MRP estimation (only the overall return on equity)

- the AER adopts different estimates of the MRP from historical data, ignoring adjustments recommended by experts

- the AER does not agree with SFG's construction of the DDM

- the AER takes into account survey evidence and conditioning variables, and

- the AER does not appear to adjust its MRP estimate for changes in market conditions since publication of the rate of return guideline.

126. This section addresses each of these points in turn.

3.4.1   THE AER HAS INCORRECTLY USED THE WRIGHT APPROACH

127. The AER does not take into account the Wright approach when estimating the MRP, because it considers that the Wright approach should inform the overall return on equity only. The AER refers to the Wright approach as an alternative implementation of the SLCAPM designed to provide information at the return on equity level.[81]

128. This is an incorrect interpretation of Wright's work. Wright did not develop an alternative implementation of the SLCAPM. Wright simply proposed an alternative method of estimating the MRP for use in the SLCAPM—as the

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79   SFG, *Equity beta*, 12 May 2014.

80   SFG, *Beta and the Black Capital Asset Pricing Model*, February 2015, [55].

81   Draft decision, [3-37] and [3-62].

difference between the historical average market return (adjusted for historical inflation) and the current risk free rate—on the basis that market returns may be more stable over time than excess returns.[82]

129. Associate Professor Handley, in a passage referred to in the draft decision, clearly describes the Wright approach as an alternative method of estimating the MRP, rather than as an alternative return on equity model. Handley describes the Wright approach as follows:[83]

> *Wright adopts an alternative non-standard approach to estimating the MRP. Rather than treating the MRP as a distinct variable he suggests estimating the return on the market – by estimating the real return on equity and combining this with a current forecast of inflation to give an estimated nominal return on equity – and the risk free rate separately.*

130. At [3-62] of the draft decision, the AER sets out a formula, which it says represents the Wright approach to implementing the SLCAPM (referred to as the 'Wright SLCAPM'). However, the formula set out by the AER is simply the standard SLCAPM, as originally specified by Sharpe and Lintner.[84] It is clear from this that the Wright approach does not involve an alternative model for estimating the overall return on equity. Rather, the Wright approach represents an alternative method for estimating the MRP parameter.

131. In fact, the Wright approach to estimating the MRP would appear to be more aligned with the conventional SLCAPM specification, because it seeks to estimate the MRP as the difference between two distinct parameters (the market return and risk-free rate). This is in contrast to other methods which seek to estimate the MRP as a parameter in its own right.

132. It is therefore incorrect for the AER to reject the Wright approach when estimating the MRP on the basis that it is not used to measure the MRP. The Wright approach clearly provides relevant information in relation to the required market return and the MRP, and it would be an error for the AER to disregard it when estimating the MRP.

133. It also appears at odds with the AER's foundation model approach, where evidence relevant to estimating the MRP should be considered when estimating that parameter for input to the foundation model. The AER has not done that here. Instead, the AER has incorrectly treated the Wright approach as a separate return on equity model and used it (by design) as an ineffective crosscheck on its estimate from the SLCAPM (see discussion below).

3.4.2   USE OF INDEPENDENT VALUATION REPORTS

134. The AER considers independent valuation reports to be relevant, but only to assessing the overall return on equity. Further, due to perceived limitations, the AER considers that only 'limited reliance' should be placed on this material, and that it should be used in a 'directional role' only.[85]

135. Ultimately it is not clear what practical effect, if any, independent valuation reports have on the AER's decision on the return on equity. As a consequence of their relegation to an overall return on equity 'check' role, they appear to have little or no practical impact on the final estimate. The AER retains its original parameter estimates and model choice once it completes its cross-check against the results of independent expert reports.

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[82]   Wright, S., *Review of Risk Free Rate and Cost of Equity Estimates: A Comparison of U.K. Approaches with the AER*, 25 October 2012.

[83]   John C Handley, *Advice on the Return on Equity*, 16 October 2014, p. 17.

[84]   Sharpe, W., 1964, "Capital asset prices: A theory of market equilibrium under conditions of risk," *Journal of Finance*, 19, 425–442.

[85]   Draft decision, [3-71].

136. We consider that independent valuation reports provide relevant evidence of the required market return and MRP applied by market practitioners. Therefore, evidence from these reports as to the MRP applied by market practitioners should be given a direct role in estimating the MRP.

137. Based on review of recent report undertaken by Incenta[86], SFG concludes that the best estimate of the required market return from independent expert reports continues to be 11.2 per cent.[87] This is based on grossing up an MRP value of 6 per cent—which SFG considers to be conservative—for imputation credits based on theta of 0.35, and adding the prevailing risk-free rate.

138. Incenta has updated its review of independent expert reports. Incenta observes that the market rate of return estimated by independent experts has remained relatively constant in recent times, notwithstanding declines in the 'spot' risk free rate.[88] This implies that the MRP used in these reports, and/or the uplifts used by independent experts, has increased as the risk-free rate has declined.

3.4.3   HISTORICAL EXCESS RETURN ESTIMATES

139. The AER does not accept the adjustment to the historical returns data proposed by NERA. Based on an analysis of the historical data without NERA's adjustments, the AER estimates an MRP of 6.3 per cent for the period 1883 to 2013.[89]

140. NERA explains in detail why its adjustments to the historical data are necessary and addresses each of the AER's concerns with its proposed adjustments.[90] For the reasons set out in NERA's report, we consider that these adjustments are necessary.

141. NERA also addresses the issue of geometric and arithmetic averaging, and recommends use of arithmetic mean of historical returns.[91] For the reasons set out in NERA's report, we continue to use an arithmetic average as the basis for estimates of the historic average excess return and historic average market return.

142. NERA provides updated estimates of the historical excess return, with its adjustments to the dataset. NERA reports that for the period 1883 to 2013, the average MRP—adjusted for the value of imputation credits—is 6.56 per cent.[92]

3.4.4   USE OF DDM ESTIMATES

143. The AER adopts a different construction of the DDM to that used by SFG, and as a result derives a wider range of estimates for the market return and MRP.

144. SFG clearly explains each of the points of difference between its approach and the AER's, and explains why it has taken the approach that it has.[93] In particular, SFG clearly explains the reasons for its choice of long term growth assumption, its estimation approach and dataset. For the reasons set out in SFG's report, we consider that SFG's approach to implementing the DDM is clearly preferable to the AER's.

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86   Incenta, *Update of evidence on the required return on equity from independent expert reports*, May 2014.

87   SFG, *The required return on equity for regulated gas and electricity network businesses*, June 2014, [321].

88   Incenta, *Further update on the required return on equity from independent expert reports*, February 2015.

89   Draft decision, [3-195] (Table 3-39).

90   NERA, *Historical Estimates of the Market Risk Premium*, February 2015.

91   NERA, *Historical Estimates of the Market Risk Premium*, February 2015, section 2.

92   NERA, *Historical Estimates of the Market Risk Premium*, February 2015.

93   SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, February 2015.

145. However, even adopting the AER's preferred construction of the DDM, it is clear that both the market return estimated by the DDM and the implied MRP have increased significantly over the past twelve months, due to the fall in the risk-free rate over this period. Table 3–3 shows the change in return on market estimates from the AER's DDM between the rate of return guideline (December 2013) and the draft decision (November 2014). Given that its estimates of the market return from the DDM have increased while the risk-free rate has fallen, this should indicate to the AER that the MRP is increasing.

Table 3–3 AER dividend discount model estimates of the required return on the market

| | Growth rate (%) | Required return on the market | |
		Two stage model (%)	Three stage model (%)
Guideline	4.0	9.65	10.20
	4.6	10.21	10.65
	5.1	10.68	11.02
Draft decisions	4.0	10.15	10.55
	4.6	10.75	10.95
	5.1	11.25	11.35

Source: AER.[94]

(1) Return on market estimates are derived by adding the AER's reported MRP estimates to the prevailing risk free rate (4.2 per cent at the time of the Guideline and 3.55 per cent at the time of the draft decision).

146. SFG has updated its estimates of the required return on the market portfolio using its preferred construction of the DDM. SFG reports that the best estimate of the expected market return at the current time is 11.37 per cent.[95] We note that this is very close to the estimate produced by the AER's three-stage model using a growth rate of 5.1 per cent.

147. Based on a current risk-free rate of 2.64 per cent,[96] this implies a current MRP of 8.73 per cent using the DDM—this is DDM estimate of the MRP recommended by SFG.[97] Even using the AER's two-stage DDM with a 4 per cent growth rate (which SFG consider to be too low[98]) applied at the time of the draft decision gives a current MRP of 7.51 per cent. Both of these estimates are well above the historical excess return estimates referred to above.

3.4.5   USE OF SURVEY EVIDENCE AND CONDITIONING VARIABLES

148. The AER appears to give material weight to survey evidence, despite evidence as to the limitations of this evidence—and concerns previously expressed by the Tribunal in this regard.[99]

149. SFG considers that survey responses do not provide relevant evidence for the purpose of estimating MRP. SFG observes that that the surveys on which the AER relies do not satisfy the criteria previously set out by the

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[94]   AER, *Rate of return guideline Appendices*, p. 87; *Draft decision*, Attachment 3, p. 200.

[95]   SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, February 2015, [48].

[96]   Risk-free rate is a placeholder estimate, based on a January averaging period (2–30 January 2015).

[97]   SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, February 2015.

[98]   SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, February 2015.

[99]   For example: *Application by Envestra Limited (No 2)* [2012] ACompT 3, [159]-[163].

Tribunal—e.g. some are two-page magazine articles that were completed by audiences that had been 'primed' by the author—and that the evidence suggests that participants are simply regurgitating the historical excess return estimates.[100]

150. In relation to conditioning variables, SFG notes that in aggregate these do not provide a clear signal as to the prevailing market return or MRP.[101] The government bond yield and credit spreads would indicate elevated risk premiums, whereas the dividend yield and implied volatility do not.

151. Therefore, we do not propose to give any role to either survey evidence or conditioning variables in estimating the prevailing market return or MRP. If survey estimates are to be included however, they must be adjusted for the value of imputation credits, to be consistent with other estimates of MRP.

3.4.6   IMPACT OF CHANGES IN MARKET CONDITIONS ON THE MRP ESTIMATE

152. We note that the AER's estimate of the MRP has not changed since publication of it rate of return guideline, despite apparent changes in prevailing market conditions.

153. In particular, the risk-free rate has fallen significantly, from 4.1 per cent at the time the Guideline was published, to 3.55 per cent at the time of the AER's draft decision—and further since the AER's draft decision. This in itself indicates that market conditions may have changed and that the MRP may now be higher than it was at the time the Guideline was published. The MRP could only have remained unchanged if the required return on the market has dropped one-for-one with the risk-free rate.

154. The available evidence does not indicate that the market return has fallen one-for-one with the risk-free rate, or that the MRP has remained constant. On the contrary, forward-looking estimates from the DDM (referred to above) indicate that the market return and MRP have increased significantly since the Guideline was published. This is clear even from the AER's DDM estimates.

155. The approach taken in JGN's proposal to estimating the MRP takes into account changes in prevailing market conditions. Each of the estimation methodologies can be updated for recent data in order to derive a current estimate of the MRP.

156. However, we are concerned that the AER's methodology is not similarly responsive to changes in market conditions. This means that the return on equity estimated by the AER will not reflect prevailing market conditions, as required by the NGR [102] This is likely be due to the fact that the AER's approach fails to take into account a number of relevant estimation methodologies which will provide an indication of current market conditions, such as the Wright approach and evidence from independent expert reports. This is clearly inconsistent with the new rules and the AEMC's intent.

3.4.7   CONCLUSION ON THE MRP

157. For the above reasons, we do not agree with the AER's estimate for the MRP of 6.5 per cent. This estimate does not reflect prevailing conditions in the market for equity funds and will not contribute to the achievement of the allowed rate of return objective. Applying the AER's MRP estimate in the SLCAPM will lead to a return on equity that is below what is required to promote efficient investment in, and efficient use of infrastructure. The AER's decision on the MRP is affected by a number of errors of fact, as described above.

158. We consider that a preferable approach is that set out by SFG. This approach takes into account all relevant evidence on the MRP and applies a transparent weighting to each estimate based on the relative strengths and

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[100]   SFG, *The required return on equity for the benchmark efficient entity*, February 2015, [118].

[101]   SFG, *The required return on equity for the benchmark efficient entity*, February 2015, [123].

[102]   NGR, rule 87(7).

weaknesses of each estimation approach. The reasons for SFG's weighting approach are set out in the expert report submitted with JGN's original proposal.[103]

159. SFG has now updated its estimate of the MRP based on current data. SFG's revised estimate is set out in Table 3–4 below.

Table 3–4: SFG estimates of market risk premium. Per cent.

Estimation method	Market return (%)	MRP (%)	Weighting (%)
Historical excess returns (Ibbotson)	9.20	6.56	20
Historical real market returns (Wright)	11.64	9.00	20
Dividend discount model	11.37	8.73	50
Independent expert reports	9.57	6.93	10
Weighted average	**10.81**	**8.17**	**100**

Source: SFG.[104]

(1)   The risk-free rate assumed in these calculations is a placeholder estimate, based on a January averaging period (2–30 January 2015).

3.5   ASSESSMENT OF THE OVERALL RETURN ON EQUITY AND ERP

160. The AER considers that its allowed equity risk premium (**ERP**)[105] and return on equity is broadly supported by a number of pieces of 'cross-check' evidence. The 'cross-check' evidence referred to by the AER includes:[106]

• estimates using the Wright approach

• the ERP range from the recent Grant Samuel valuation report for Envestra, and

• ERP estimates from 'other market participants', including practitioners and regulators.

161. This section addresses each of the AER's 'cross-checks'.

3.5.1   USE OF THE WRIGHT APPROACH TO SUPPORT THE AER'S ERP ESTIMATE

162. As noted above, we consider that the AER has misinterpreted and misapplied the work of Professor Wright. Wright did not develop an alternative implementation of the SLCAPM for checking of the overall return on equity. Rather, Wright developed an alternative method for estimating the MRP.

163. Further, the way in which the AER has developed its ERP range from the Wright approach means that this 'cross-check' will almost certainly support the AER's ERP estimate. The AER derives a wide range of estimates from the Wright approach by using an equity beta range of 0.4 to 0.7 and a market return range of 10.1 per cent to 12.8 per cent in what it refers to as the 'Wright CAPM'. The AER then checks the reasonableness of its ERP estimate by confirming that it falls within the broad range of estimates derived from the 'Wright CAPM'.

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[103]   SFG, *The required return on equity for regulated gas and electricity network businesses*, June 2014.

[104]   SFG, *The required return on equity for the benchmark efficient entity*, February 2015, Table 5.

[105]   The ERP, as used in the draft decision, refers to the difference between the estimated return on equity and the risk-free rate.

[106]   Draft decision, [3-32].

164. Clearly, if the AER had used its chosen point estimate of beta in the 'Wright CAPM', this cross-check would not support the AER's ERP estimate (Table 3–5). Even if the AER's lower bound value for the market return from Wright approach were to be adopted, the resulting ERP would be above the ERP allowed by the AER (4.59 per cent, compared to 4.55 per cent allowed by the AER). If a midpoint or upper bound value for the market return were to be taken from the Wright approach, the resulting ERP would be significantly higher than the AER-allowed ERP.

Table 3–5: Estimates of the ERP using the Wright approach. Per cent.

Approach to estimating the ERP	ERP estimate (%)
AER approach (equity beta 0.7; MRP 6.5%)	4.55
Wright approach with lower bound R_m estimate (equity beta 0.7; R_m 10.1%)	4.59
Wright approach with midpoint R_m estimate (equity beta 0.7; R_m 11.45%)	5.53
Wright approach with upper bound R_m estimate (equity beta 0.7; R_m 12.8%)	6.48

(1) Estimates of the market return are the AER's estimates, as set out in Table 3-19 of the draft decision. All calculations are based on a risk-free rate of 3.55 per cent.

3.5.2   USE OF THE GRANT SAMUEL ANALYSIS

165. The AER presents a wide ERP range from the Grant Samuel report for Envestra, and on this basis concludes that its ERP estimate is consistent with the range adopted by Grant Samuel.

166. The AER has made critical errors in its interpretation of the Grant Samuel report for Envestra. When these errors are accounted for, it is clear that this evidence does not support the ERP and return on equity estimate adopted by the AER.

167. This range of estimates referred to by the AER encompasses Grant Samuel's 'lower bound' SLCAPM estimate with no imputation adjustment, as well as the upper bound with Grant Samuel's uplift and an imputation adjustment. The AER considers that it is difficult to determine how much of the uplift is attributable to the return on equity, and therefore presents a range of values with and without this uplift.[107]

168. However, the Grant Samuel report clearly indicates that:[108]

- **Uplifted the SLCAPM estimate.** For the purposes of its analysis, Grant Samuel has not used the raw SLCAPM estimate of the return on equity. A fundamental aspect of Grant Samuel's analysis was to conclude that the calculated SLCAPM return on equity was not an appropriate benchmark and understated the realistic required rate of return on equity. This was one reason why Grant Samuel applied an uplift to its SLCAPM estimates. Therefore it is not appropriate to use Grant Samuel's 'lower bound' SLCAPM estimate with no uplift.

- **Applied uplift only to equity.** The Grant Samuel WACC uplift is to account for factors likely to be affecting the return on equity (not the return on debt), including:

    − repricing of risk by equity investors since the GFC

    − alternative models, such as the Gordon Growth Model, currently indicating higher returns on equity than the SLCAPM, and

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107   Draft decision, [3-99].

108   Grant Samuel, *Financial Services Guide and Independent Expert's Report to the Independent Board Sub-committee in relation to the Proposal by APA Group*, 3 March 2014, Appendix 3, pp. 8–9.

− evidence that brokers are currently adopting return on equity estimates that are higher than indicated by the SLCAPM.

Accordingly, it is clear that most (if not all) of this uplift should be attributed to the return on equity.

• **Gave no value to imputation credits.** There is no allowance made by Grant Samuel for imputation credits in the return on equity estimate. Accordingly, for comparison with the AER's ERP estimate, an imputation adjustment must be made.

• **Adopted conservative WACC estimate.** Grant Samuel adopted a WACC estimate at the lower end of its range (6.5 per cent – 7.0 per cent) for the purposes of its valuation of Envestra assets, in order to ensure that the fairness assessment for the APA proposal was robust. That is, Grant Samuel erred towards the lower end of its WACC range to ensure that its NPV valuation of the Envestra assets was conservative on the high side.

169. These issues are addressed in the subsequent clarification letter from Grant Samuel.

170. On a correct interpretation of the Grant Samuel report for Envestra, it is clear that it does not support the AER's ERP estimate. Incenta notes that the range for the return on equity implied by Grant Samuel's uplift factor was from 9.47 per cent to 9.57 per cent, with a respective ERP range of 5.27 per cent to 5.37 per cent, exclusive of any uplift for the value of imputation credits.[109] These Grant Samuel ranges compare with the AER's return on equity of 8.75 per cent and ERP of 4.55 per cent.

171. Thus, the AER's ERP and return on equity estimates in fact fail this cross-check against the Grant Samuel Envestra report. This suggests that the AER's estimate is not consistent with the rate of return objective and not reflective of prevailing conditions in the market for equity funds.

3.5.3 ERP ESTIMATES FROM 'OTHER MARKET PARTICIPANTS', INCLUDING PRACTITIONERS AND REGULATORS

172. The AER refers to an ERP range from market practitioners and other regulators. As it reflects a combination of regulatory decisions and practitioner views over a long timeframe, it is a very wide range. In itself, this wide range of values drawn from various sources over a number of years provides little information or guidance of the current required return on equity.

173. We consider that past decisions of the AER and other regulators should not be used as direct evidence of the required return on equity. These decisions are at best secondary evidence of the prevailing return on equity at previous points in time. However, the return on equity in these decisions:

• will not reflect prevailing market conditions—rather, they will reflect market conditions at the time the decision was made, or possibly earlier periods depending on what estimation techniques were used, and

• may not be consistent with the rate of return objective, to the extent that they have been determined under different regulatory frameworks with different objectives.

174. Use of such decisions will also be circular where it is based on previous decisions the same regulator has made in relation to the return on equity.

175. Certainly, these past regulatory decisions should not be mixed with practitioner evidence under the banner of 'market evidence'. Decisions of regulators do not reflect the views of market practitioners as to the current required return on equity.

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[109] Incenta, *Further update on the required return on equity from independent expert reports*, February 2015, p. 25.

176. In relation to the independent valuation reports referred to by the AER (Table 3-20 of the draft decision), it is clear that the evidence from these reports does not support the AER's ERP estimate. Table 3-20 shows:

   • **Independent valuation reports above AER ERP, except two.** The imputation-adjusted ERP in all but two of these reports is at least 5 per cent—well above the ERP determined by the AER (4.55 per cent).

   • **Grant Samuel's Envestra report is above the AER's when correctly interpreted.** The imputation-adjusted ERP from the Grant Samuel report for Envestra is quoted as 4.47 per cent. However, this appears to be based on the midpoint of Grant Samuel's range of SLCAPM values, with none of the uplift used by Grant Samuel. The WACC value used as the basis for this estimate is 6.2 per cent, which is well below the WACC range actually used by Grant Samuel (6.5 per cent - 7.0 per cent). As noted above, a fundamental aspect of Grant Samuel's analysis was to conclude that the calculated SLCAPM return on equity was not an appropriate benchmark and understated the required rate of return on equity. This was one reason why Grant Samuel applied an uplift to its SLCAPM estimates. Incenta notes that on a correct interpretation of this report, the relevant range for the ERP is 5.27 per cent to 5.37 per cent, exclusive of any uplift for the value of imputation credits.[110] This is clearly does not support the AER's ERP estimate.

   • **Other report does not reflect prevailing conditions.** The only other report with an imputation-adjusted ERP less than 5 per cent is more than ten years old (the 2003 Deloitte report for United Energy). The return on equity and ERP estimate in this report cannot be said to be indicative of current practitioners' views as to the required return on equity.

177. Of the 20 independent valuation reports referred to by the AER which have been published in the last decade, none of these actually used an ERP estimate below 5 per cent (adjusted for imputation). Excluding the 2003 Deloitte report and using the correct range of estimates from the Grant Samuel Envestra report, the ERP range from this evidence is approximately 5–5.8 per cent (based on the reports in Table 3-20 of the draft decision). Therefore, this market evidence clearly does not support the AER's ERP estimate.

178. Finally, in relation to broker reports, JGN has been unable to replicate the ERP and return on equity ranges from these reports referred to by the AER in Table 3-21 of the draft decision. However, we note that the ranges referred to by the AER indicate that brokers had been using risk-free rate values well above the prevailing rate—the difference between the return on equity and ERP values in Table 3-21 is 5 per cent, compared to a prevailing risk-free rate during the relevant period of approximately 3.5 per cent—the AER states that it has relied on broker reports issued between 20 August 2014 and 24 September 2014.[111]

179. If the return on equity estimates from the relevant broker reports are used, and adjusted for the *prevailing* risk-free rate to obtain implied ERP estimates, then it is clear that the return on equity and ERP values in these broker reports is not consistent with the AER's estimate. Even without any adjustment for imputation, the range of return on equity values from these broker reports is 8.5 per cent to 9.9 per cent, implying an ERP range of 5.0 per cent to 6.4 per cent—based on a prevailing risk-free rate over the relevant period of approximately 3.5 per cent. With the AER's adjustment for imputation, the range of return on equity values from these broker reports is 9.1 per cent to 10.6 per cent, implying an ERP range of 5.6 per cent to 7.1 per cent. This can be compared with the AER's draft decision return on equity of 8.1 per cent and ERP of 4.55 per cent.

### 3.5.4 CONCLUSION IN RELATION TO 'CROSS CHECK' EVIDENCE

180. When correctly interpreted, none of the 'cross-check' evidence referred to by the AER supports its ERP estimate. In fact, as shown in Figure 3–3 below, the AER's ERP estimate lies below even the lower bound values indicated by each piece of evidence.

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110   Incenta, *Further update on the required return on equity from independent expert reports*, February 2015, p. 25.

111   Draft decision, [3-94].

181. This indicates that the return on equity estimate derived by the AER using the SLCAPM does not reflect prevailing market conditions and is likely to be less than what is required to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers.

Figure 3–3: Corrected ERP cross-checks
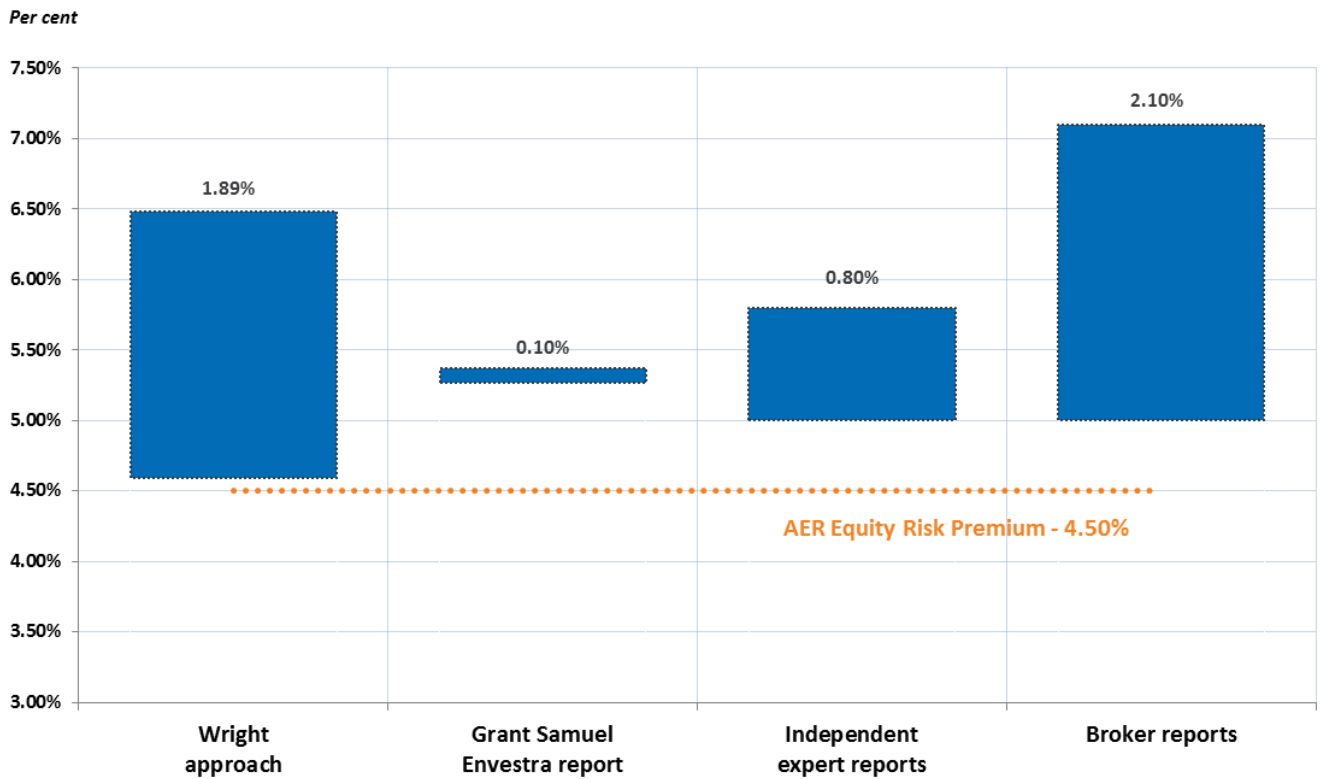
(1) All estimates are based on the AER's estimates of the ERP from each source, adjusted as described above. Risk-free rate assumptions are based on the risk-free rate used in the draft decision (3.55 per cent).

4. REVISED PROPOSAL

182. For reasons set out above, we do not agree with the AER's approach to determining the return on equity, as set out in the draft decision.

4.1 PROPOSED APPROACH

183. JGN maintains its proposal for a multi-model approach to determining the return on equity. This reflects our view that there is no one superior return on equity model, and accordingly each relevant model should be given a direct role in estimating the return on equity. Certainly the SLCAPM cannot be said to be superior to other models, given its known weaknesses.

184. We also maintain our proposed approach to estimating model parameters. For reasons discussed above, this approach differs from the AER's approach in respect of a number of key parameters. In particular:

- **MRP.** We estimate the required return on the market and the MRP by combining evidence from historical excess returns, the Wright approach, the DDM and independent expert reports. The best evidence from each of these sources is combined in a transparent way, as described in the expert report of SFG.[112]

- **Equity beta.** We adopt an equity beta of 0.82, based on SFG's analysis using a wider sample of businesses than that used by the AER's expert.[113]

- **Return on equity models.** Black CAPM, FFM and DDM parameter estimates required to estimate the return on equity using these models are as estimated by SFG (these other return on equity models are not parameterised by the AER in its draft decision).[114]

185. Our proposed approach is set out in detail in our original proposal and the supporting expert reports of SFG. This approach has regard to all relevant models and evidence, and uses this material for its proper purpose. Each of the relevant return on equity models is independently used to derive an estimate of the required return on equity, while other relevant evidence is used to determine the best estimate of each parameter within these models.

186. We consider that our proposed approach provides for a return on equity estimate that reflects prevailing market conditions—including those faced by JGN and its private owners—and which contributes to the achievement of the rate of return objective. It does so by:

- giving all relevant models a direct role in estimating the return on equity, in recognition of the fact that no one model is superior, and

- relying on the best empirical evidence in estimating each model parameter.

187. For reasons discussed above, the AER's approach will not deliver a return on equity estimate which reflects prevailing market conditions and which contributes to the achievement of the rate of return objective and the NGO. The AER's approach is affected by critical errors of fact and errors of logic. These errors lead to a return on equity estimate which is below what is required to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers.

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[112] SFG, *The required return on equity for regulated gas and electricity network businesses*, 6 June 2014, section 3.

[113] SFG, *Equity beta*, 12 May 2014.

[114] SFG, *The required return on equity for regulated gas and electricity network businesses*, 6 June 2014, section 4.

188. Accordingly, we consider that JGN's proposed approach to estimating the return on equity is clearly preferable in terms of it making a contribution to the achievement of the NGO.

4.2 UPDATED ESTIMATES OF MODEL PARAMETERS

189. We obtained updated estimates of model parameters, in order to generate a revised estimate of the required return on equity. This has been done to ensure that the proposed return on equity reflects prevailing market conditions and responds to matters raised in the draft decision.

190. Revised parameter estimates, as reported by SFG, are set out in Table 4–1 below.

Table 4–1: Updated parameter estimates.

Parameter	Updated estimate (%)
Risk-free rate	2.64%
Required return on the market	10.81%
MRP	8.17%
Equity beta	0.82
Zero-beta premium	3.34%
FFM market beta	0.78
FFM size factor (s x SMB)	-0.19%
FFM book-to-market factor (h x HML)	1.15%
DDM estimate of the required return	10.32%

Source: SFG.[115]

(1) Risk-free rate is a placeholder estimate, based on a January averaging period (2–30 January 2015). This will be updated for the final averaging period (19 January–16 February 2015).

4.3 SYNTHESIS OF MODEL RESULTS

191. For reasons previously discussed, and following a thorough examination and comparison of the merits of the different models and estimation methods, we consider that at least equal weight should be given to the results of other return on equity models (besides the SLCAPM), given the relative strengths of these models. Certainly, the SLCAPM should be given no more than equal weight, given its known deficiencies.

192. We have previously argued for greater weight to be given to more recently developed models, particularly the FFM. In its original proposal, JGN gave 37.5 per cent weight to the FFM, 25 per cent each to the Black CAPM and DDM and 12.5 per cent weight to the SLCAPM, based on advice from SFG. This weighting reflected SFG's view of the relative strengths and weaknesses of each model (and in particular, the weaknesses of the SLCAPM, relative to the other asset pricing models).

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[115] SFG, *The required return on equity for the benchmark efficient entity*, February 2015; SFG, *Using the Fama-French model to estimate the required return on equity,* February 2015; SFG, *Share prices, the dividend discount model and the cost of equity for the market and a benchmark energy network*, February 2015; SFG, *Beta and the Black Capital Asset Pricing Model*, February 2015.

193. An alternative approach is to give equal weight to each of the four relevant models. As noted in JGN's original proposal, in the current circumstances there is no evidence to demonstrate that any one model is clearly superior to others, or that one model contains all relevant information. Given that there is no clear basis to distinguish one method or model over others in terms of its likelihood of producing outcomes that contribute to the rate of return objective, it would be appropriate to give equal weight to each model or method. We note that this is consistent with the approach previously taken by the Tribunal to deciding between alternative models or methods.[116]

194. This approach is also consistent with the AER's approach to estimating the return on debt in the JGN draft decision. Faced with two relevant independent third data providers, the AER adopted a simple average of return on debt estimates from each. We see no reason why the same logic should not apply to estimating the return on equity, especially given the evidence before the AER clearly shows that each model has strengths and weaknesses.

195. We consider that either of these weighting approaches would be appropriate in light of the strengths and weaknesses of each model, but in this revised proposal has chosen to adopt an equal weighting approach. JGN's position is that the weighting of each model should reflect its relative strengths and weaknesses. We consider that both the SFG approach and our revised approach reflect this, and we note that the estimates produced by the two approaches are similar. On the basis of the updated estimates set out in this revised proposal, the difference between the weighting proposed in the original proposal, and the weighting proposal in this revised proposal is 0.08 per cent.[117]

196. We consider that the approach to estimating the return on equity as set out in this revised proposal gives effect to the requirements of the NGR that in determining the allowed rate of return regard must be had to relevant estimation methods, financial models, market data and other evidence. Having identified the material that is relevant to estimating the return on equity, and having examined and compared the merits of this material, all of the relevant material is given an appropriate role in the calculation of the return on equity.

197. A revised return on equity estimate, based on equal weighting of the four relevant models, is set out Table 4–2 below.

Table 4–2: Equal weighted return on equity estimate. Per cent.

Model	Required return on equity (%)	Weighting (%)
SLCAPM	9.32	25
Black CAPM	9.93	25
FFM	9.93	25
DDM	10.32	25
Weighted average	**9.87**	**100**

Source: SFG.[118]

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[116]   *Application by ActewAGL Distribution* [2010] ACompT 4, [78]. In that case, the Tribunal was considering alternative methods for estimating the return on debt. The Tribunal noted that if there was no basis to distinguish the alternative methods, then taking an average would be appropriate.

[117]   SFG, *The required return on equity for the benchmark efficient entity*, February 2015, section 5. SFG calculates a return on equity based on its unequal weighting approach of 9.95 per cent. Based on the equal weighting approach, the return on equity is 9.87 per cent.

[118]   SFG, *The required return on equity for the benchmark efficient entity*, February 2015, section 5.