Preliminary analysis of rule change proposals

Report for AEMC

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1. Executive summary

Background and context

1. SFG Consulting (**SFG**) has been engaged by the Australian Energy Markets Commission (**AEMC**) to provide advice in relation to proposals to vary the National Electricity Rules (**NER**) and the National Gas Rules (**NGR**). The proposals have been made by the Australian Energy Regulator (**AER**) and the Energy Users Rule Change Committee (**EURCC**).

2. The AEMC is required to consider these proposals within the context of the National Electricity Law (**NEL**) and the National Gas Law (**NGL**). Specifically, the AEMC is required to have regard to the National Electricity Objective (**NEO**) and the National Gas Objective (**NGO**) and whether any rule change would contribute to the achievement of the relevant objective. The AEMC must also take into account the Revenue and Pricing Principles that are set out in the NEL and NGL respectively.

3. In considering the rule change proposals, the AEMC has indicated that it will first consider whether there is an issue or problem with the current Rules that needs to be addressed. It will do this by considering whether there is any evidence that the current Rules are not achieving the Objectives or are producing outcomes that are inconsistent with the Revenue and Pricing Principles.

4. If the AEMC determines that such a problem or issue has been established, it will then consider whether the proposed rule changes, or some other set of rule changes, would best address that problem or issue. In particular, the AEMC will consider what set of rule changes would best contribute to the achievement of the NEO and NGO respectively, taking into account the relevant Pricing Principles.

5. SFG has been engaged to provide advice to the AEMC on the rule change proposals insofar as they relate to the estimation of the weighted average cost of capital (**WACC**).

Conclusions in relation to WACC estimation framework

6. Our analysis follows the broad framework set out by the AEMC:

    a) We first consider the requirements of the NEL and NGL generally and the NEO, NGO and Revenue and Pricing Principles specifically;

    b) We then evaluate the current Rules for electricity transmission and distribution and gas pipelines to determine whether the requirements in (a) are being met;

    c) To the extent that the current Rules do not meet the requirements of the NEL and NGL, we consider whether the proposed rule changes would (better) meet those requirements; and

    d) We consider whether rule changes other than those which have been proposed would better contribute to the achievement of the NEO and NGO, taking into account the relevant revenue and pricing principles.

7. Our primary conclusions are:

    a) The NEO, NGO and Revenue and Pricing Principles set out in the NEL and NGL require the best possible regulatory estimate of WACC;

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b) The current rules for electricity transmission NSPs, electricity distribution NSPs and gas pipeline businesses all have features that prevent the highest-quality WACC estimates from being achieved. Since the Objectives and Revenue and Pricing Principles require the best possible WACC estimates, it follows that the threshold for review of the existing rules has been reached;

c) The rule changes proposed by the AER and EURCC would not produce the best possible regulatory estimates of WACC, and in some respects are likely to produce estimates that are inferior and more prone to error than the estimates that are produced under the current Rules; and

d) Rule changes different from those proposed by the AER and EURCC may produce higher-quality WACC estimates and so should be considered further.

8. Our conclusions pertaining to a number of specific issues in relation to WACC estimation are:

a) Consideration should be given to adopting the principle that a common WACC estimation framework (not common parameters, but a common set of Rules) should be applied across the three industries (electricity transmission, electricity distribution, gas pipelines);

b) If a common WACC definition is to be applied, the obvious default would be the vanilla post-tax nominal definition that is used under the NER. Submissions could be sought on alternative proposals, where those submissions would have to explain why that alternative was likely to result in a higher-quality WACC estimate;

c) Consideration should be given to allowing regulators to consider models other than the Capital Asset Pricing Model (**CAPM**) when estimating the required return on equity for all three industries. Submissions could be sought on any prescriptions or principles that might be inserted into the Rules to guide the way in which information from other models might be used – within the framework of seeking to produce a high-quality WACC estimate;

d) Consideration should be given to allowing regulators the flexibility to adopt the parameter estimates that they believe to be most appropriate for the particular network or pipeline in question rather than being constrained to adopt the same parameter estimates for all regulated firms;[1]

e) Consideration should be given to allowing regulators the flexibility to adopt the parameter estimates that they believe to be most appropriate at the time of each determination. Submissions could be sought on whether there are any reasons to support the view that fixing parameters for five years would produce higher quality WACC estimates. This comment applies to all WACC parameter estimates.

f) Consideration should be given to allowing a merits review of WACC parameters (for all three industries) on the basis that more scrutiny of parameter estimates is likely to produce higher-quality WACC estimates. Submissions could be sought whether there are any reasons to

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[1] Although it is difficult to empirically establish differences in parameter estimates between sectors, it is conceptually possible for there to be differences between sectors, or even (for example) between different pipelines within the same sector or within the same firm, in terms of risk and capacity to bear debt. For example, this can be driven by differences in the type of contracts (e.g., long-term take-or-pay or at risk) and the nature of the customer base (e.g., diversified or concentrated; industrial or residential).

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support the view that eliminating merits reviews would produce higher quality WACC estimates.

Conclusions in relation to differential treatment for government-owned entities

9. The EURCC has proposed that the debt risk premium (**DRP**) should be estimated in a different way for government-owned and private sector NSPs. Specifically, the proposal is that the DRP for government-owned NSPs would be lower – set according to the historical yields on certain state government bonds.

10. In our view, the EURCC proposal for different arrangements to apply to government-owned and private sector NSPs should be rejected because:

    a) It is based on flawed analysis in that it:

        i) Fails to recognise government guarantee or competitive neutrality fees; and

        ii) Confuses the roles of shareholder and taxing authority;

    b) It would have the effect of creating artificial market distortions; and

    c) It would effectively remove from state governments the option of ever being able to release capital from government-owned NSPs.

Conclusions in relation to estimation of debt risk premium

11. In setting regulated rates of return the debt risk premium has become a contentious issue in recent years. In part, this has occurred because of changes in the market for traded corporate debt in Australia. Subsequent to the global financial crisis we have observed relatively less new issues of long-dated corporate debt. This increases estimation error when the objective is to estimate the yield to maturity on long-dated corporate debt. Regulated entities argue that this estimation issue has been exacerbated by the use of a narrow selection of data by the AER in performing its analysis.

12. The first reason the issue is contentious is that regulated entities have recently borrowed debt at relatively short terms to maturity, and at lower rates than the cost of debt component in the regulated rate of return. The AER argues that regulated businesses are earning an abnormal return because the cost of debt component in the regulated rate of return exceeds the yield to maturity on debt which they could issue today.[2] The regulated businesses dispute this assessment, and argue that the difference between the regulated rate of return and their cost of debt simply reflects their refinancing risk.[3] More formally, they argue that the lower yield to maturity available on short-term debt, relative to long-term debt, is offset by an increase in the required return to equity holders which has not been considered by the AER. The rule change proposed by the AER is that the regulator should be given increased flexibility to determine the methodology which underpins the estimated debt risk premium.

13. A second reason for this contention is the significant increase in the debt risk premium above historical levels. The EURCC argues that the businesses are earning an abnormal return because the cost of debt component in the regulated rate of return exceeds the interest costs on debt previously

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[2] AER (2011a, 2011b).
[3] APIA (2011), CEG (2011a, 2011b), Energex (2011).

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issued.[4] The rule change proposed by the EURCC is that the cost of debt allowed by the regulator should reflect interest costs on debt issued prior to the regulatory period. This would represent a fundamental change to the principles which underpin the regulated rate of return. It would also embed a clear inconsistency between the principles which underpin the cost of debt and equity components of the regulated rates of return.[5] Specifically, the cost of equity component would reflect the return equity holders require to encourage them to commit to a new project today; while the cost of debt component would reflect the return debt holders required to entice them to commit funds in a prior period.

14. In all likelihood, the historical indexing approach of the EURCC will produce cost of debt estimates which exhibit lower variation over time from one determination to the next. If this time-series stability promotes a regulatory objective then it should be considered. However, it should also be made clear that this computation does not represent an estimate of the prevailing cost of funds at the time of the determination.

15. In short, the regulated rate of return will not be an estimate of the cost of capital. The principle which underpins the regulatory framework in Australia is to estimate a price which equates the present value of expected cash flows to the regulated asset base. If the regulated rate of return is set at a rate other than the cost of capital this will no longer hold. Investment decisions will be distorted. It may be the case that there are benefits of setting the regulated rate of return in a manner which exhibits less variation over time. However, any decision to adopt an alternative construct for setting the regulated rate of return should outline why these benefits offset the costs associated with investment distortions.

16. In addressing these issues it is useful to outline the facts about the corporate debt market that are not in question. First, the debt risk premium is above levels observed prior to the global financial crisis. Second, there is an upward-sloping yield curve and it is easier to obtain debt finance at short terms to maturity relative to long terms to maturity. So, if the debt risk premium reflects the cost of funds at the present time and is based upon the assumption of a long-dated term to maturity, we will observe debt risk premiums which: (1) exceed the premiums on previously-issued debt; and (2) exceed premiums on debt issued with a short term to maturity.

17. In themselves, these facts do not imply that regulatory estimates of the debt risk premium are overstated. It could well be the case that the difference between long-term and short-term borrowing rates represents an appropriate premium for bearing refinancing risk. With respect to recent interest rates, the mere fact that interest rates have risen does not in itself imply that abnormal returns are being earned. Furthermore, there appears to be no conceptual reason why financing costs should be treated differently from other costs in terms of incentives. If a regulated entity is able to source finance at rates below an efficient benchmark, perhaps because of superior trading or risk management techniques, why should these cost savings be treated differently from other cost savings?

18. One answer as to why these savings might be treated differently is that there is no mechanism for these savings to be factored into efficient cost estimates in the next regulatory period. This contrasts with other operating costs in which the regulator will factor in the cost savings in its expectation of efficient costs in a subsequent period.

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[4] EURCC (2011).
[5] Endeavour Energy (2011).

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19. However, there is an important distinction between the ability of an individual entity to obtain finance at below-benchmark rates, and consistent generation of abnormal returns amongst regulated energy networks. If we observe that the sector is, in fact, *consistently* able to obtain debt finance on a *risk-adjusted basis* at below-benchmark rates, then there is evidence that the benchmark is mis-specified. Merely observing that at one point in time the sector is borrowing at short-term rates which are below long-term rates does not establish that abnormal returns are being earned on a consistent basis.

20. This prompts the question of what evidence would establish that the debt risk premium was overstated. This would occur if the benchmark estimate is mis-specified, such that it systematically overstated the cost of debt for an entity of similar risk. In other words, the debt risk premium is overstated if the benchmark is biased. At present the NER specify the following benchmark characteristics – an Australian corporate bond, with term to maturity equal to that used to derive the risk-free rate, and with a credit rating from a recognised agency.

21. The proposals put forward by the AER and the EURCC do not provide direct evidence that this benchmark is biased. Below, we consider whether there is a bias in terms of the term to maturity, credit rating or the specification of a corporate bond.

22. Consider, first, the term to maturity. The proposals do not establish that regulated businesses earn abnormal returns by issuing debt at a short term to maturity. Regulated businesses have issued short term debt in recent years as a result of the illiquidity and high premiums required to issue long-term debt. If there has been a structural break in the manner in which long-lived assets are financed in the debt market (that is, a paradigm shift to the use of short-term rather than long-term debt) then it is arguable that the benchmark should reflect this structural break. But the proposals do not provide evidence that current debt market conditions do not simply reflect a high risk premium required by lenders for financing long-lived assets.

23. A numerical example illustrates the point. Suppose that the regulated business offers to borrow long-dated debt at a debt risk premium of 3% but the lender is only willing to lend at a premium of 5%. This is unacceptable to the borrower so there is no bond issuance. However, both the borrower and lender are prepared to accept a premium of 2% on short-dated debt and we observe this bond issuance. If we could observe the yield to maturity on long-dated debt, because an agreement was reached, the observed premium would be within the range of 3 to 5%. What we in fact observe is a short-term premium of 2%.

24. This characterises debt market conditions in the global financial crisis – a steep upward slope to the yield curve and limited bond issuance of long-dated debt. According to the current benchmark, the debt risk premium factored into the regulated rate of return would be within the range of 3 to 5%. Compared to previous estimates, this estimate would have higher estimation error, because of the reduced number of long-dated debt issuances. But the appropriate debt risk premium for long-lived assets would be within this range. The lower debt figure of 2% would be estimated with more precision, because there are more bond issuances of short-dated debt. But this lower figure would simply represent the increased risk borne by equity holders of the asset who would bear increased refinancing risk.

25. It is also important to note that there has been no discussion in the proposals or submissions to the effect that theories underlying efficient term to maturity of debt have been made redundant. It could be the case that we have observed fewer long-dated debt issues in recent years because the prior rationale – long-lived assets are financed with long-term debt – no longer holds; or it could be the

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case that the current use of short-term debt is merely a second-best solution in the circumstances, whereby borrowers and lenders are not prepared to agree on terms for long-dated debt.

26. The second issue to consider is the benchmark credit rating, which is for the regulator to determine. The benchmark will be biased if the true cost of debt capital for regulated utilities, with the same credit rating as the benchmark, is below the yield to maturity on bonds which comprise the benchmark. The proposals have not established that this occurs. It is known that utilities are able to adopt higher leverage than businesses in other industries and maintain the same credit rating. This is reflected in the typical 60% gearing assumption in the regulated rate of return. However, the proposals have not provided evidence that reference to the yield on bonds of a given credit rating in general are higher than the yields on bonds for regulated utilities with the same credit rating.

27. The third component of the benchmark to consider is the specification of a corporate bond. The benchmark will be biased if corporate bond yields are systematically higher than interest costs on other sources of debt, and those other sources of debt are the predominant form of debt financing for regulated utilities. The proposals do not establish that this is the case. In general, the proposals contend that the cost of debt component of the regulated rate of return should be more reflective of the actual cost of debt, where the term actual refers to all debt financing sources and not just the issuance of corporate bonds. The interest rate applicable to these debt sources will reflect their characteristics, including term to maturity, liquidity, security and other debt covenants, including provisions which trigger rights which the lender can exercise.

28. In terms of the regulated rate of return, the issue is whether the corporate bond specification results in regulated entities systematically earning an abnormal return on their borrowing. Observing that an entity borrows using instruments other than corporate bonds, or borrows at rates below corporate bond rates, does not establish that the benchmark is mis-specified. If the same entity was able to re-negotiate its labour agreements or supply contracts to reduce its costs to below benchmark levels we would not necessarily conclude that the benchmark is mis-specified.

29. The issue is whether the predominant borrowing arrangements of regulated utilities are such that, in aggregate and on a long-term basis, they are consistently funded at rates below benchmark levels. It is not clear from the proposals that the corporate bond benchmark is no longer appropriate. It is also not clear that the regulator is constrained from analysing other data sources in order to estimate the yield on corporate bonds. As mentioned above, there are directional relationships between characteristics of debt securities and their yields, including security, liquidity, term to maturity and covenants. If the regulator is able to observe yields on debt other than corporate bonds and is also able to observe these characteristics, this could provide information about benchmark corporate bond yields.

30. The important interpretation question is whether the benchmark specification – an Australian corporate bond with term to maturity equal to that used in estimating the risk-free rate – defines the dataset available for analysis, or whether it represents a benchmark which can be estimated with a more expansive dataset, appropriately analysed. In merits reviews, the Australian Competition Tribunal has adopted a broader interpretation of the benchmark specification than the AER. The Tribunal's interpretation appears to be that the benchmark specification in the rules does not prescribe the dataset because it allowed analysis of bonds which had credit ratings different from benchmark specification and at terms to maturity below benchmark specification. The analysis of data other than corporate bond yields, such as credit default swap spreads, in order to estimate benchmark corporate bond yields, has not yet been tested. However, this is a question of statutory interpretation for which the AEMC should seek legal advice.

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31. In summary, we have proposals to significantly change the manner in which the regulator estimates the cost of debt component of regulated rates of return. Both these proposals are predicated on the premise that there is a problem to be solved, that the current rules result in a systematic overstatement of the cost of debt. It is questionable whether this premise has been established. Regulated businesses do not dispute that there is an upward-sloping yield curve, that interest rates have risen in recent years, and that there is been relatively more short-term borrowing in recent years compared to history. What is not clear from the proposals is that the debt risk premium component of the regulated rate of return allows those businesses to earn abnormal rates of return. If it can be established that the current benchmark approach is systematically biased in this manner, then further analysis can determine whether either proposal provides a useful means of correcting this bias.

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2. Summary of WACC-related rule change proposals

AER Proposals

32. The AER has proposed a number of rule changes that relate to the process and framework that is used to estimate the regulatory WACC as well as specific proposals in relation to the estimation of the debt risk premium. In this section, we summarise the proposals that have been made, and the AER's stated reasons for making these proposals.

Common framework and parameters across industries, no merits review

33. The present situation is that a different set of rules applies to each of the three different industry groups as follows:[6]

a) **Electricity transmission** businesses are governed by Chapter 6A of the National Electricity Rules under which:

   i) A WACC review is undertaken at fixed five-yearly intervals;

   ii) A post-tax nominal framework must be used and the Capital Asset Pricing Model must be used to estimate the required return on equity;

   iii) The parameters determined during the WACC review must then be applied to each subsequent determination with no ability to depart from the parameters determined during the review. Consequently, there is no scope for any merits review of parameters; and

   iv) At each WACC review, persuasive evidence is required before changing a previously applied value or method.

b) **Electricity distribution** businesses are governed by Chapter 6 of the National Electricity Rules under which:

   i) A WACC review is undertaken at least every five years;

   ii) A post-tax nominal framework must be used and the Capital Asset Pricing Model must be used to estimate the required return on equity; and

   iii) The parameters determined during the WACC review can be departed from in a subsequent determination if persuasive evidence has been established. Decisions on whether or not persuasive evidence has been established in relation to a particular parameter are subject to merits review by the Australian Competition Tribunal;

c) **Gas pipeline** businesses are governed by the National Gas Rules under which:

   i) There is no prescribed industry-wide WACC review, but rather an appropriate set of WACC parameters must be estimated for each determination;

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[6] See also the AER Rule Change Proposal (p. 16)

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ii) There is no prescription on the use of a post-tax nominal framework or the use of the CAPM, but rather:

- the rate of return on capital is required to be commensurate with prevailing conditions in the market for funds and the risk involved in providing the Reference Service[7]; and

- a well-accepted approach that incorporates the cost of equity and debt, such as the Weighted Average Cost of Capital, is to be used; and a well-accepted financial model, such as the Capital Asset Pricing Model, is to be used;[8] and

iii) Determinations are subject to merits review by the Australian Competition Tribunal.

34. The AER has proposed that a common framework should be applied to all three industries such that, in essence, the rules that currently apply to transmission businesses would extend across all regulated energy businesses. The key features of the proposed rule changes are:

a) A single WACC review would be conducted for all three industries. The WACC parameters and methodologies determined in that review would apply to all three industries. The timing of these reviews would be determined by the AER, but reviews must be held at least every five years. There would be no requirement for the AER to meet a persuasive evidence test before changing parameter estimates or estimation methodologies from the previous WACC review;

b) The outcomes of the WACC review would be applied to all subsequent determinations. There would be no opportunity for any merits review and consequently no need for any persuasive evidence test in relation to a specific determination; and

c) A post-tax nominal framework would have to be used and the CAPM would have to be used to estimate the required return on equity.

35. The AER summarises the main features of its proposed rule change as follows:

> Under the proposed rule the WACC review would be undertaken at least every five years, with discretion for the AER to initiate earlier reviews. The parameters (or methodologies) determined during the WACC review would apply to each NSP's revenue determination, as is currently the case under chapter 6A. This proposal streamlines the current process for setting the WACC parameters and provides certainty in setting the WACC for NSPs and consumers. The proposed removal of the persuasive evidence test to apply at the time of each WACC review will provide more flexibility for the AER to deal with changing market circumstances while still ensuring the importance of previously adopted values is taken into account.[9]

Debt risk premium

36. One quantity that must be estimated in any WACC calculation is the required return on debt – the return that debt investors would require in order to provide the required amount of debt capital to

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[7] NGR 87(1).
[8] NGR 87(2).
[9] AER Rule Change Proposal, p. 20.

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the regulated firm. It is standard regulatory practice to estimate the required return on debt as the sum of the risk-free rate and a debt risk premium. The DRP is an estimate of the additional return (over and above the risk-free rate) that debt investors would require from lending to the regulated firm, given the risks involved.

37. The AER summarises the current rules as follows:

> For DNSPs, the meaning of the DRP is specified in clause 6.5.2(e) as the margin between the annualised risk free rate and the observed annualised Australian corporate bond rate for corporate bonds which have a maturity equal to that used to derive the nominal risk free rate, and a credit rating from a recognised credit rating agency. For TNSPs, clause 6A.6.2(e) is the same however specifies a credit rating from Standard and Poor's in lieu of a credit rating from a recognised credit rating agency. Aside from this, the current rules do not specify how to estimate the observed annualised Australian benchmark corporate bond rate.[10]

38. The AER's proposed rule change is to:

   a) Remove the definition of DRP from the Rules; and

   b) Provide for DRP (methodology and value) to be determined during the WACC reviews that would occur at least every five years.

39. That is, the AER would have discretion to use whatever definitions, data and methodologies it considered to be most appropriate for determining the debt risk premium at each WACC review, the outcome of which would not be subject to merits review. The methodology and approach that was adopted in the WACC review would be applied in all subsequent determinations, but the precise values would be updated to reflect current market information at the time of each determination.

40. The proposed rule change would provide the AER with more discretion in how it estimates DRP in that references to Australian corporate bonds, Standard and Poor's credit ratings, and maturities consistent with the estimate of the risk-free rate would be removed from the Rules.

EURCC Proposals

41. The EURCC rule change proposal relates only to the estimation of the DRP parameter. The EURCC proposes that the AER should not be given discretion to determine the DRP, but rather that the full approach for determining the DRP should be specified in the Rules. Under the EURCC proposal, it is unnecessary to estimate the DRP because the required return on debt (the sum of risk-free rate and DRP) would be estimated directly.

42. The proposed approach for estimating the required return on debt differs for government-owned and privately-owned businesses as follows:

   a) For government-owned businesses, the required return on debt would be computed as the average yield to maturity in the previous calendar year of all bonds issued by the relevant government (that owns that NSP) that have between three and seven years to maturity at the end of that calendar year:[11] and

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[10] AER Rule Change Proposal, p. 76.
[11] EURCC Rule Change Proposal, p. 42.

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b) For privately-owned businesses, the required return on debt would be computed as the average yield to maturity over the previous five years of an index of all five-year maturity BBB and A rated corporate debt, with the estimate to be mechanistically updated each year of the price control review.[12]

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[12] EURCC Rule Change Proposal, p. 43.

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3. Framework for analysing rule change proposals

Evaluation to have regard to National Electricity Objective

Overriding considerations when evaluating rule change proposals

43. The National Electricity Law sets out the National Electricity Objective[13] and a set of Revenue and Pricing Principles.[14] The National Gas Law sets out the National Gas Objective (NGO)[15] and the same set of Revenue and Pricing Principles.[16] Under the relevant Laws, the AEMC must have regard to the NEO and the revenue and pricing principles when assessing rule change proposals. The NEL states that:

> In performing or exercising any function or power under this Law, the Regulations or the Rules, the AEMC must have regard to the national electricity objective.[17]

and

> The AEMC may only make a Rule if it is satisfied that the Rule will or is likely to contribute to the achievement of the national electricity objective.[18]

and

> the AEMC must take into account the revenue and pricing principles in making a Rule.[19]

The NGL contains corresponding provisions.[20]

44. The NEL also states that the AEMC may make a rule that differs from a proposed rule change if it considers that the different rule better meets the NEO:

> The AEMC may make a Rule that is different (including materially different) from a market initiated proposed Rule (a ***more preferable Rule***) if the AEMC is satisfied that, having regard to the issue or issues that were raised by the market initiated proposed Rule (to which the more preferable Rule relates), the more preferable Rule will or is likely to better contribute to the achievement of the national electricity objective.[21]

Again, the NGL contains a corresponding provision.[22]

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[13] NEL, s. 7.
[14] NEL, s. 7A.
[15] NGL, s. 23.
[16] NGL, s. 24.
[17] NEL, s.32.
[18] NEL, s.88.
[19] NEL, s.88B.
[20] NGL, s. 72, s. 291, and s. 293.
[21] NEL, s.91A.
[22] NGL, s. 296.

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The Objectives and Revenue and Pricing Principles

45. The NEL sets out the NEO as follows:

> The objective of this Law is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to—
> (a) price, quality, safety, reliability and security of supply of electricity; and
> (b) the reliability, safety and security of the national electricity system.[23]

46. The NEL further sets out a number of Revenue and Pricing Principles. Those with particular relevance to the estimation of WACC are as follows:

> (2) A regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs in—
> (a) providing direct control network services; and
> (b) complying with a regulatory obligation or requirement or making a regulatory payment.
>
> (3) A regulated network service provider should be provided with effective incentives in order to promote economic efficiency with respect to direct control network services the operator provides. The economic efficiency that should be promoted includes—
> (a) efficient investment in a distribution system or transmission system with which the operator provides direct control network services; and
> (b) the efficient provision of electricity network services; and
> (c) the efficient use of the distribution system or transmission system with which the operator provides direct control network services.
> …
> (5) A price or charge for the provision of a direct control network service should allow for a return commensurate with the regulatory and commercial risks involved in providing the direct control network service to which that price or charge relates.
>
> (6) Regard should be had to the economic costs and risks of the potential for under and over investment by a regulated network service provider in, as the case requires, a distribution system or transmission system with which the operator provides direct control network services.
>
> (7) Regard should be had to the economic costs and risks of the potential for under and over utilisation of a distribution system or transmission system with which a regulated network service provider provides direct control network services.[24]

47. In summary:

  a) Any rule change proposal must be evaluated against the Objective and the Revenue and Pricing Principles;

  b) A rule change should only be made if it is considered that it is likely to contribute to the achievement of the Objective more effectively than the existing rules which are to be replaced; and

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[23] NEL, s.7. See also NGL s. 23.
[24] NEL, s.7A. See also NGL s. 24.

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c) If a rule change proposal identifies a problem with the existing rules, and if the AEMC considers that a rule change different from that which is proposed would contribute to achieving the Objective and Revenue and Pricing Principles, the AEMC is not bound to adopt the proposed rule change and should adopt the rule change that it considers to be more consistent with the Objective and Principles.

Application of the Objective and Revenue and Pricing Principles in relation to WACC estimation

48. In relation to WACC estimation, it is our view that the Objective and Revenue and Pricing Principles are best met by having the highest quality WACC estimate that is available. The WACC is an estimate of the return that investors would require in order to commit capital (debt and equity) to finance the assets of the benchmark firm. The concept of a benchmark firm is an important one under the NEL and forms the basis of the entire regulatory WACC framework. As set out above, the NEL refers to "efficient costs," "efficient investment," "efficient use," and so on. Efficiency is measured against the concept of an efficient benchmark firm. In terms of WACC, the NEL requires that regulated firms be provided with a reasonable opportunity to recover at least the *efficient* cost of obtaining the required amount of investment capital. The NEL specifically does *not* provide that the cost of capital of a particular business can be recovered (or passed through to consumers) whatever it may be – because such an arrangement would destroy the incentive for it to operate efficiently. By way of example, a particular firm may employ an inefficient capital structure that results in its cost of capital being higher that what could be achieved by adopting an industry standard efficient mix of debt and equity financing. The NEL allows only the efficient cost to be passed through and therefore creates an incentive for the business to adopt an efficient practice. In our view, the concept of estimating the WACC for an efficient benchmark firm, and of assessing the allowed return on capital with reference to such a benchmark firm, is an essential one under the NEL which seeks to create efficient outcomes. Were the "actual" cost of capital of a specific business (or any component of it) to be passed through to consumers, there would be no incentive to adopt efficient financing practices.

49. WACC estimates differ in quality because (among other reasons) they are based on different information and estimation techniques, are subject to different exercise of judgment, and have been subjected to different levels of analysis and scrutiny and verification. The higher the quality of a WACC estimate, the more likely it is to provide an accurate assessment of the return that investors would require in order to commit capital to the firm. In the remainder of this sub-section, we set out the reasons why a high-quality WACC estimate is required under the National Electricity and Gas Laws.

50. The NEO/NGO is to promote efficient investment in, and efficient operation and use of, electricity and gas services. All of these elements of the Objective are met by having the best, most robust and accurate estimate of WACC that can possibly be achieved. For example, a WACC estimate that is too low (i.e., lower than the true return required by investors) is likely to result in:

a) An inefficiently low level of investment in electricity or gas services as firms would face a disincentive to invest;

b) Inefficient operation of electricity or gas services as firms would face an incentive to reduce costs below normal levels to "catch up" on the return shortfall; and

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c) Inefficient overuse of electricity or gas services as setting the allowed return below the true required return would act as a subsidy such that the price did not reflect the true cost of providing those services.

51. Conversely, a WACC that is set above the true required return would cause inefficiencies in the opposite direction.

52. This implies that the risk of inefficient outcomes is reduced by minimising the potential for the estimated WACC to diverge from the true required return. Efficient outcomes in terms of investment, operation and use of electricity services are most likely to be obtained when the estimate of WACC is as accurate as possible.

53. It may also be argued that another element of efficiency is the cost of obtaining the WACC estimate. A WACC estimation process that is unnecessarily detailed, complex and drawn out, and which incurs considerable expense while producing little marginal benefit, can be considered to be inefficient. However, the cost of the WACC estimation process is:

a) A tiny fraction of the total operating costs of a NSP; and

b) A tiny fraction of the change in an NSP's total revenue requirement that would flow from even a small change in the allowed WACC.

54. That is, when trading off (a) the effect of an erroneous WACC estimate against (b) the cost of obtaining a higher-quality WACC estimate, it will generally be the case that the former dwarfs the latter.

55. Moreover, the NEO/NGO provide guidance about how efficiency should be interpreted, referring to efficient investment in, and efficient operation and use of, electricity and gas services. As discussed above, a poor WACC estimate can have a material effect on all three aspects of efficiency that are set out in the Objectives: the efficiency of investment, operation and use of regulated services. Consistency with the Objectives would seem to require a WACC estimate that is commensurate with the prevailing conditions in the market for funds – as is recognised in the current rules for all three industries.[25]

56. The NEL and NGL also set out a number of Revenue and Pricing Principles that have implications for the estimation of the WACC. The relevant principles, and their application to WACC estimation, are:

a) The regulated business should be provided with a reasonable opportunity to recover at least its efficient costs. One of these costs is the cost of capital. To determine whether a regulated business is being provided with a reasonable opportunity to recover at least its efficient cost of capital, we need an accurate estimate of the WACC. A lower quality WACC estimate (e.g., an estimate that is based on limited information and analysis and scrutiny) is more likely to differ from the true required return by a larger margin than would be the case for a higher quality WACC estimate. Consequently the margin of error that must be applied to be confident of at least recovering the efficient cost of capital will be greater for a low-quality WACC estimate than for a high-quality estimate;

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[25] NEL s.6.5.4(e)(1), s.6A.6.2(j)(1), NGR s. 87(1).

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b) The regulated business should be provided with incentives to promote efficiency in the investment, operation and use of electricity services. This principle largely mirrors the corresponding terms set out in the Objective. For the reasons set out above, efficient outcomes in terms of investment, operation and use of electricity services are most likely to be obtained when the estimate of WACC is as accurate as possible;

c) The price charged for a network service should allow for a return commensurate with the regulatory and commercial risks involved in providing the service. Compliance with this principle obviously requires a proper estimate of the return that is commensurate with the risks involved in providing the service, which is precisely what is sought from the WACC estimation process. This principle can best be met by obtaining the best possible estimate of the WACC – an inaccurate WACC estimate would result in the price charged being inconsistent with the risks involved;[26]

d) Regard should be had to the potential for under- and over-investment in electricity or gas services. If the WACC estimate is set exactly to the true required return, there will be no incentive for under or over investment. Such incentives for inefficient investment become more pronounced when the WACC estimate differs from the true required return;

e) Regard should be had to the potential for under- and over-use of electricity or gas services. Again, if the WACC estimate is set exactly to the true required return, then prices are (by definition) set at the efficient level and there is no distortive effect due to mispricing.

57. In summary, the better, more accurate and more robust a WACC estimate is, the more consistent it will be with the Objective and the Revenue and Pricing Principles set out in the NEL and NGL.

58. One final point to note in relation to the requirements of the NEL and NGL is that there is a potential trade-off between the requirements to consider the efficiency of investment, operation and use of regulated networks and pipelines and the incentives that different WACC estimates might create. For example, a WACC estimate below the true cost of funds that caused prices to be artificially low would create incentives for under-investment and over-use.[27] Conversely, a WACC estimate above the true cost of funds that caused prices to be artificially high would create incentives for over-investment and under-use. Since even the highest-quality WACC estimates are still subject to estimation error, it will never be the case that the estimated WACC will correspond precisely with the required return for the benchmark firm. This implies that there will always be some incentive for either over-investment and under-use or vice versa, although the magnitude of any such incentive reduces as the quality of the WACC estimate is increased.

59. The NEL and NGL recognise this trade-off and provide some guidance as to how to manage it. Specifically, the Revenue and Pricing Principles require that a service provider should be provided with a reasonable opportunity to recover *at least* its efficient costs.[28] That is, the NEL and NGL imply that the costs of over-estimating WACC (higher prices) are outweighed by the costs of under-estimating WACC (incentive to under-invest).

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[26] To determine whether a particular allowed return is commensurate with the risks involved in providing the service, those risks need to be properly understood, which requires proper consideration of other aspects of the particular determination. The point here is that a WACC estimate that is not commensurate with those risks will be inconsistent with the Revenue and Pricing Principles.

[27] See Paragraph 46 above.

[28] NEL s. 7A(2), NGL s.24(3).

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Features of a high-quality WACC estimate

60. High-quality WACC estimates will come from an estimation process that:

   a) **Reflects current market circumstances**. By definition, the WACC is a forward-looking opportunity cost. It is an estimate of the expected return that investors would require in order to commit capital to the firm in the current environment. Since market circumstances vary over time, a firm's cost of capital will also vary over time. For this reason it is important that any WACC estimate properly reflects the current market circumstances. The current Rules recognise this where they refer to the need for the regulatory rate of return to be "a forward looking rate of return that is commensurate with prevailing conditions in the market for funds."[29] The reference to prevailing conditions is important in providing the correct incentives for investment, operation, and use of the regulated networks and pipelines. Suppose it is generally agreed that, (i) at a particular point in time, the cost of capital is relatively high, and (ii) the cost of capital is likely to reduce in the future. If the allowed return was set to an estimate of the (lower) future cost of capital, or to some average of the current and expected future values, that allowed return would (by definition) be below the return that investors currently require to provide capital to the firm. This creates an incentive for under-investment and over-use of regulated networks and pipelines;[30]

   b) **Utilises all of the relevant data**. It seems unlikely that the quality of a WACC estimate could be improved by removing access to some of the relevant data. Consequently, a high-quality WACC estimate would be based on the analysis of all relevant data. This is not to say that all data points or all types of data must receive the same weight, but only that all of the relevant data should be properly considered in the circumstances;

   c) **Considers all relevant estimation methods**. Again, it is not a requirement that different estimation methods must receive equal weight. For example, different methods may be more or less directly relevant to the estimation of a particular parameter and consequently receive different weight, or one approach may be properly used as a point estimate whereas another can be used as an upper bound check. The point here is that all of the relevant estimation methods should be properly considered in the circumstances;

   d) **Ensures internal consistency**. Some WACC parameters are inter-related (e.g. gearing and equity beta). A high-quality WACC estimate ensures that all parameters are consistently estimated. Also, some parameters (e.g., risk-free rate) appear in more than one step of the WACC estimation process. A high-quality WACC estimation framework ensures that consistent estimates are used throughout the process;

   e) **Is open and transparent**. Any estimation process will benefit from advice and information from parties beyond the estimation team. Others will potentially have information about different data sources or estimation techniques. A framework that captures all relevant external information and advice is likely to provide a high-quality estimate. Again, this is not to say that the estimation is effectively sub-contracted, but rather that all external advice and submissions should be properly considered in the circumstances.

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[29] NEL s.6.5.4(e)(1), s.6A.6.2(j)(1), NGR s. 87(1).

[30] Moreover, constructing a reliable estimate of what the WACC might be for the benchmark firm at some time in the future is likely to be impossible as a practical matter in any event.

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f) **Has been subjected to scrutiny**. An important component of a high-quality estimate is the scrutiny and checking process. All of the estimation and analysis on which the estimation team has relied should be available for scrutiny.

g) **Has been cross checked for reasonableness**. WACC estimation should not be conducted in a mechanical way whereby data is processed in a prescribed manner and the output is applied without thought or question. Rather, a number of cross-checks for reasonableness should be applied. For example, it is generally accepted that the required return on equity is higher than the required return on debt in the same firm since the equity is known to have higher risk. This simple type of cross check can be applied to ensure that the estimation process has produced outputs that are reasonable.

Evaluation of rule change proposals

61. Since the NEO/NGO and Revenue and Pricing Principles are best met by obtaining the highest quality WACC estimate, the rule change proposals (insofar as they relate to WACC issues) can be evaluated by considering whether or not they are likely to improve the quality of WACC estimates.

62. Like many products, lower-quality WACC estimates can be produced in less time and at less expense than high-quality WACC estimates. Consequently, there is a trade-off between quality on the one hand and time and expense on the other. However, the costs involved in adopting a framework that is more likely to produce lower-quality WACC estimates is dwarfed by the difference in allowed revenues that flow from small variations in WACC estimates. Consequently, we evaluate the rule change proposals by considering whether or not they are likely to improve the quality of WACC estimates.

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4. Evaluation of current Rules

Overview

63. In this section, we evaluate the current Rules in terms of their ability to produce high-quality WACC estimates that are consistent with the NEO, NGO and Revenue and Pricing Principles. Our conclusion is that the current rules for electricity transmission NSPs, electricity distribution NSPs and gas pipeline businesses all have features that prevent the highest-quality WACC estimates from being achieved. In this section, we summarise some of the main reasons for this conclusion – the aspects of the current rules that have the effect of reducing the quality of regulatory WACC estimates.

64. We note that the goal of this section is determine whether there is a case for concluding that the current rules are affecting the quality of WACC estimates in a way that is inconsistent with the NEO, NGO and Revenue and Pricing Principles. Once this threshold is reached, the AEMC is required to consider what rule changes might be made to best achieve the NEO and NGO. We consider the specific nature of potential rule changes in subsequent sections. In this section, we seek only to establish that the threshold for review of the existing rules has been reached in relation to WACC estimation.

Electricity Transmission Rules

Effect of fixed parameters and estimation methods

65. Over any five-year period, there is likely to be more variation in some WACC parameters than in others. For example, the credit rating of the benchmark firm is likely to be more stable over time than the risk-free rate or debt risk premium. This difference is reflected in the electricity transmission rules, which fix values for some parameters (such as credit rating) but allow up-to-date estimation of others (such as the risk free rate and DRP). The five-yearly WACC review fixes values for some parameters and estimation methods for others.

66. When considering the variability of WACC parameters over time, it is important to distinguish between the true (but unobservable) value of the parameter and the regulatory estimate of that parameter. For example, if market risk premium is estimated primarily with reference to a very long-run average of historical excess returns, the resulting estimate will be very slow to move over time. However, it is well-accepted that the actual return that investors require to invest equity capital in the average firm can increase sharply – during financial crises, for example.

67. The argument in favour of fixing (some) parameter values is couched in terms of regulatory efficiency and stability. If the relevant rules prevent change in certain parameters there will be no debate about those parameters during determinations, which may save time and expense.[31] Also, fixing parameters provides more certainty about what future returns will be available to regulated businesses.

68. The cost of fixing parameters, or even estimation methods, is that the resulting WACC estimates are less likely to be commensurate with prevailing conditions in the market for funds and more likely to distort investment incentives. Suppose, for example, that a parameter value is fixed at the time of a WACC review and circumstances change so that there is now persuasive evidence that a different value would now be appropriate. It cannot, by definition, be the case that the resulting WACC estimate (which relies on a now out-dated parameter estimate) is forward-looking or is commensurate with prevailing conditions in the market for funds – the WACC estimate will be a poor-quality one.

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[31] Unless a fixed regulatory budget is simply spent on submissions on other issues.

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This has the consequence of distorting the incentives to invest, operate, and use the regulated service as set out in the previous section.

69. Specifically, fixing a number of WACC parameters for all determinations over the five-year period between WACC reviews is inconsistent with a number of the features of a high-quality WACC estimation process as set out in Paragraph 59 above:

    a) **Inability to reflect current market conditions**. Whereas some WACC parameters are updated at the time of each determination (e.g., risk-free rate, debt risk premium) others are fixed between WACC reviews. If parameter values are fixed for long periods, and if market conditions change, the WACC estimate will not reflect the current market conditions. For example, if a set of WACC parameters is fixed during a period of financial stability and growth, and if a period of financial crisis occurs during the subsequent five years, the regulatory WACC will no longer be commensurate with current market conditions;

    b) **Inability to correct errors**. The electricity transmission rules have no simple mechanism for correcting errors that are made when estimating parameters at the time of each WACC review. For example, the Tribunal has determined that the AER erred when estimating the gamma parameter to be 0.65 at the time of its 2009 WACC review and that an appropriate estimate (based on the material before the AER) is 0.25. This error has been corrected in subsequent electricity distribution and gas pipeline determinations, but cannot be easily corrected under the electricity transmission rules until the next WACC review; and

    c) **Inability to adjust to changes in data availability**. Under the electricity transmission rules, some parameters do not have values locked in at the time of each WACC review, but rather have an estimation method or data source prescribed for use in subsequent determinations. It is possible that (a) a prescribed data source ceases publishing the relevant data or (b) that a new (and possibly even superior) data source becomes available between WACC reviews. The current Rules do not easily accommodate changes in the estimation methods in such circumstances.

Effect of specification of CAPM: Inability to consider all relevant estimation methods.

70. The current electricity transmission rules specify that the required return on equity must be estimated using the CAPM. In practice, this has been interpreted by the AER as requiring:

    a) The use of the Sharpe-Lintner CAPM;[32]

    b) Beta to be estimated via regression analysis of historical returns of Australian firms;[33]

    c) MRP to be estimated primarily on the basis of historical excess stock returns;[34] and

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[32] Papers developing the Capital Asset Pricing Model were first published by Sharpe (1964) and Lintner (1965). The model developed in these papers corresponds exactly with the mathematical formula set out in s. 6.5.2(b) and s. 6A.6.2(b) of the NER for distribution and transmission businesses respectively. Other versions of Capital Asset Pricing Models have also been published. Appendix 1 contains a summary of a number of approaches that could be used to provide estimates of the required return on equity.

[33] Beta is one of the input parameters for the CAPM, so an estimate of beta is required when using the model to estimate the required return on equity. There are a number of ways to compute beta estimates. The approach adopted by the AER is to consider regression analysis of historical stock returns, as described in Appendix 1. Many data service providers make further statistical refinements (e.g., ValueLine, Bloomberg, Merrill Lynch) and others use a wider set of information about the firm (e.g., BARRA). The AER has focussed on estimates from basic regression analysis applied to a set of Australian firms.

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    d)   as preventing the consideration of any other approaches.

71.   To the extent that other approaches for estimating the required return on equity (such as those that are commonly used in published academic research, those used in commercial settings, and those used by regulators in other jurisdictions[35]) contain some relevant information, excluding them from consideration is unlikely to assist in achieving the highest quality WACC estimate.

72.   The AER's requirement to use "the CAPM" has been quite strict in terms of both the model to be adopted (that is, not to consider alternative, published versions of the CAPM) and the techniques it uses to estimate inputs into the CAPM. The Rules do not prescribe the techniques for estimating the parameter inputs into the CAPM, yet the AER has considered a very narrow information set in estimating these inputs. It can be argued that "CAPM" should be afforded a broader definition than adopted by the AER and that the AER has more flexibility in how it may estimate CAPM parameters. Whether or not this is the case, the practice has been to apply a narrow definition and to exclude potentially relevant information. Since this is unlikely to assist in achieving the highest quality WACC estimate, it provides further support for the view that a change in the existing rules is necessary to better achieve the NEO in light of the Revenue and Pricing Principles.

Effect of specification of DRP: Inability to consider all relevant information.

73.   The current electricity transmission rules specify that the debt risk premium must be estimated with reference to the yield on Australian corporate bonds. The AER and EURCC rule change proposals both state that this rule has resulted in regulated NSPs and gas pipeline businesses being over-compensated in relation to their cost of debt capital. A number of submissions to the AEMC process agree with this conclusion, but others argue that the proper interpretation of the data is that the regulated businesses have in fact been under-compensated.

74.   In our view, there is reason to conclude that the rules in relation to DRP could benefit from revision irrespective of the arguments about over- or under-compensation. If it is the case that the current rules have led to systematic over-compensation, those rules would require revision. Symmetrically, if it is the case that the current rules have led to systematic under-compensation, those rules would also require revision.

75.   Quite independent of these arguments is the fact that the practical implementation of the existing rules has proved to be problematic. The AER has sought to implement the current rules in a number of different ways over a series of determinations across the three industries. The approaches adopted by the AER include estimating the yield on Australian corporate bonds using CBA Spectrum, Bloomberg (with various forms of extrapolation), a combination/average of CBA Spectrum and Bloomberg, various weighted averages of extrapolated Bloomberg and individual bond yields, and an average of a sample of individual bond yields.

76.   On four occasions (across industries) the Tribunal has ruled that the AER has erred in relation to its estimation of DRP.[36] This suggests that the AER's interpretation of the current rules are not producing high-quality WACC estimates consistent with the Objectives and Principles set out in the

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[34] There are techniques for extracting the implied MRP from traded security prices using approaches such as the dividend growth model. The AER has focused on estimating the long-run mean MRP by examining estimates of the mean of the excess return (over and above the risk free rate) of a broad-based Australian stock market index.

[35] For example, CEG (2010) examine a sample of 31 regulatory decisions issued by 20 US regulators and conclude (p. 44) that "US regulators overwhelmingly use the DGM model to estimate the cost of equity for regulated utilities."

[36] These decisions are summarised in Appendix 2.

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relevant legislation. Logically, it is either the case that (a) the AER's estimates of DRP have truly been consistently erroneous or (b) the AER's estimates of DRP really are high-quality estimates of the true DRP but the current rules are drafted so as to prevent those estimates from standing. In either case, the existing rules would be in need of modification, in which case the threshold for review has been reached.

77. While the AER's determination of the DRP has been the subject of successful appeals this does not necessarily mean that the benchmark specification is biased. The AER's interpretation of the benchmark specification is to prescribe the data available for analysis, rather than a construct which it is able to estimate using a wide range of data sources. Therefore, modifications to the rules would not necessarily entail altering the benchmark specification. Rather, the rules could inform the regulator that its information set available to estimate the benchmark is not constrained by the rules.

Electricity distribution rules

78. The electricity distribution rules differ from the transmission rules in that:

   a) parameters or estimation methodologies can be changed between WACC reviews, subject to a persuasive evidence test;[37]

   b) WACC reviews are required to be held *at least* every five years rather than at fixed five-yearly intervals; and

   c) Merits review of determinations is available before the Tribunal.

79. Consequently, the inability to reflect current market conditions, the inability to correct estimation errors and the inability to adjust to changes in data availability (that were identified above as problems with the electricity transmission rules) are not problematic to the same degree under the electricity distribution rules. For example, the AER is able to adopt different parameter estimates if there is persuasive evidence that such a change is required and the AER could also conduct a new WACC review within the five year period.

80. In its rule change proposal, the AER has identified a number of different interpretations of the meaning of "persuasive evidence" including whether that term is limited to new evidence since the previous WACC review, whether there must be unanimous agreement among experts before it is considered to be persuasive, whether persuasiveness can be quantified via a statistical confidence interval, whether persuasive evidence is that which proves the previous value to be incorrect, and so on.[38]

81. On this point, the Australian Competition Tribunal has concluded that:

> the adjective "persuasive" bears its ordinary meaning of able to persuade or induce a belief.[39]

82. In practice, the requirement for persuasive evidence has had no practical effect on the extent to which the AER has sought to vary parameter values. Of all the parameter values that were fixed at the last WACC review, the AER has only sought to vary the estimate of MRP – from 6.5% at the

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[37] NER s. 6.5.4(g).
[38] AER Rule Change Proposal, p. 72.
[39] Application by Energex Ltd No 2, [2010] ACompT 7, Paragraph 23.

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time of the WACC review to 6% in recent determinations. It has made the same variation in its most recent electricity distribution draft determination[40] and recent gas determinations – where there is no persuasive evidence test, only a requirement that the WACC estimate must be commensurate with current conditions in the market for funds.

83. It seems that the persuasive evidence test would only have an effect beyond the requirement for the WACC estimate to be commensurate with prevailing conditions in circumstances where a regulator considered that:

   a) the WACC review estimate was not commensurate with the prevailing conditions, but

   b) the evidence to move from the WACC review estimate was not persuasive (in the ordinary sense of that word).

84. It is difficult to imagine a scenario that simultaneously meets these two conditions. It could be argued that it is easier to observe cases in which the AER considers the persuasive evidence test has been met, than in cases where the AER considers this threshold has not been met. Perhaps the persuasive evidence requirement impacts upon internal deliberations which do not form part of the AER's written determinations, so the requirement has more impact than it appears. However, if that were true the AER's rule change proposal and submissions would presumably include examples where the persuasive evidence test prevented it from arriving at an estimate of the prevailing cost of funds. The AER clearly believes that the cost of debt component of the regulated rate of return is overstated, due to its perceived benchmarking constraint. But, on other parameter estimates, it has not advanced examples in which the estimates are inappropriately constrained by the persuasive evidence test.

85. Accelerating the distribution WACC review so that its timing did not coincide with the transmission WACC review would be expensive and time consuming. Also, the regulator will consider whether having a materially different set of parameters for transmission and distribution may have a distortive effect on investment between industries. Consequently, the problems identified above in relation to the transmission rules have the potential to have an indirect effect on WACC estimation under the distribution rules.

86. As for the transmission rules, the distribution rules specify that the required return on equity must be estimated using the CAPM, and the AER has applied the same interpretation of this requirement in its transmission and distribution determinations. As for transmission, to the extent that other approaches for estimating the required return on equity contain some relevant information, excluding them from consideration is unlikely to assist in achieving the highest quality WACC estimate.

87. In relation to the estimation of the DRP, the issues set out above for transmission businesses apply equally to distribution businesses.

Gas pipeline rules

88. The NGR do not provide for any system of industry-wide WACC parameter reviews, rather each determination is conducted as a separate exercise. Consequently, there is no requirement for any parameters or estimation methods or data sources to be held fixed. In practice, the AER has generally adopted the same parameters and estimation methods for gas and electricity determinations. This may, in part, be due to consideration of the potentially distortive effect on investment of having

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[40] Aurora Draft Determination (Tasmania).

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materially different parameter estimates across industries. This is not to suggest that any particular change should be made to the NGR, but rather that there is potential for the NER to have some residual effect on outcomes under the NGR.

89. The NGR do not require that the CAPM must be used to estimate the required return on equity. However, in practice the AER has used the CAPM exclusively in all of its gas determinations. Excluding other approaches from consideration is unlikely to assist in achieving the highest quality WACC estimate. In general, excluding any relevant information from consideration will lower the quality of any estimate. In the present case, estimates from other approaches could be used in a number of ways including (i) producing a range of estimates of the required return on equity from which a final estimate can be selected, or (ii) using the estimates from other approaches as a cross check on the reasonableness of an estimate produced by inserting a particular set of parameter estimates into the CAPM.

90. Although consideration of other approaches is allowed under the NGR, this has not occurred in practice. Again, this is not to suggest that any particular change should be made to the NGR, but rather that there is potential for the NER to have some residual effect on outcomes under the NGR.

91. In relation to the estimation of the DRP, the issues set out above for electricity NSPs apply equally to gas businesses – in practice, the AER has not distinguished between electricity and gas businesses in estimating DRP.

Conclusions

92. The purpose of this section is to determine whether the threshold for review of the existing rules has been reached in relation to WACC estimation. We conclude that the current rules for electricity transmission NSPs, electricity distribution NSPs and gas pipeline businesses all have features that prevent the highest-quality WACC estimates from being achieved. Since the Objectives and Revenue and Pricing Principles require the best possible WACC estimates, it follows that the threshold for review of the existing rules has been reached. In the subsequent sections, we examine the specific nature of the rule changes that might be considered, within the framework developed in Section 3.

93. One key consideration for the AEMC is the question of whether the Gas Rules, with their greater flexibility in relation to WACC estimation, have produced superior outcomes to the Electricity Rules. However, it is difficult to make a determination on this point since the Electricity Rules are likely to have had some influence on decisions under the Gas Rules. As noted above, in practice, the AER has generally adopted the same parameters and estimation methods for gas and electricity determinations, possibly due to consideration of the potentially distortive effect on investment of having materially different parameter estimates across industries. The ERA has also made determinations for electricity distribution businesses (Western Power) and gas pipelines. Its approach is also to have a high degree of consistency between sectors. Over time the ERA has applied different equity beta estimates to electricity distribution and various gas pipelines, but it has generally adopted a common approach in setting market wide parameters and in rejecting the use of models other than the CAPM.

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5. Evaluation of WACC estimation framework issues

WACC specification and estimation of the return on equity

Problems and issues identified by the AER

94. In its Rule Change Proposal, the AER notes that different WACC estimation frameworks currently apply across the three industries and that different values of the same WACC parameter can be applied to businesses depending on which industry they are in. For example:

   a) The NER provide that a post-tax nominal WACC framework must be used and that the CAPM must be used to estimate the required return on equity, but there are no such requirements under the NGR. This has resulted in some regulated gas businesses proposing to investigate the use of models other than the CAPM and pre-tax and real definitions of WACC; and

   b) Because some parameter values are fixed for five years under the TNSP rules, but are subject to revision under the persuasive evidence test under the DNSP rules, different values for the same parameter can be simultaneously applied to different businesses. For example, gamma values of 0.25 and 0.65 are currently used for DNSPs and TNSPs, respectively.

95. The AER argues that:

   > there appears to be little justification for having different arrangements in setting the WACC between electricity DNSPs and TNSPs and gas networks. The WACC is a benchmark and is largely independent of business/ industry specific considerations.[41]

96. The AER also states that:

   > there appears to be no justification for having differences across sectors with regards to the legal requirements and other processes for setting the WACC, given the rate of return is predominantly based on market and sector wide benchmarks. An unintended consequence of having different WACC frameworks is that they could produce different benchmark parameters when the risks of investment reflected in these parameters should be the same between TNSPs and DNSPs, resulting in investment distortions between sectors.[42]

97. There are three separate, but closely related, issues within this part of the AER's rule change proposal:

   a) Whether the same general WACC estimation framework should be applied to all three industries;

   b) Whether estimation of the required return on equity should be restricted to the CAPM for all three industries; and

   c) Whether each WACC parameter should be set to the same value for all three industries.

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[41] AER Rule Change Proposal, p. 65.
[42] AER Rule Change Proposal, p. 67.

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98. We consider each of these issues in turn below.

Should a common WACC estimation framework be used?

99. When referring to the WACC estimation framework, we mean:

   a) The definition of WACC that is to be applied (e.g., post-tax nominal vs. pre-tax real etc.); and

   b) The approaches that can be adopted to estimate the required return on equity (e.g., CAPM vs. other approaches).

100. In our view, there are several reasons to support the use of a common WACC estimation framework across all three industries;

   a) Adopting a different approach across industries has the potential to lead to allocate inefficiencies. For example, different approaches across industries could lead to materially different allowed returns even though the risk profiles of the two industries were not materially different. This, in turn, would lead to relative over-investment in the high-return industry and under-investment in the low-return industry;

   b) There is no compelling reason to adopt different approaches across the three industries. For example, there is no argument that the CAPM works well for electricity businesses, but not for gas businesses, or that a post-tax nominal WACC is more appropriate for one class of NSPs whereas a pre-tax real approach is more appropriate for others. The differences between the approaches that currently apply to the three industries under the current NER and NGR appear to be more to do with historical accident than a conscious choice to accommodate any perceived need for different approaches;

   c) Although not the determinative consideration, a common approach across industries is likely to result in some administrative cost savings for regulators and for businesses with interests across industries. Having a common approach may also assist in focusing analysis and debate.

101. We recommend that consideration be given to adopting the principle that a common WACC estimation framework should be applied across the three industries. Submissions could be sought in relation to any reasons for *not* adopting a common framework as a principle. Note that the issue here is the *principle* that a common framework would be appropriate. The specific details of the framework are addressed below. Note also that the adoption of a common framework does *not* imply the adoption of common parameters.

102. If a common definition of WACC is to be applied across the three industries, it is likely that a post-tax nominal vanilla definition of WACC (as currently used under the NER and in the AER's post tax revenue model) would be adopted. Officer (1994) has shown that when cash flows are level perpetuities, the allowed revenue would be the same regardless of which definition of WACC was used. However, cash flows for actual businesses vary from year to year in which case different WACC definitions can lead to different outcomes. Incorporating tax effects (such as the potential value of imputation credits and the deductibility of interest payments) via an adjustment to the WACC is a blunt instrument as it requires that the same adjustment must apply to every year. By contrast, using a post-tax vanilla WACC allows the tax wedge adjustment to be incorporated into the

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cash flows as required year by year taking into account the way circumstances might change each year.

103. The specification of which WACC formula to adopt (e.g., post-tax nominal, pre-tax real etc.) did not receive substantial attention in the submissions.

104. Submissions could be sought on whether there are reasons to adopt a WACC definition other than the vanilla post-tax nominal definition that is used under the NER. Alternative proposals would have to explain why that alternative was likely to result in a higher-quality WACC estimate.

Should the CAPM be mandated for all industries?

105. The NER mandate that the required return on equity must be estimated using the CAPM. The NGR require that a "well-accepted financial model such as the CAPM" must be used.[43] In recent determinations, a number of regulated businesses have submitted that other approaches such as the Fama-French three-factor model[44], the Black CAPM[45], and the dividend growth model should also be considered.[46]

106. These alternative models can be treated as:

a) Providing alternative estimates of the required return on equity. In this case, the regulator would apply judgment in selecting an appropriate regulatory estimate in light of all of the relevant information, including the range of estimates provided by the various models; or

b) As a cross-check on the CAPM estimate. In this case, the regulator would use the results of other models (and any other relevant information) to assess the reasonableness of its CAPM estimate. As with any model, the CAPM output (an estimate of the required return on equity) is only as robust and reliable as the input parameter estimates that are used. Cross-checking the output of a CAPM estimate for reasonableness against other models and approaches can be used to determine whether the CAPM inputs have produced an output that is reasonable in the circumstances.

107. To date, the AER (and the ERA, which regulates a number of Western Australian pipeline businesses that have made such submissions) have not accepted that any of the alternative models set out above is well-accepted and have not used any other model in either of the ways set out in the paragraph above. For example, in its Envestra (QLD) Final Decision, the AER concludes that:

> the Black CAPM and Fama–French three–factor model (FFM) are not well accepted, since there is no evidence that these models are used by any of the relevant groups, namely regulators, academics and market practitioners…the DGM is not well accepted for use in the Australian context, since there are no reliable Australian inputs for the model and no evidence that it is used by any of the relevant groups in Australia.[47]

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[43] NGR, Rule 87(2).

[44] Fama and French (1993).

[45] Black (1972).

[46] These alternative models are discussed in Appendix 1. By way of some examples, submissions in relation to the use of alternative models have been made in the Victorian electricity distribution and Queensland and South Australian gas determinations conducted by the AER and the DBP determination conducted by the ERA.

[47] Envestra (QLD) Final Decision, p. 40.

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108. The Economic Regulation Authority (**ERA**) also dealt with this issue in some detail in its DBP Draft Decision, concluding that:

> The Authority has not identified any evidence that the Black CAPM has been broadly applied by financial analysts and business practitioners in valuation or capital budgeting in Australia.[48]

and

> there is insufficient evidence from both theoretical and practical grounds to confirm that the FFM [Fama French Model] is a well accepted financial model.[49]

109. If the goal is to produce the highest-quality estimate of the required return on equity – the value that most closely corresponds with what equity investors would actually require from an investment in the benchmark firm – the question is whether restricting the estimation approach to the CAPM only is more likely to produce the highest-quality estimate. In our view it is difficult to make the case that allowing the regulator to consider more information about the required return on equity would systematically result in lower-quality estimates.

110. We recommend that consideration be given to allowing regulators to consider models other than the CAPM when estimating the required return on equity for all three industries. Submissions could be sought on any prescriptions or principles that might be inserted into the Rules to guide the way in which information from other models might be used – within the framework of seeking to produce a high-quality WACC estimate.

Should the same parameter values be adopted across all industries?

111. A number of WACC parameters are market-wide parameters that do not vary across industries. In the regulatory setting, the risk-free rate, market risk premium, gamma, and corporate tax rate are usually treated as market-wide parameters.

112. Other WACC parameters vary by firm or industry. For example:

a) Equity beta varies depending on the systematic risk of the business in question;

b) Gearing varies depending on the firm's ability to support debt financing; and

c) Credit rating, and consequently debt risk premium, also varies by industry as different types of firms have different levels of credit worthiness.

113. The firm or industry-specific parameters are usually estimated with reference to a set of "comparable" firms. In the Australian market, there is a very limited set of comparable firms, usually consisting of six or fewer, depending on the time period examined. Moreover, some of the comparable firms have a mix of regulated and unregulated assets and others have a mix of electricity and gas assets. This makes *estimation* of parameter differences between gas and electricity or between distribution and transmission impossible to detect. To detect such differences between industries would require a large sample of pure-play gas businesses and a large sample of pure-play electricity business and so on.

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[48] DBP Draft Decision, Paragraph 380.
[49] DBP Draft Decision, Paragraph 395.

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114. Even then, there may be differences between different networks or pipelines within the same industry. For example, APIA submits that risks can vary across gas pipelines depending on the nature of the customer base (e.g., whether concentrated or diverse, and the industry in which customers operate) and the type of contracts that it has entered (e.g., take or pay arrangements, the vintage of the contract, and so on).[50]

115. In our view, a distinction should be drawn between:

a) The conceptual notion that different networks or pipelines even within the same industry may warrant different WACC parameter estimates (e.g., different beta or gearing or credit rating assumptions due to differences in customer type, contractual arrangements, and so on); and

b) The ability to document or to precisely quantify the extent of those differences with the available data.

116. For example, whereas it may be possible to set out a number of reasons why a particular network or pipeline is likely to have a different systematic risk than the average network or pipeline in the industry (because of a difference in the nature of its customers or contractual arrangements), it is unlikely to be possible to precisely quantify the extent of that difference using the available data.

117. But, in our view, this does not imply that all WACC parameters should be fixed to the same number for all networks and pipelines across the three industries. An alternative way of approaching the issue, for example, would be for a regulator to establish a reasonable range for a particular parameter estimate and then to consider how the particular network or pipeline in question might differ from the average network or pipeline in the industry in determining which value from within the reasonable range would be most appropriate.

118. We recommend that consideration be given to allowing regulators the flexibility to adopt the parameter estimates that they believe to be most appropriate for the particular network or pipeline in question rather than being constrained to adopt the same parameter estimates for all regulated firms.

119. Submissions made to the AEMC by regulated businesses and industry associations have generally argued that electricity transmission and distribution businesses are sufficiently uniform to have a common set of WACC parameter estimates but that for gas pipeline businesses different values may be warranted for at least some WACC parameters – and that there may be variation among gas businesses such that some variation of parameter estimates occurs between pipelines within that industry. For example, the ENA submission states that:

> most parameters are business/industry-specific values, for which there may be good reason to observe differences, particularly between electricity and gas businesses; further, within the gas pipeline sector, there are likely to be significant differences between typical gas distribution network services, and particular gas transmission services, which often face very different end-market (and so revenue outlook) characteristics.[51]

120. The Grid Australia submission states support for:

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[50] APIA submission, p. 54 and following.
[51] Grid Australia Submission, p. 56.

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> a process that continues to combine electricity transmission and distribution.

121. The APIA submission presents a number of reasons why gas businesses may differ from electricity businesses and why there may be variation among gas businesses, concluding that:

> The AER's proposed rule change requires the use of the same benchmark WACC parameters for all energy supply infrastructure and is inappropriate. For the AER's rule change proposal to promote the NGO, it must be demonstrated that that financial and capital markets do not distinguish between investments in gas and electricity. This is not the case.[52]

122. In summary, the submissions reject the notion that the same set of WACC parameters should be applied to all businesses within the three regulated industries.

Fixing parameter values for five years and eliminating merits review

Problems and issues identified by the AER

123. In its Rule Change Proposal, the AER has proposed that it would produce a Statement on the Cost of Capital at least every five years and the parameter values (or, for some parameters, estimation methodologies) would remain fixed for all subsequent determinations, with no access to merits review.

124. The AER has proposed this rule change as a way of responding to two issues, which we discuss in turn below:

a) Administrative cost and inconvenience; and

b) The "cherry-picking" nature of applications to the Tribunal.

Administrative cost and inconvenience of frequent reviews

125. In relation to the administrative cost and inconvenience argument, the AER submits that:

> For many parameters, the current rule framework in chapter 6 provides for the AER and DNSPs to be in continual 'WACC review' mode where considerable resources are spent at every determination process re-examining issues.[53]

126. It is common for DNSPs and gas pipeline businesses to make submissions on every WACC parameter at every determination. These submissions must then be examined and considered by the AER and its consultants. This process inevitably takes time and incurs costs. However, as noted above, any costs involved in evaluating WACC submissions are dwarfed by the impact that even very small changes in WACC parameters can have on required revenues on regulated assets.

127. The AER further submits that the extra administrative cost of evaluating WACC submissions at each determination may not produce any tangible benefits:

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[52] APIA Submission, p. 53.
[53] AER Rule Change Proposal, p. 65.

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> networks are incentivised to continually repackage arguments and data which have been previously considered by the regulator
>
> where new information or theory does arise, it is slow to evolve and does not warrant the high administrative and opportunity costs of continually reviewing certain parameters under the current framework.[54]

128. On the issue of re-packaged arguments, it would seem that:

    a) If the AER has already dealt with an argument in a previous determination, the cost of responding to it again would be minimal;

    b) If the argument has appeared in a previous determination, but the data has been updated, there may be some information content in the new data that should be examined in the pursuit of a high-quality WACC estimate; and

    c) It would only be rational for a business to re-package an argument if it felt that that it had not been satisfactorily addressed by the AER and that either the AER or Tribunal may now decide the issue differently.

129. On the issue of WACC parameters being slow to evolve, we note that if the goal is to obtain the highest-quality WACC estimate – the value that most closely corresponds with what investors would actually require from an investment in the benchmark firm – the question is whether fixing parameters for five-year periods is the best way to achieve that goal. If there is likely to be good reason to modify parameter estimates within a five-year period, then preventing those modifications would obviously be inconsistent with the goal of obtaining the highest-quality WACC estimate. Possible reasons for modifying parameters include the availability of new data or estimation techniques, changes to market conditions, and the correction of errors. In the time since the AER's last WACC review (May 2009) there has already been cause for revision of parameters. For example:

    a) The AER has determined that, whereas the best estimate of MRP was 6.5% at the time of the WACC review, market conditions have since changed to the extent that 6% is now the appropriate estimate; and

    b) The Tribunal has held that the AER erred in adopting a gamma estimate of 0.65 at the time of its WACC review and has substituted an estimate of 0.25. Subsequent DNSP determinations have adopted the 0.25 value, but the 0.65 value (which the Tribunal has found to be in error) is required to be maintained for TNSP determinations until the next WACC review.

130. The AER has advocated the use of a five-yearly WACC review as providing a better balance between flexibility and certainty. One problem with a five-yearly WACC review process is that there is more uncertainty about large changes in parameter estimates from one review to the next. We agree that investors in regulated assets have a preference for a stable regulatory regime. But enshrining parameter estimates over five years, rather than allowing those estimates to be adjusted for new information and estimation techniques as they become available, does not imply that the regime is more stable. It simply means that the regulated rate of return will be further away from the best estimate of the cost of capital. There is no reason why a regulator cannot adopt small changes in

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[54] AER Rule Change Proposal, p. 69.

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parameter estimates, which place some weight on new evidence and some weight on evidence which informed its prior opinion, providing an explanation as to the rationale behind any change.

131. A regulator could also explain what new information would persuade it to make further changes to a parameter estimate, thereby focusing submissions in future determinations along these lines. If WACC parameters are fixed according to a five-year review process, there is less ability for a regulator to make small changes to parameter estimates and less ability for it to be proactive in encouraging the production of evidence it would consider to be influential.

132. Another issue is that determinations at the beginning of the five-year cycle will be based on recent WACC estimates whereas those at the end of the cycle will be based on estimates that are nearly five years old, and which will then remain locked in for a further five year reset period. For example, under the current rules the erroneous 0.65 value of gamma would apply to TNSP determinations in late 2013 and which would then apply for a further five years.

133. We recommend that consideration be given to allowing regulators the flexibility to adopt the parameter estimates that they believe to be most appropriate at the time of each determination. Submissions could be sought on whether there are any reasons to support the view that fixing parameters for five years would produce higher quality WACC estimates.

134. One line of argument that might be explored in relation to five-year re-sets and the quality of WACC estimates is the asymmetry of resources and incentives. In this regard, the AER submits that:

> given the technical and ongoing nature of arguments, consumers and other stakeholders may find it difficult to debate WACC issues at every network determination.
>
> Stakeholder engagement is better achieved where all parameters are open for debate in a single focused consultation process, where all affected parties are incentivised to participate and devote resources.[55]

135. However, if rules are to be evaluated in terms of the quality of the WACC estimates they are likely to produce, further submissions on this point would have to be focussed on how a five-year re-set might impact the quality of the WACC estimate.

Cherry-picking in parameter reviews

136. In relation to the cherry-picking nature of Tribunal reviews, the AER submits that

> it remains open for DNSPs to cherry pick those component parameters of the WACC which they consider unfavourable for them. This process detracts from the AER's ability to adequately consider the resulting overall rate of return.[56]

137. There are two possible issues in relation to parties being allowed to refer individual parameter estimates to the Tribunal for review:

    a) There are inter-relationships between some parameters, so a change in one parameter may cause a consequential change in another. For example, the levered equity beta depends on

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[55] AER Rule Change Proposal, p. 69.
[56] AER Rule Change Proposal, p. 65.

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the assumed gearing level. If the level of gearing was to be changed, one would have to consider what consequential changes might then be required to the equity beta estimate. If one parameter is altered by the Tribunal and the flow-on effects on other parameters are ignored, the result would be an internally-inconsistent and biased WACC estimate; and

b) A particular determination may be generous with respect to one parameter and aggressive with respect to another so that the overall WACC is reasonable. If appeals only ever relate to the aggressive parameters, the result would be an upward bias in WACC outcomes.

138. The issue of inter-relationships between parameters can be (and has already been) recognised and addressed by the Tribunal. In the Gamma Case, for example, the Tribunal recognised that a change in the estimate of theta (a component of the gamma estimate) may have a flow-on effect on the estimate of MRP. The Tribunal invited the AER to make submissions on the consequences that a change in the estimate of theta would have on the estimate of MRP. The existence of inter-relationships between WACC parameters would not seem to be a reason for eliminating the availability of merits review.

In this regard, the ENA has submitted that:

> The AER has not presented any evidence of a "cherry picking" problem under the Chapter 6 framework. To the extent that WACC parameters are inter-linked, evidence for a change in one linked parameter must also be persuasive evidence for the change in the other linked parameter. As a matter of principle, the AER does therefore have the ability to make offsetting adjustments to other parameters as necessary under the current Chapter 6 framework.
> …
> Given that opportunities clearly exist for the AER to make offsetting adjustments under the Chapter 6 framework, there is no basis for its claim of cherry picking. To the extent that there are interrelationships between various parameters, the risk of offsetting adjustments being made by the AER causes NSPs to think carefully before challenging any aspect of the WACC. The fact that the AER has chosen not to seek offsetting adjustments suggests that the interrelationships between parameters implied by the AER's contention are mostly insignificant, at least in respect of parameters subject to review thus far.[57]

139. The issue of balancing generous and aggressive WACC parameter estimates is not one that is specifically considered by the Tribunal. Rather, the role of the Tribunal (in relation to WACC matters) is to determine whether any parameter estimate brought before it is the subject of an error. The argument that, although the parameter in question might be in error, there are offsetting errors in other parameters is not one that would be addressed by the Tribunal. Rather, the expectation is that all parameter values should be determined in a way that does not involve error.

140. We recommend that consideration be given to allowing a merits review of WACC parameters (for all three industries) on the basis that more scrutiny of parameter estimates is likely to produce higher-quality WACC estimates. Submissions could be sought whether there are any reasons to support the view that eliminating merits reviews would produce higher quality WACC estimates.

141. An argument to suggest that eliminating merits reviews could produce higher quality WACC estimates is likely to rely on bias – if the regulator errs on the upside in relation to some parameter

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[57] ENA Submission, pp. 43-44.

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estimates and on the downside in relation to others so the effects offset, and if only those errors that disadvantage the regulated business are corrected by the Tribunal, the result would be an upwardly-biased WACC estimate. However, such an argument would also have to explain why the approach of having offsetting errors and no merits review is likely to lead to a higher quality WACC estimate than the alternative approach of having a robust and defensible estimate for every parameter subject to independent scrutiny.

Findings of Australian Competition Tribunal

142. In recent years, the Tribunal has heard a number of merits reviews relating to the estimation of WACC parameters. The Tribunal has concluded, on a number of occasions, that the AER has erred in its estimation of WACC parameters. In particular, these decisions have related to the estimation of debt risk premium (on a number of occasions) and gamma. A summary of some of these decisions is set out in Appendix 2.

143. The existence of a merits review process has enabled these errors to be corrected for electricity distribution and gas pipeline businesses. The absence of a merits review process for electricity transmission businesses has resulted in parameters that the AER accepts are erroneous (gamma in particular) being maintained for transmission businesses. It is difficult to imagine how the goal of obtaining a high quality WACC estimate that is consistent with the prevailing conditions in the market would be better achieved by eliminating merits review.

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6. Different treatment for government-owned and private sector networks and pipelines

Problems and issues identified by the EURCC

144. In its rule change proposal, the EURCC summarises the issue in relation to government-owned networks and pipelines as follows:

> The Committee's argument is as follows:
>
> 1. The Committee recognises state governments' right to compensation from its NSPs in order to ensure that users share in the benefit these NSPs (and their customers) derive from access to inexpensive debt through state government treasuries.
>
> 2. But, the regulatory regime is already providing investment returns to governments that own NSPs that are far in excess of what the AER has anticipated in its price control determinations, or that can be considered to be reasonable.
>
> 3. The Committee suggests that the promotion of the long-term interest of consumers requires that the AEMC has regard to the outcomes being delivered by the regulatory regime as a whole in deciding the appropriate treatment of the return on debt.
>
> Accordingly the Committee proposes that the return on debt for government-owned NSPs should reflect the cost of debt in state government bonds, rather than the cost of debt of privately owned corporations.[58]

145. Various submissions to the AEMC rule change process have pointed out a number of problems with this argument. We consider the most important arguments against the EURCC's conclusions in the remainder of this section.

Failure to recognise government guarantee fees

146. The EURCC submission implicitly assumes that state governments provide debt financing to their state-owned NSPs at the government's cost of borrowing. However, in accordance with National Competition Policy, state governments require their NSPs to pay a "competitive neutrality" or "guarantee" fee to reflect the fact that the stand-alone NSP would have a lower credit rating than the state and, in a competitive market, would have to pay an appropriate spread above the state's borrowing rate.

147. In its submission to the AEMC process, Queensland Treasury Corporation (which arranges and manages debt for the Queensland government-owned NSPs) states that:

> The EURCC has not made a compelling case to depart from National Competition Policy and has overlooked that NSPs pay a competitive neutrality fee to deal with the differential in the cost of debt.[59]

and

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[58] EURCC Rule Change Proposal, pp. 37-38.
[59] Queensland Treasury Corporation Submission, p. 2.

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> The total cost of debt paid by an NSP is made up of a base interest rate (referred to as the book interest rate), administration and capital market fees, and a Competitive Neutrality Fee (CNF) paid to Queensland Treasury. Information on the CNF is available in the Code of Practice for Government Owned Corporations' Financial Arrangements, which is available on Queensland Treasury's website.[60]

148. The competitive neutrality fee is, as the name suggests, designed to remove any funding advantage that government-owned businesses would enjoy from being able to borrow against the state's balance sheet rather than that of their own business. The fee that is charged is an estimate of what the business would pay for its debt funding (over and above the risk-free rate) on a stand-alone basis. It is effectively an estimate of the debt risk premium. The business in question will obtain a stand-alone credit rating (i.e., one that ignores any explicit or implicit government support) and the funding authority will then estimate the yield on corporate debt with the relevant credit rating. These yields are usually estimated by surveying a number of banks on the funding authority's banking panel.[61] These fees must be included in any analysis of the cost of debt funding for government-owned businesses.

Taxation receipts are irrelevant

149. The EURCC proposal contends that "the regulatory regime is already providing investment returns to governments that own NSPs that are far in excess of what the AER has anticipated in its price control determinations, or that can be considered to be reasonable." The main basis for this contention is that state government owners of NSPs receive tax payments from government-owned entities under the tax equivalents regime. This confuses the two roles of the state in relation to government-owned NSPs:

    a) The state is the shareholder and, as for any other shareholder, it is appropriate for the state to earn a return on its equity capital investment (via dividends) that is consistent with the risk of that equity investment; and

    b) The state is the taxing authority and receives taxation payments from the businesses, where those taxation payments are calculated in the same way as for private sector NSPs.

That is, private sector and government-owned NSPs both pay dividends to their shareholders and tax payments (at the same rate) to the relevant taxing authority. Shareholders receive dividends as compensation for bearing risk, and taxing authorities receive tax payments to support the operation of government.

150. The EURCC argues that the dividends paid to the state as the shareholder *and* the taxation payments paid to the state as the taxing authority should be added together when calculating the return on equity. Of course, when taxation revenues are included in this calculation, the resulting estimate of the return on equity appears to be disproportionate to the risk that is borne by the state as the shareholder. But this is quite clearly an inappropriate calculation and an inappropriate conclusion. The return received as a *shareholder* (dividends) should be compared with the risk borne as a *shareholder*. Taxation revenues received as the taxing authority have no part in this comparison.

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[60] Queensland Treasury Corporation Submission, p. 8.

[61] The goal of this exercise is to determine the yield on a similar type of debt (credit rating and term to maturity) that would be paid by an otherwise identical private sector business. We have not performed an analysis comparing the competitive neutrality fees with estimates of private sector debt yields.

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Consequences of proposed rule changes

151. If the EURCC proposals were implemented, the result would be that a government-owned NSP would charge lower prices than an otherwise identical private-sector NSP. The consequences of this differential include:

   a) **Market distortion**: Energy-intensive businesses would have an incentive to locate in (or even move to) areas served by government-owned NSPs. It is exactly this kind of distortion that national competition and competitive neutrality policies seek to remedy; and

   b) **Permanent government ownership**: Since the sale of a government-owned NSP would result in an immediate and material increase in prices, it is unlikely that any such sale would ever be politically feasible.

Dispute in relation to EURCC calculations

152. In its rule change proposal, the EURCC presents a series of calculations to support its conclusions about (i) AER DRP estimates being materially higher than the actual premiums paid by NSPs, and (ii) state government owners receiving excessive returns from their investments in regulated NSPs. These calculations have been disputed in submissions from Queensland Treasury Corporation (QTC) and NSW Treasury.

153. On the issue of excessive DRP estimates, the QTC submission contains a section that sets out a series of potential errors made by the EURCC and its consultants, including:

   a) The EURCC has significantly overstated the difference between the swap issue margins in Table 5 of its submission and the average DRP awarded by the AER;

   b) The EURCC has erred in directly comparing swap issue margins with DRP estimates;

   c) The EURCC's estimate of a DRP of 385 basis points has no basis; and

   d) The DRP estimates adopted by the AER over the time period examined by the EURCC averaged 55 basis points less than the figure reported by the EURCC.[62]

154. On the issue of excessive returns on government-owned NSPs, the QTC submission notes that:

> There is no evidence of excessive profits for Queensland Government-owned NSPs:
>
> The return on average assets for ENERGEX was 6.8 per cent in 2011 and 5.8 per cent in 2010 before asset revaluations, or 9.6 per cent and 7.8 per cent respectively when asset revaluations were taken into account, and
>
> The return on average assets for Ergon Energy before revaluations was 8.0 per cent in 2011 and 5.7 per cent in 2010; with revaluations the figures were 13.8 per cent in 2011 and 6.6 per cent in 2010.

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[62] QTC Submission, pp. 15-16.

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> With the exception of Ergon Energy's 2011 result, which includes a large revaluation of property, plant and equipment, the return on assets earned by the Queensland NSPs have typically been below the WACC allowed in the latest determination.[63]

155. The NSW Treasury submission further notes that:

> The return on equity quoted by the EURCC in support of their arguments of excessive returns to Government is not accurate as it applies to both network and retail business operations. The actual return on equity for the network businesses for 2010 was 5.5% when the non-regulated returns from the retail businesses are removed.[64]

156. In our view, the errors that have been identified in the calculations performed for the EURCC are material and the claims about (i) AER DRP estimates being materially higher than the actual premiums paid by NSPs, and (ii) state government owners receiving excessive returns from their investments in regulated NSPs should be discounted accordingly.

Conclusions and recommendations

157. In our view, the EURCC proposal for different arrangements to apply to government-owned and private sector NSPs should be rejected because:

    a) It is based on flawed analysis in that it:

        i) Fails to recognise government guarantee or competitive neutrality fees; and

        ii) Confuses the roles of shareholder and taxing authority; and

    b) It would have the effect of creating artificial market distortions; and

    c) It would effectively remove from state governments the option of ever being able to release capital from government-owned NSPs.

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[63] QTC Submission, pp. 15-16.
[64] NSW Treasury Submission, p. 2.

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7. Evaluation of debt risk premium estimation issues

Introduction

158. In this section we consider the proposals put forward by the AER and the EURCC for estimation of the debt risk premium. The rationale for both proposals is that the cost of debt component of the regulated rate of return exceeds the interest rate which network businesses pay on their debt. The proponents contend that the businesses are earning regulated returns above their true cost of funds. With respect to government-owned businesses, the EURCC proposal goes one step further to argue that the true cost of funds for consideration is the cost of borrowings to state governments, which excludes the government guarantee fee.

159. The proposal of the AER provides the regulator with greater flexibility in arriving at a methodology for estimating the debt risk premium. It would no longer have to be estimated with a term to maturity equal to that of the risk-free rate, and would no longer have to be estimated with reference to Australian corporate bonds with a particular credit rating. Rather, the regulator would have the flexibility to determine the estimation methodology. The estimate for the cost of debt capital would remain an estimate of the return required by debt holders in a period subsequent to the regulatory determination.[65]

160. The proposal of the EURCC is completely different to that of the AER. The EURCC proposes that the cost of debt component of the regulated rate of return should be estimated with reference to debt which has been previously issued. With respect to government-owned networks the EURCC contends that the regulated rate of return should be determined with reference to the interest rates on government debt issued over a period prior to the regulatory determination. With respect to businesses in private ownership, the EURCC recommends computing an average of benchmark interest rates over a period prior to the regulatory determination.[66] In this section we discuss the implications of estimating the debt risk premium with reference to historical interest rates, having dealt with the issue of ownership implications in the previous section.

161. Regulated businesses and associated organisations have strongly rejected the premise of the proposals, namely that they earn abnormal returns as a result of deficiencies in the Rules.[67]

162. In evaluating these proposals we separately consider the following issues:

   a) What are we trying to estimate?;

   b) Has the AER or the EURCC demonstrated the existence of a problem?;

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[65] The AER proposal is supported by the Economic Regulation Authority (2011) and the Victorian Department of Primary Industries (2011).

[66] The EURCC proposal is supported by the Alternative Technology Association (2011), Amcor (2011), the Australian Chamber of Commerce and Industry (2011), Australian Paper (2011), Bellala (2011), Central Irrigation Trust (2011), Queensland Magnesia (2011), the Shopping Centre Council of Australia (2011), the Tasmanian Council of Social Service (2011) and Total Environment Centre (2011). The Brotherhood of St Laurence (2011) and the CUAC (2011) agree that the current approach to setting the regulated rate of return results in a return on debt which exceeds the actual cost of debt. However, they have not reached a decision on whether they support the EURCC proposal or the AER proposal. The Business Council of Australia (2011) recommended that the AEMC examine regulatory practice in other jurisdictions.

[67] ATCO Gas Australia (2011) and APA Group (2011) support retention of the current National Gas Rules which afford the regulator considerable discretion in setting the regulated rate of return, along with merits review of that decision. Aurora Energy (2011) and the Energy Networks Association (2011) disagree with the AER's premise view that the prescriptive nature of the National Electricity Rules has resulted in an overstatement of the cost of debt. APA Group (2011) states that the AER has also not established this premise with respect to the National Gas Rules.

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c)   Historical versus forward-looking estimates;

d)   Long-dated versus short-dated debt as conventional practice;

e)   Should the regulated entity be allowed to recover more than its "actual" cost of debt?;

f)   Implications of an upward-sloping yield curve;

g)   Rules need flexibility to accommodate changes in financial theory and estimation techniques; and

h)   Consistency between market risk premium and debt risk premium estimation.

What are we trying to estimate?

163. The basic premise is that the regulator is attempting to estimate the per unit price which would prevail in a competitive market.[68]   The following quotes illustrate the broad consensus amongst regulated entities and the AEMC that the ultimate objective of the regulatory process is to replicate competitive market outcomes.

164. APIA:[69]

> Rule 87 of the NGR comprises two parts. The first and paramount part (Rule 87(1)) requires a rate of return on capital used in the setting of a regulated tariff to meet the following two criteria:
>
> be commensurate with prevailing conditions in the market for funds; and be commensurate with the risks involved in providing reference services.
>
> This is the end, or outcome, that must be achieved. These are the two criteria that must be met in the setting of the rate of return. They are the paramount criteria.

165. APIA, referencing the AEMC:[70]

> "Providing incentives to regulated businesses [for efficient investment and operation of transmission services] is intended to reproduce, to the extent possible, the behaviours and outcomes that would occur in an effectively competitive market."]

166. CEG:[71]

> In order to achieve the NGO it is necessary that investors have an expectation that, on any capital supplied to the regulated business, that they will recover a cost of capital that is commensurate with the market return they can achieve elsewhere for exposure to

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[68] APIA (2011), Australian Paper (2011), CEG (2011a), Endeavour Energy (2011), Energex (2011), ENA (2011), QTC (2011).
[69] APIA (2011, p.20).
[70] APIA (2011, p.29).
[71] CEG (2011a, p.10).

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> similar risk. If this is not the case then investors will not willingly invest in the assets of the regulated business.

167. Energy Networks Association:[72]

> [T]he ultimate aim of regulation is to mimic a competitive market in terms of price and other outcomes.

168. Even Queensland Treasury Corporation is in agreement with this ultimate outcome, despite the support of that organisation for a debt risk premium estimate derived from a trailing average benchmark:[73]

> As a broad objective of regulation is to replicate competitive market outcomes, the regulator should use the same cost of capital principles that apply in competitive markets when setting the regulated WACC for all NSPs.

169. The framework used to make this estimate is to ask, "If an investment equal to the regulated asset base were made today, what per unit price would allow the investor, in expectations, to receive cash flows with net present value equal to that regulated asset base?" This is achieved by setting the regulated rate of return equal to the cost of capital at the time of the regulatory determination.

170. The fundamental point in relation to the EURCC proposal is that it proposes to set the regulated rate of return at something other than the cost of capital at the time of the regulatory determination. The cost of capital is the discount rate the market will apply to expected future cash flows. This means that, if regulated prices are set at level which reflects a regulated rate of return other than the cost of capital, the present value of expected cash flows will no longer be equal to the regulated asset base. In any given period they could be higher or lower than the regulated asset base, but this present value relationship will no longer hold.

171. The implication of breaking the present value relationship is that investment decisions will be distorted. When regulated rates of return are below the cost of capital the incentive is to delay investment until regulated returns increase; when regulated rates of return are above the cost of capital the incentive is to increase the regulated asset base.

172. This does not necessarily rule out the use of a trailing average estimation technique for setting regulated rates of return. A trailing average estimate will exhibit lower variation over time. Even if the regulator is able to precisely estimate the cost of capital at each point in time, this will fluctuate from one period to the next because market discount rates are volatile. So if it can be demonstrated that the benefits of a regulated rate of return which is less variable over time outweigh the costs associated with investment distortions, then a trailing average should be considered. However, the proposals merely demonstrate that the trailing average is less volatile than the cost of capital at each point in time, and that there will be less impact on estimation error of short periods when debt markets are less liquid. This does not, of itself, establish that the trailing average is more consistent with the Objective or the Revenue and Pricing Principles under the NEL and NGL.

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[72] ENA (2011, p.48).
[73] QTC (2011, p.10).

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173. Another conceptual issue is whether customers should share in any benefit from the NSP raising debt at a rate below the allowed cost of debt in the regulated rate of return. If the benchmark is unbiased then this is a moot point because some entities will be financed at rates below the benchmark while others will be financed at rates above the benchmark. So we are trying to estimate an unbiased benchmark such that, *on a risk-adjusted basis*, businesses with superior debt management ability will be financed at below-benchmark rates and other businesses will be financed at above-benchmark rates. If the sector were consistently financed at below benchmark rates, on a risk adjusted basis, then there is evidence that the benchmark is mis-specified. This is analogous to the regulator adjusting its expectations of benchmark operating costs on the basis of the businesses' performance in the prior regulatory period. If all the NSPs were able to achieve below-benchmark operating costs the regulator will revise its view of efficient costs in the next regulatory period.

174. With this issue in mind we consider below whether the AER or the EURCC has demonstrated the existence of a problem by answering two questions. First, is the benchmark biased, and second, is the benchmark impossible to estimate?

Has the AER or the EURCC demonstrated the existence of a problem?

Is the benchmark biased?

175. If the broad objective of regulation is to replicate competitive market outcomes, the issue for debt risk premium estimation is whether the proposals of the AER and the EURCC demonstrate the existence of a problem. There is a problem if regulation leads to inefficient investment. In the specific case of setting regulated rates of return, we expect over-investment if the regulated rate of return exceeds the cost of funds over the life of the investment subsequent to the determination.

176. There is no question that recent changes in electricity prices have been at rates well above inflation.[74] These price rises are largely due to substantial increases in investment. The issue is whether this investment has been inefficient, motivated by regulated returns which exceed the cost of funds, or whether this investment has been at an appropriate level to maintain service standards.

177. The AER and the EURCC have demonstrated that recent regulated rates of return exceed the interest rates on debt which businesses borrowed at, prior to significant increases in interest rates coinciding with the global financial crisis. They have also demonstrated the existence of an upward-sloping yield curve, whereby the yield to maturity on ten-year corporate debt exceeds the yield to maturity on five-year corporate debt. Neither of these pieces of evidence necessarily implies that the regulated rates of return on debt have been overstated.

178. With respect to a comparison of the current yield to maturity on debt and previously-issued debt, the mere fact that interest rates at one point in time are higher than a previous point in time does not in itself provide an incentive for a business to overinvest. An investment will provide value for shareholders if the return over the life of the investment exceeds required returns from investors providing capital. The fact that capital was previously sourced at a lower cost of funds is independent of the investment decision today.

179. With respect to the upward-sloping yield curve, the direction of this curve is typical of debt pricing. The only difference with respect to recent bond issues is that lenders have been unwilling to lend at rates which borrowers consider to be reasonable, so we have simply observed relatively more issues

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[74] ACOSS (2011), EUAA (2011). SP Ausnet (2011) provided evidence that the rise in network charges in recent periods were limited to electricity networks in New South Wales and Queensland.

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of short-dated debt during this period. The yield curve has a high upward slope (estimates of ten-year yields exceed five-year yields) and the slope is estimated with less precision (due to few long-dated bond issues). But the mere fact that the yield curve is upward-sloping and estimated with relatively less precision does not in itself establish that the use of a long-dated term to maturity as benchmark financing is inappropriate.

180. A separate argument suggesting that the benchmark is biased (in the event of an upward-sloping yield curve) has been made by the ERA which supports matching the term to maturity of the debt risk premium to the regulatory period.[75] At a conceptual level there is reason to question this requirement. On average, the term premium is positive. So all else being equal, on average, regulated prices in jurisdictions with a short regulatory period would be lower than in jurisdictions with a long regulatory period (if no adjustment is made for the effect that the choice of debt maturity has on the refinancing risk that is borne by equity holders). Yet there seems no reason why the term of the regulatory period, which represents a trade-off between administrative efficiency and timeliness of reviews, would bear any relationship to the prices which would prevail in a competitive market.[76]

Is the benchmark impossible to estimate?

181. Aside from bias, the Rules might be problematic if they are impossible to implement. Does the benchmark specification of a rated Australian corporate bond give the regulator an impossible task, or a task affected by an unreasonable degree of imprecision?

182. There is evidence that, in recent years, the imprecision of this estimate is likely to have increased, because there are relatively fewer issues of long-dated corporate debt, compared to short-dated corporate debt.[77] However, while regulated businesses have acknowledged that the regulator's task has been made more challenging in recent years, they dispute that the regulator is faced with an impossible task and consider that estimation is made more difficult by the regulator's narrow interpretation of the estimation exercise.

183. The AER has previously used a limited dataset of long-dated Australian corporate bonds in its analysis, while regulated businesses have recommended using a more expansive dataset. This issue is discussed in numerous submissions including Sub-section 3.4 of CEG (2011c).[78] CEG outlines the decision of the Tribunal to instruct the AER to have more regard to BBB and A– rated bonds and to floating rate notes, compared to the AER's reliance on five BBB+ rated bonds paying fixed coupons.[79] Even the sample of bonds relied upon by the AER had maturity of less than 4.5 years. So the Tribunal has interpreted the rules as allowing the debt risk premium to be estimated according to a sample which includes credit ratings which range from BBB to A–, with maturities substantially below ten years, and which pay both fixed and floating rate coupons.

184. The important interpretation question is whether the benchmark specification – an Australian corporate bond with term to maturity equal to that used in estimating the risk-free rate – defines the dataset available for analysis, or whether it represents a benchmark which can be estimated with a more expansive dataset, appropriately analysed. The Tribunal's interpretation appears to be that the benchmark specification in the rules does not prescribe the dataset because it allowed analysis of

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[75] ERA (2011b).

[76] For the theoretical debate behind this issue see Hall (2007) and Lally (2007a, 2007b).

[77] Ausgrid (2011), CEG (2011a), Energy Networks Association (2011), ETSA Utilities, CitiPower and Powercor (2011), Financial Investor Group (2011), Grid Australia (2011), QTC (2011), SP AusNet (2011).

[78] This is relied upon by ETSA Utilities, CitiPower and Powercor (2011, p.145).

[79] Application by ActewAGL Distribution [2010] AcompT 4 (17 September 2010), paras. 39 – 63.

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bonds which had credit ratings different from benchmark specification and at terms to maturity below benchmark specification. However, this is ultimately a question of statutory interpretation.

185. The debate over the appropriate dataset is just one example of the trade-off between relevance and reliability in any benchmarking exercise. Bonds issued by Australian companies in Australian dollars with a maturity of exactly ten years with a credit rating equal to the benchmark rating will be most relevant for analysis. But strict adoption of these criteria, especially in recent periods, is likely to result in a highly restricted sample. Relaxing some criteria to expand the data available for analysis is likely to generate a more reliable dataset in a statistical sense, because firm- or contract-specific features affecting the yield will carry less weight. But the sample is less relevant to the benchmark to be estimated.

186. It is not immediately clear why any source of data is excluded from consideration in order to estimate the benchmark yield on Australian corporate debt. Yields on instruments other than long-dated corporate debt are still likely to contain information which is relevant to estimating the benchmark yield. It is simply a matter of degree. For example, premia on credit default swaps are worthy of consideration for analysis. In the Australian market these securities are quoted on BBB rated corporate debt, but only denominated in US dollars. These are likely to contain information relevant to estimating the debt risk premium on a benchmark corporate bond, albeit with assumptions required about currency conversions.

187. IPART has recently revised its approach to estimating the debt margin.[80] Their revised benchmark specification is a five-year term to maturity for Australian corporate bonds (to match a five-year estimate of the risk-free rate) with credit ratings within the range of BBB to BBB+. Importantly, the decision to adopt a five-year term to maturity is primarily based on theoretical considerations, with the relatively greater data availability at this tenor a secondary consideration. However, the sample of bonds available for analysis allows consideration of bonds issued in US dollars and with just a two year term to maturity. Hence, estimation of a benchmark Australian corporate bond at a particular term to maturity and credit rating does not necessarily preclude analysis of other data in making this estimate. We acknowledge that IPART has considerable flexibility in specifying its benchmark characteristics, but the point remains that there is a difference between the benchmark specification and sample selection.

188. The sample selection adopted by the ERA has similarities and differences to that of IPART.[81] In common are the requirements for the bond to be issued by an Australian entity with a term to maturity of at least two years. The ERA allows BBB– rated debt to be included. But the important differences are that the ERA will exclude bonds with payments in other currencies than Australian dollars, but will allow bonds with embedded options to be included.

189. Both state regulators are performing essentially the same benchmarking exercise, but have different views on sample selection. As discussed below, the view of the AER is that its benchmark specification in the Rules constrains its sample selection.

190. In their commentary on proposed changes to the NGR, CEG argues that the cost of debt methodology should not be codified in the rules, because this could:[82]

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[80] IPART (2011a). Also, see Appendix 3 for a summary of approaches used by a range of regulators.
[81] ERA (2010, 2011a).
[82] CEG (2011a, p.40).

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> saddle the regulator with a methodology that is not the best in the circumstances. [The methodology incorporated into the rules could be] high level principles…with detailed implementation of those principles carried out by the regulator.

191. With respect to the NER, it is a matter of interpretation as to whether the benchmarking criteria represent a *high level principle* or a *codification*. The AER interpretation is that it is a codification which has resulted in the cost of debt being overstated. The use of more reliable but less relevant data for estimation of the benchmark is consistent with the rules being a statement of high level principle.

192. The key point is that specification of an appropriate benchmark, at a conceptual level, should not be driven by specific data availability issues. At a practical level, obviously we can only measure what we can observe, but this does not imply that our conceptual benchmark should fluctuate according to the dataset. To illustrate the difference between the conceptual and practical specification of benchmarks, consider the use of the All Ordinaries Index and the ASX200 as performance hurdles for Australian equity funds. The conceptual benchmark is the return which an investor could have achieved in the Australian equities market by holding a broadly-diversified portfolio; or in other words, what is the default option for an investor in the Australian market, absent skill in identifying a mispriced security? A large fund could select the ASX200 as its benchmark rather than the All Ordinaries Index because some of the low liquidity shares in the broader index are not investable, in a practical sense.

193. The practical issue involved with respect to the debt risk premium is that we can estimate yields on five-year debt with more precision than yields on ten-year debt. This does not necessarily imply that the term to maturity of an efficient financing structure has changed. It could be the case that borrowers and lenders have simply been able to come to agreement at a short term to maturity, but have been unable to reach agreement at longer terms. This issue can be summarised by the following extracts.

194. QTC:[83]

> If the AER is concerned about the quality or accuracy of their ten-year DRP estimates, then the objective should be to identify better estimation methodologies and data sources, with the focus remaining on trying to produce the best estimate of a ten-year DRP. A lack of observable data does not justify the use of a shorter tenor for the regulated cost of debt.

195. Financial Investor Group:[84]

> [The] FIG acknowledges that lack of data is an issue which has worsened since the GFC. However, it remains unclear to the FIG whether shortened tenors are now a permanent feature of the Australian corporate bond market or whether this pattern represents cyclical conditions. The former would imply that the problem is a systematic one and if so, the FIG would agree that it would be necessary to re-visit the benchmark cost of debt.

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[83] QTC (2011, p.25).
[84] Financial Investor Group (2011, p.45).

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Historical versus forward-looking estimates

196. The EUAA disagrees with the AER's proposal and agrees with the proposal of the EURCC.[85] The EUAA favours a more formulaic approach for estimating the cost of debt, based upon interest rates observed over a period prior to the regulatory determination. For government-owned businesses, the proposal makes reference to actual government borrowing rates, specifically excluding the government guarantee fee. The issue of different cost of debt estimates for government-owned businesses and privately-owned businesses is considered in a previous chapter. For privately-owned businesses, the proposal makes reference to a trailing average of benchmark borrowing costs for private sector debt. At a conceptual level the historical indexing approach has received general support from QTC, TCorp and IPART.[86] A number of businesses have stated that a methodological change towards a trailing average estimate is worthy of consideration and provided commentary on the EURCC proposal, but have not endorsed the EURCC proposal.[87]

197. The first issue to address with this proposal is that it represents a fundamentally different approach to setting regulated rates of return than has been previously adopted. It would mean that the debt component of the regulated rate of return provides compensation for interest rates prevailing in the past, rather than compensation for the risk of providing debt finance in the future. During periods when interest rates have risen substantially, the trailing average yield on debt will be below current interest rates, so the overall regulated rate of return is relatively more likely to fall below the true cost of capital prevailing at the time of the determination. Obviously, the reverse is true when interest rates have fallen substantially.

198. This means that there is an increased incentive for over-investment when interest rates have fallen – because the business can borrow funds at the low rate and earn regulated returns at the higher rate – and an incentive for underinvestment when interest rates have risen. So the primary argument against estimating the cost of debt in this manner is the distortion of incentives.

199. The arguments in favour of the indexing approach are practical. First, the estimation error concern associated with data availability is likely to be reduced. Over an extended time period the potential for illiquidity to affect an entire segment of the bond market, namely long-dated, Australian corporate debt, is likely to be reduced. Second, we will not have the debate over the appropriate short-term estimation period for estimating the debt risk premium.

200. These practical arguments form part of the EURCC's rationale. In their summary of the EURCC proposal, CME states that:[88]

> the cost of debt is observable with reasonable certainty…[making it] amenable to clear specification in terms of both methodology and parameters [and that]
>
> …[o]pportunities reduce the scope of on-going, repeated consultation by setting the determination of the return on debt in the rules (as the RCC proposes), will reduce the need for repeated consultation and hence help to reduce advocacy burdens on consumers. It will also diminish opportunities for lobbying from well-resourced NSPs who can recover the cost of lobbying through regulated charges.

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[85] EUAA (2011) and EURCC (2011).
[86] QTC (2011), TCorp (2011) and IPART (2011b).
[87] Grid Australia (2011), SP AustNet (2011), United Energy and Multinet Gas (2011).
[88] CME (2011, p.19).

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201. The recent series of merits reviews in relation to estimation of the cost of debt suggest that the cost of debt is not observable with reasonable certainty. Like every other parameter in the regulated rate of return it has estimation error. However, it is fair to say that there is relatively less estimation error with respect to the cost of debt capital compared to the cost of equity capital. Taking a time-series average of debt yields, which will encompass periods with greater data availability than observed during the global financial crisis, will also serve to reduce imprecision in measurement. But as we discuss below, we will be measuring something which is different to the prevailing cost of funds.

202. It is also reasonable to suggest that there will be less consultation on return on debt issues if the trailing index approach were incorporated into the rules. Of course, consultation could be eliminated entirely if the Rules simply stated "the cost of debt will be X%." The issue is whether there is *too much* consultation at present and, if so, whether the rules are the cause of there being excessive consultation. What CME refers to as consultation (or lobbying) is empirical analysis of data to estimate the debt risk premium at the time of the regulatory determination. This analysis has formed the basis of submissions to the AER and evidence presented to the Australian Competition Tribunal. As discussed above, the submissions presented as part of the current process have not substantiated that the current benchmark overstates the cost of debt. They have substantiated that the current benchmark generates yields which are above the trailing average and above the yields on short-term debt. In itself this does not imply that those yields provide compensation above a normal level for the risk of long-dated debt, or that a long term to maturity is no longer efficient for financing long-lived assets.

203. Ultimately, the cost of debt component of the regulated rate of return will be more predictable. The longer the trailing average used to estimate the required return to debt holders, the less variability will be observed from one regulatory determination to the next. This lower variation over time is the reason behind TCorp's evidence that the trailing average cost of debt predicts future interest rates with more precision than yields at a snapshot in time.

204. A similar exercise was conducted by the Major Energy Users (**MEU**) which contends that the entity should only recover its actual cost of debt. The MEU questions the 20-day averaging period for estimating the risk-free rate on the basis:[89]

> that there is considerable variation between the spot value for CGS used to set the WACC for the following 5 year period and the actual values for the 10 year CGS over the five year period.

205. However, the yield on debt at any point in time is not intended to be a predictor of future interest rates. Rather, it reflects the cost of securing funds today over a given future time period. The evidence of TCorp and MEU is that the future cost of capital is closer to the historical average than the cost of capital observed at a point in time. However, *if* the objective is to estimate the cost of capital, which is the only rate which will equate the net present value of expected cash flows with the regulated asset base, then we will likely have a more reliable estimate by estimating the current yield to maturity than referring to a trailing average estimate. Even if there is estimation error because there are a small sample of Australian long-dated corporate bond issues, there is likely to be information available to estimate the yield, provided the dataset available for analysis is not constrained to a narrow definition.

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[89] MEU (2011, p.22).

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206. In contrast, *if* the objective is not to estimate the cost of capital, but rather to determine a regulated rate of return to achieve another regulatory objective – other than equating the present value of expected cash flows to the asset base – the historical averaging approach could have merit. The key point is that the merit of the historical index approach to estimating the cost of debt capital is purely the lower variation in this estimate from one period to the next. If this reduced variation over time is important, in order to achieve a regulatory objective other than estimating the prevailing cost of funds, then it should be considered. But it should be made clear that this will not provide an estimate of the prevailing cost of funds at the time of the determination.

207. Furthermore, there is a fundamental difference between variation in the cost of capital over time and estimation error in the regulated rate of return from one period to the next. Even if the regulator is perfectly able to estimate the prevailing cost of funds at every point in time, we will observe substantial fluctuations in discount rates. These fluctuations can obviously be reduced by setting regulated rates of return on a trailing average basis. But the regulated rate of return is no longer an estimate of the cost of capital at each point in time. The precisely-estimated cost of capital has been replaced by a figure which is less variable over time, but no longer represents the prevailing cost of funds.

Should the regulated entity be allowed to recover more than its "actual" cost of debt?

208. A related issue to the use of the historical indexing approach to estimating the cost of debt is the debate about whether a regulated entity should be allowed to recover more than its *actual* cost of debt. For example, the EUAA contends that:[90]

> the actual cost of debt should be given more weight in the estimation of the cost of debt.

209. The term *actual* cost of debt has two interpretations. First, it could refer to the actual interest payments being made on previously-issued debt. So for an entity to recover its actual cost of debt would equate to matching expected future cash inflows to future cash outflows from previous debt issues. Second, it could refer to the actual yields on debt issued by regulated entities in the period subsequent to the regulatory determination. In this case, for an entity to recover its actual cost of debt would equate to matching expected future inflows to the future cash outflows assuming all debt was refinanced at prevailing interest rates.

210. The proposal by the AER is based on the premise that regulated businesses are consistently earning more than their actual cost of debt in a forward-looking sense. The regulator contends that the benchmark is biased because the implied yields exceed the actual interest rates prevailing in the market at the time of the regulatory determination.

211. The proposal by the EURCC is based on the premise that regulated businesses should only recover the actual costs of previously-issued debt. In this sense, "actual" means "historical." At present the businesses will earn more than these historical costs because corporate interest rates have risen in recent years.

212. The EURCC concept of allowing recovery for the actual (historical) cost of debt is that adopted by the energy network regulator Ofgem in the United Kingdom.[91] Going forward, Ofgem signalled that it would estimate the cost of debt based on a ten year simple trailing average index to be updated

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[90] EUAA (2011, p.24).
[91] Ofgem (2011).

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mechanistically each year during the price control period. This index is to be constructed as an average of the iBoxx GBP Non-Financial indices of 10+ years maturity, with credit ratings of broad A and broad BBB.

213. In determining that the cost of debt should be estimated with reference to an index, Ofgem rejected the use of a fixed allowance for the cost of debt. Explaining its rationale for this decision, Ofgem stated:[92]

> With current risk free rates at historical lows and debt premia on BBB and A rated UK corporates back to their pre-crisis lows, it is unlikely that the cost of debt has much scope to decline further. However, it is unclear if and when the market cost of debt will increase, how fast it will climb and what levels it will reach during RIIO-T1 and GD1. With that in mind, we do not think that a fixed cost of debt allowance could be set with any confidence. We consider indexation to be the most robust option available to us to protect both consumers and companies.

214. Ofgem's rationale is that it is difficult to predict future interest rates, so in attempting to allow businesses to recover their *actual* cost of debt it is better to rely upon past interest rates than incorporate estimates of future interest rates. It is correct that the Ofgem approach, compared to estimating the yield at the regulatory determination, is more likely to allow businesses to recover their actual costs of previously issued debt. However, it is less likely to allow businesses to recover their actual costs of new debt for investment.

215. The water regulator in the United Kingdom, Ofwat, adopted a weighted average of yields on previously-issued debt (75%) and forward projections (25%).[93] While it considered the businesses' actual debt portfolios, rather than an index, the important point is that it's cost of debt estimate was a hybrid of yields on previously-issued debt and debt to be subsequently issued. In an appeal to the UK Competition Commission, Bristol Water PLC was successful in having equal weight placed on yields of previously-issued debt and the cost of new debt.[94]

216. The Ofwat approach has the same underlying rationale as that of Ofgem, namely to allow the businesses to recover the cash outflows associated with the debt they hold during the regulatory period. The different weights applied to the trailing yields and projections simply reflect different views about the proportion of debt which will be required in the future and the precision with which future interest rates can be estimated.

217. Hence, regulatory precedent in other jurisdictions needs to be considered alongside the economic rationale for that precedent. The UK regulators have formed a view that consumers and businesses are best served by matching expected cash inflows with the expected cash outflows from debt previously issued, or a weighted average of debt previously issued and that which will be issued at a future date. In Australia, regulation has proceeded under the framework of matching the present value of expected cash inflows with the regulated asset base. The UK/trailing average approach will result in lower time-series variation in the regulated rate of return. The Australian/current yield approach will have less distortion on investment incentives.

218. So when debating any rule change proposal or submission the AEMC should be very clear about whether the proposal or submission uses the term "actual" to:

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[92] Ofgem (2011, p.20).
[93] Ofwat (2009).
[94] UK Competition Commission (2010).

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a) characterise a mis-estimation of a benchmark at a point in time (for example, "the benchmark is biased because actual interest rates today are lower"); or

b) to argue that the regulated rate of return should be a recovery of the actual cash outflows associated with previously issued debt; or

c) to argue that the regulated rate of return should allow recovery of cash outflows for previous debt issues and debt issues which occur during the regulatory period.

Implications of an upward-sloping yield curve

219. An issue which has not been discussed in either the proposals or submissions is the potential financing constraint which could be imposed on businesses should there be a shortening of term to maturity used to estimate the cost of debt.

220. If the regulated rate of return is set using the ten-year yield to maturity, the business has the option to borrow at a short-term rate of interest and bear the associated refinancing risk, or borrow at the more expensive long-term rate. If the regulated rate of return is set using the five-year yield to maturity, the business does not have the option of borrowing at the more expensive ten-year rate because the regulated returns will be insufficient to cover the cost of funds.

Rules need flexibility to accommodate changes in financial theory and estimation techniques

221. In theory, different WACC parameters will likely have substantial differences in how they vary over time. But it is important to distinguish between the relative stability of the true, unobservable parameter values and the stability that is artificially imposed in practice as a hedge against estimation error. For example, the market risk premium is likely to fluctuate substantially during different market conditions. But given that it is difficult to estimate in practice, both regulators and corporate finance practitioners impose a degree of stability in their estimates of this parameter.

222. There are also advances in estimation techniques and financial theory which are slow to be embedded in corporate finance practice, as a hedge against those estimation techniques subsequently being found to result in error. An example of this issue is the use of the same beta estimates and leverage ratios for gas and electricity regulation. We know that the customer bases, contractual arrangements and capital expenditure decisions differ across these industries.[95] However, it has been difficult for businesses and regulators, given current estimation techniques, to explicitly quantify the impact these differences have on systematic risk and leverage choice. As noted by Ausgrid, the previous application of consistent WACC parameters across electricity transmission, distribution and gas networks in itself does not justify prescribing the use of the same parameters in the rules.[96]

223. There seems no reason to impose rules requiring these industries to have the same parameter estimates, simply because it has previously been difficult to quantify the impact that industry characteristics have on cost of capital parameter. Furthermore, allowing the rules to accommodate differences in parameter estimates is likely to encourage research into estimation techniques, thereby allowing a better understanding of the industries' risk differences.

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[95] APIA (2011).
[96] Ausgrid (2011).

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224. The concern over allowing the regulator too much flexibility in determining parameter estimates is that it will adopt an ad hoc approach from decision to decision. This concern is raised by CEG which argues that the regulator has changed its preferred estimation technique a number of times in order to arrive at a lower value for the debt risk premium at each point in time.[97] The successful appeals to a number of determinations reinforces the importance of merits review as an appropriate check on unfettered discretion. We have observed successful appeals against the debt risk premium estimate under the NGR despite the flexibility afforded the regulator.[98]

Consistency between market risk premium and debt risk premium estimation

225. The catalyst for the rule change proposal of the AER was a material change in the Australian corporate bond market, coinciding with the global financial crisis. Network business agree that during this period the term to maturity on new bond issues has been reduced. However, they also argue that long-dated debt only ceased to be issued when the global financial crisis began, coinciding with a period of increased risk premiums on both debt and equity capital.[99]

226. An important issue for cost of capital estimation is the consistency between parameter estimates. One reason network businesses are so concerned by the proposed discretion available under the AER proposal is that parameter estimates will not be set on a consistent basis. Specifically, the AER proposal is motivated by data availability and observed financing practices of regulated networks. The AER believes that the rules have constrained it from setting a benchmark debt risk premium which appropriate financing practices of the businesses. If this change is driven by market conditions, we would expect these conditions to be reflected in the market risk premium estimate. If this change is driven by a different foundation for the financing of long-lived assets, we would expect there to be some theoretical rationale for this practice.

Conclusion

227. The proposals of the AER and EURCC are based on the premise that the cost of debt component in regulated rates of return is overstated. The AER contends that it is overstated in the sense that its benchmark of long-dated Australian corporate bond yields is higher than the current borrowing rates of regulated utilities. Hence, the AER proposes it should be given greater flexibility in measuring benchmark yields.

228. The EURCC contends that it is overstated in the sense that regulated entities are benefitting from the current high yields on corporate debt when they were able to previously borrow at substantially lower interest rates. Hence, the EURCC contends that the cost of debt component in regulated returns should be estimated as a trailing average of yields observed on an historical basis.

229. At present, neither proposal has presented substantive evidence that there is a problem to be solved. Regulated entities do not disagree that there is an upward-sloping yield curve and that there has been a recent trend towards issuance of relatively short-term corporate debt. However, they contend that the difference between short- and long-term borrowing rates merely represents appropriate compensation for the refinancing risk being borne by equity holders. For the benchmark to be considered biased, there would need to be evidence that this premium represented an abnormal return.

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[97] CEG (2011b).
[98] Appeals include those by ActewAGL [2011] ACompT 4, Jemena Gas Networks (NSW) Ltd [2011] ACompT 10 and the current separate appeals by APT Allgas Energy Pty Ltd and Envestra Ltd.
[99] Sub-section 4.2 of the joint report by PcW, Gilbert & Tobin and NERA (2011) is one example.

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230. There is also no debate that interest rates available at present are higher than the trailing average over the previous ten years. Further, there is no debate that a trailing average yield will exhibit lower variation over time than an estimate of the cost of debt at the time of a regulatory determination. If reducing the variation of the regulated rate of return over time achieves a regulatory objective then the EURCC proposal will assist in achieving this objective. However, this will necessarily mean that the regulated rate of return will not be an estimate of the prevailing cost of funds at the time of the determination.

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Appendix 1: Alternative asset pricing models

231. One of the issues that have arisen in the rule change proposals is whether the method for estimating the required return on equity should be prescribed in the Rules. The National Electricity Rules currently require that the Capital Asset Pricing Model[100] must be used to estimate the required return on equity. The National Gas Rules currently require that "a well-accepted financial model such as the Capital Asset Pricing Model"[101] must be used.

232. In recent months, a number of alternative models for estimating the required return of equity have been proposed under the National Gas Rules. This report provides a summary and explanation of each of those models including:

   a) The Sharpe CAPM;

   b) The Black CAPM;

   c) The Fama-French three factor model; and

   d) The dividend growth model.

233. The purpose of this appendix is to provide background information on the range of models that have been proposed in recent regulatory determinations. Consequently, we set out each of the proposed models and provide some context and explanation, but we do not provide any detailed analysis of the models or express any preferences for the use of a particular model.

Sharpe-Lintner Capital Asset Pricing Model (CAPM)

Overview of model

234. The required return on equity can be estimated using the Capital Asset Pricing Model (CAPM):

$$r_e = r_f + \beta \times MRP$$

where:

   a) r_f represents the risk-free rate of interest. This is the return that is available to investors on an investment that is completely free of risk. Commonwealth government bonds are usually assumed to be such a risk-free investment;

   b) β represents the equity beta, which is the amount of risk that is involved in the particular investment; and

   c) MRP represents the market risk premium, which is the amount of extra return that investors would require for investing in the average asset.

235. Suppose, for example, that the risk free rate is 5% and MRP is 6%. In this case, investors would require an expected return of 11% as compensation for the risk involved in owning shares in the

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[100] NER 6.5.2; 6A.6.2.
[101] NGR 87(2).

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average firm. A firm with a beta of 1.2 is 20% riskier than the average firm, so would have a required return of:

$$k_e = r_f + \beta \times MRP$$
$$= 5\% + 1.2 \times 6\% = 12.2\%.$$

Estimation of parameters

236. In this appendix, we briefly summarise the sorts of techniques that can be employed to estimate the model parameters. We note that parameter estimation is a contentious exercise and the purpose of this appendix is to provide examples and not to analyse, or rank, or endorse any particular models or estimation methods.

Risk-free rate

237. It is common to estimate the risk-free rate as the yield to maturity on government bonds. This is the annual compound rate of return that an investor would receive if they hold the bond to maturity and if there is no default.

Market risk premium

238. It is common to estimate the market risk premium from an analysis of historical excess returns. Annual data over a long period is obtained for:

a) The return (dividends and capital gains/losses) on a broad stock market index such as the All Ordinaries accumulation index; and

b) The corresponding yield on ten-year government bonds.

239. The difference between these two terms represents the return to investors in a broadly diversified equity portfolio over and above the return that could have been earned for no risk at all. MRP is estimated as the average of this excess return over a long period of time. A long period is used because the excess return series is highly volatile, so a large sample is required to obtain statistically meaningful results. Recent determinations have focussed on data from 1958 to the present as this is a relatively long period and because the post 1958 data is believed to be more reliable and accurate.

Equity beta

240. It is common to estimate equity beta using some form of regression analysis to estimate the relationship between stock returns and market returns. For example, to estimate the equity beta of BHP, one would obtain past returns for BHP shares and past returns for a market index (such as the All Ordinaries accumulation index).

241. The figure below shows a scatter plot of monthly BHP and market returns over a recent five-year period. Each point on the figure represents one monthly observation. The equity beta estimate is simply the slope coefficient of a line a best fit drawn through these points. In this case that coefficient is 0.93.

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242. There are many contentious issues in relation to beta estimation. These relate to the data and time period that should be examined and the precise statistical techniques that should be employed.
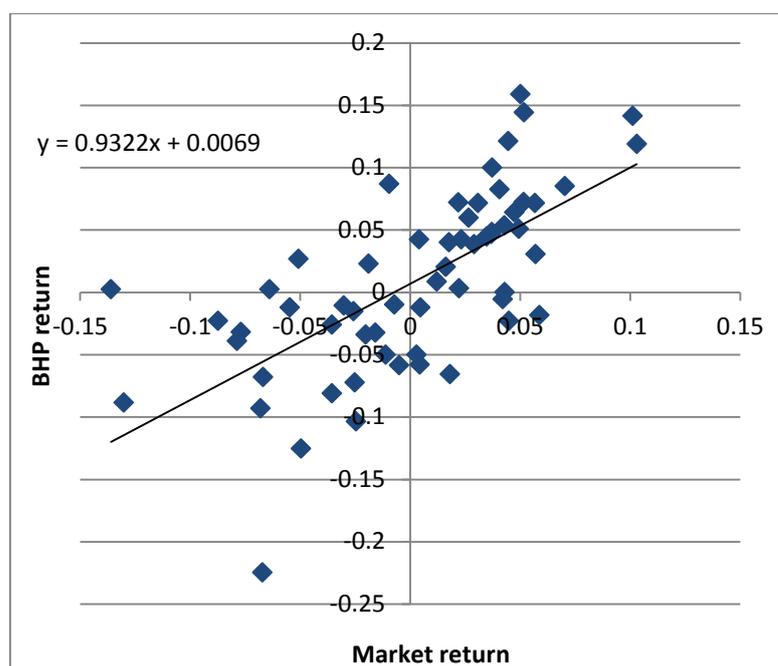
Black Capital Asset Pricing Model (Black CAPM)

Overview of model

243. The original CAPM is known as the Sharpe CAPM or the Sharpe-Lintner CAPM, after the authors of the papers that developed the model. The Sharpe CAPM can be written as:

$$r_e = r_f + \beta \times MRP$$
$$= r_f + \beta(r_m - r_f).$$

244. The Black CAPM is similar to the Sharpe CAPM except that the risk-free rate is replaced by the return on a zero beta asset, r_0:

$$r_e = r_0 + \beta(r_m - r_0).$$

245. The return on the zero-beta asset is generally greater than the risk-free rate so that the Black CAPM produces a higher intercept and a lower slope than the Sharpe CAPM, as illustrated in the figure below.[102] This figure is known as the **security market line**.

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[102] This figure is extracted from Grundy (2011), a report submitted by Envestra in relation to the determinations in its Queensland and South Australia gas distribution businesses.

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FIGURE 1: The Sharpe CAPM (depicted by the more-steep thin upward sloping line) and the Black CAPM & the empirical relation between the cost of equity and beta (depicted by the less-steep thick upward sloping line).
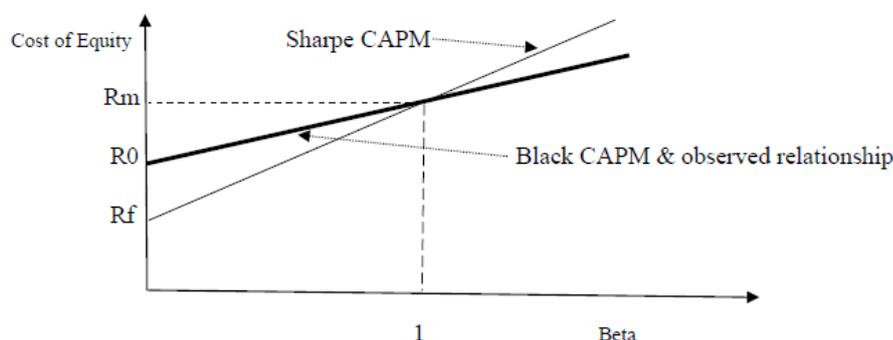
246. If a particular stock has an equity beta below 1.0, as the AER has found for regulated electricity and gas businesses, the Black CAPM will produce a higher required return on equity than the Sharpe CAPM.

Estimation of parameters

247. In this section we briefly summarise the techniques that are usually employed to estimate the model parameters.

Relative slope of security market line

248. The slope of the security market line under the Sharpe CAPM is $r_m - r_f$. This is the standard market risk premium and can be estimated in the usual way. That is, the AER already estimates this slope as part of its application of the Sharpe CAPM.

249. The slope of the security market line under the Black CAPM is $r_m - r_0$. A number of empirical studies have sought to estimate the slope of this line using a three-step approach as follows:

a) Step 1: Estimate beta for a large sample of listed firms;

b) Step 2: Construct 10-20 portfolios based on beta estimates (i.e., one portfolio consists of the firms with the very lowest betas, and so on).

c) Step 3: Plot the betas of each portfolio against the returns earned by that portfolio over a subsequent period. The slope of the line of best fit through this plot is an estimate of $r_m - r_0$.

250. This procedure has become known as the Fama-MacBeth procedure after the authors who introduced it to the finance literature in 1973.

251. A number of papers have estimated the slope of the Black CAPM relative to that of the Sharpe CAPM:

$$\frac{r_m - r_0}{r_m - r_f}$$

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252. Grundy (2011) summarises a number of these papers and concludes that the slope of the security market line under the Black CAPM is approximately half of that under the Sharpe CAPM, as illustrated in the figure above.

Slope of security market line under Black CAPM

253. Note that the slope of the security market line under the Sharpe CAPM is the standard MRP. Suppose this has been estimated as 6%. The evidence surveyed by Grundy (2011) indicates that the slope of the Black CAPM is approximately half of that of the Sharpe CAPM. It then follows that the slope of the Black CAPM is 3%:

$$r_m - r_0 = 0.5 \times 6\% = 3\%.$$

Zero beta return

254. The expected return on the zero beta asset can be estimated in two steps. First estimate the expected return on the market portfolio as:

$$r_m = r_f + MRP$$

where r_f and MRP are as currently estimated by the AER. For example, if $r_f = 5\%$ and $MRP = 6\%$ then:

$$r_m = r_f + MRP$$
$$= 5\% + 6\% = 11\%.$$

255. Now if $r_m - r_0 = 3\%$ and $r_m = 11\%$, it must be the case that $r_0 = 8\%$.

Equity beta

256. Equity beta is estimated in the same way as for the Sharpe CAPM – the same estimate is used.

Application of model

257. Consider a firm with an equity beta of 0.8, and with all other parameters as in the example above. Under the Sharpe CAPM, the required return on equity is:

$$r_e = r_f + \beta(r_m - r_f)$$
$$= 5\% + 0.8 \times 6\% = 9.8\%$$

and under the Black CAPM the required return on equity is

$$r_e = r_0 + \beta(r_0 - r_f)$$
$$= 8\% + 0.8 \times 3\% = 10.4\%.$$

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Fama French Three Factor Model (Fama-French Model)

Overview of model

258. The Fama-French model is a multi-factor model that nests the Sharpe CAPM as a special case. Under the Fama-French model, the required return on equity is given by:

$$r_e = r_f + \beta_{mkt} \times MRP + \beta_{size} \times SMB + \beta_{value} \times HML$$

where:

    a) r_f represents the risk-free rate of interest, as under the Sharpe CAPM;

    b) β_{mkt} represents the equity beta relative to a broad market index, as under the Sharpe CAPM;

    c) MRP represents the market risk premium, as under the Sharpe CAPM;

    d) SMB represents the difference between the returns on a portfolio of small stocks and the returns on a portfolio of large stocks – "small minus big";

    e) β_{size} represents the particular firm's sensitivity to the SMB factor;

    f) HML represents the difference between the returns on a portfolio of high book-to-market stocks and the returns on a portfolio of low book-to-market stocks – "high minus low"; and

    g) β_{value} represents the particular firm's sensitivity to the HML factor.

259. There are three risk factors in the model. The first of these is the return on the broad market index. When the market goes up individual firms go up and when the market goes down individual firms go down, on average. That is, market movements are one source of variation, or risk, in holding shares.

260. Of course, some firms are more sensitive to market movements than others. That is, some firms go up a lot more than average when the market is up and down a lot more than average when the market is down. The sensitivity to the market risk factor is given by β_{mkt}. A firm with average sensitivity to the market risk factor has $\beta_{mkt} = 1$, a firm with less than average sensitivity to the market risk factor has $\beta_{mkt} < 1$, and a firm with more than average sensitivity to the market risk factor has $\beta_{mkt} > 1$.

261. *MRP* represents the additional return that investors would require from a firm with average sensitivity to the market risk factor. Firms with above average sensitivity to the market risk factor ($\beta_{mkt} > 1$) will require higher returns as compensation and firms with below average sensitivity to the market risk factor risk ($\beta_{mkt} < 1$) will require lower returns.

262. The other factor and sensitivity terms in the model play similar roles. Empirical work in the finance literature has shown that, on average, smaller firms generate higher returns than larger firms, other things equal. Fama and French argue that this is not due to the characteristic of size but due to the

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fact that smaller firms tend to be more sensitive to a second risk factor. That is, small firms do not earn higher returns simply because they are small, but because they are more sensitive to the second risk factor. This second risk factor has been linked to liquidity – with investors requiring relatively higher returns from illiquid stocks.

263. Analogous to the market factor, β_{size} represents the exposure of a particular firm to the second risk factor. Unlike the case for the market factor, however, the average firm has zero sensitivity to this second factor so that for the average firm we have $\beta_{size} = 0$. Firms with above average sensitivity to the market risk factor ($\beta_{size} > 0$) will require higher returns as compensation and firms with below average sensitivity to the market risk factor risk ($\beta_{size} < 0$) will require lower returns. Also analogous to the market factor, *SMB* represents the additional return that investors would require from a firm with average sensitivity to this second factor.

264. The third factor should be interpreted in a similar way. Empirical work in the finance literature has shown that there is a relationship between stock returns and the book to market ratio (the ratio of book value per share to market value per share). In particular, firms with a high book to market ratio tend to generate higher returns than firms with a low book to market ratio, other things equal. Again, Fama and French argue that this is because high book to market stocks are more sensitive to the third risk factor. That is, high book to market firms do not earn higher returns simply because they have a high book to market ratio, but because they are more sensitive to the third risk factor. This third risk factor has been linked to financial distress – with investors requiring relatively higher returns from firms that are more likely to become distressed. As for the second factor, the average firm has $\beta_{value} = 0$.

Estimation of parameters

265. We reiterate that parameter estimation is a contentious exercise and the purpose of this appendix is to provide examples and not to analyse, or rank, or endorse any particular models or estimation methods.

MRP

266. MRP is estimated in the same way as for the Sharpe CAPM.

SMB

267. SMB is estimated by taking a long-term average of the difference between:

    a) The historical return on a portfolio of small firms (e.g., on the 30% of all firms that are the smallest by market capitalisation); and

    b) The historical return on a portfolio of large firms (e.g., on the 30% of all firms that are the largest by market capitalisation).

HML

268. HML is estimated by taking a long-term average of the difference between:

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a) The historical return on a portfolio of high book-to-market firms (e.g., on the 30% of all firms that have the highest book to market ratios); and

b) The historical return on a portfolio of low book-to-market firms (e.g., on the 30% of all firms that have the lowest book-to-market ratios).

Betas

269. The CAPM equity beta is commonly estimated via some form of regression analysis whereby stock returns for an individual firm are regressed on market returns over some historical period:

$$r_{i,t} = \alpha + \beta_{mkt} r_{mkt,t}.$$

270. This is equivalent to finding the slope coefficient of the line a best fit through a plot of stock returns and market returns, as set out above.

271. The Fama French model requires three beta terms. These betas are estimated by expanding the regression analysis to include three factors rather than one:

$$r_{i,t} = \alpha + \beta_{mkt} r_{mkt,t} + \beta_{value} r_{smb,t} + \beta_{mkt} r_{hml,t}.$$

Application of model

272. The following is an extract from the CFA (Chartered Financial Analyst) Level II materials. This example uses the following data:

a) $r_f = 4.1\%$;

b) $MRP = 5.5\%$;

c) $SMB = 2.0\%$; and

d) $HML = 4.3\%$.

273. Consequently, asset returns are estimated as:

$$r_e = r_f + \beta_{mkt} \times MRP + \beta_{size} \times SMB + \beta_{value} \times HML$$
$$= 4.1\% + \beta_{mkt} \times 5.5\% + \beta_{size} \times 2.0\% + \beta_{value} \times 4.3\%.$$

274. Now consider a stock that is pro-cyclical with the market, smaller than average, and with a higher than average book-to-market ratio. This firm might be expected to have higher than average sensitivity to all three risk factors. The case in the CFA materials is based on firm for which:

a) $\beta_{mkt} = 1.2$;

b) $\beta_{size} = 0.5$; and

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c) $\beta_{value} = 0.8$.

275. The required return on equity for this firm is given by:

$$r_e = 4.1\% + 1.2 \times 5.5\% + 0.5 \times 2.0\% + 0.8 \times 4.3\%$$
$$= 15.1\%.$$

Dividend Growth Model (CAPM)

Overview of model

276. Consider a stock that pays annual dividends.[103]   Suppose the next dividend is to be paid one year from now and that dividend will be \$1.   Also suppose that the firm's dividends are expected to increase at the rate of 4% p.a. indefinitely. Finally, suppose that the required return on equity for this stock is 12% p.a.

277. The value of this stock, and the price that investors would be prepared to pay for it, is the present value of the dividend stream that it would produce, which is:

$$P_0 = \frac{d_1}{(1+r_e)^1} + \frac{d_2}{(1+r_e)^2} + \frac{d_3}{(1+r_e)^3} + \dots$$

where:

a) P_0 represents the stock price today (time 0);

b) r_e represents the required return on equity; and

c) d_i represents the dividend to be paid at time i.

278. In the case of constant growth (g) in dividends, we have:

$$P_0 = \frac{d_1}{(1+r_e)^1} + \frac{d_1(1+g)^1}{(1+r_e)^2} + \frac{d_3(1+g)^2}{(1+r_e)^3} + \dots$$

279. It turns out that the sum of this infinite series simplifies[104] to:

$$P_0 = \frac{d_1}{(r_e - g)}$$

280. For the example above, we have:

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[103] Nothing hinges on the assumption of annual dividends – it merely simplifies the exposition.
[104] Applying the mathematical rules relating to geometric progressions.

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$$P_0 = \frac{d_1}{(r_e - g)} = \frac{1}{(0.12 - 0.04)} = 12.50.$$

281. One question that often arises in relation to this model relates to the implied holding period. The model appears to assume that the investor will live forever and will hold the stock forever. What if the holding period is much shorter? To show that the holding period is irrelevant, consider an investor who plans to hold the stock for only one year, collect the dividend at the end of that year, and then sell to another investor who then plans to hold the stock indefinitely. In this case, the value of the stock to the first investor will be:

$$P_0 = \frac{d_1}{(1 + r_e)^1} + \frac{P_1}{(1 + r_e)^1}$$

282. The price that the second investor will be prepared to pay at time 1 is the present value at that time of all of the remaining cash flows:

$$P_1 = \frac{d_2}{(1 + r_e)^1} + \frac{d_3}{(1 + r_e)^2} + \frac{d_4}{(1 + r_e)^3} + \ldots$$

283. If we substitute this into the previous equation we obtain:

$$\begin{aligned}
P_0 &= \frac{d_1}{(1 + r_e)^1} + \frac{P_1}{(1 + r_e)^1} \\
&= \frac{d_1}{(1 + r_e)^1} + \frac{1}{(1 + r_e)^1}\left[\frac{d_2}{(1 + r_e)^1} + \frac{d_3}{(1 + r_e)^2} + \frac{d_4}{(1 + r_e)^3} + \ldots\right] \\
&= \frac{d_1}{(1 + r_e)^1} + \frac{d_2}{(1 + r_e)^2} + \frac{d_3}{(1 + r_e)^3} + \frac{d_4}{(1 + r_e)^4} + \ldots
\end{aligned}$$

which is identical to the expression for the case where the first investor holds the stock in perpetuity. That is, the general valuation expression holds regardless of the length of the investor's time horizon.

284. The general expression for the current value of a share is:

$$P_0 = \frac{d_1}{(r_e - g)}.$$

This expression can be re-arranged to give:

$$r_e = \frac{d_1}{P_0} + g.$$

285. That is, the implied required return on equity is the sum of:

a) The firm's dividend yield, d_1 / P_0 ; and

b) The expected growth rate in dividends, g .

Estimation of parameters

Dividend yield

286. An estimate of the dividend yield is required for a set of firms that are considered to be comparable to the benchmark regulated firm. This requires estimates of the next dividend to be paid and the current stock price. The stock price can be observed directly. In regulatory submissions on this point, the next dividend has been estimated by using the previous dividend (on the basis that dividends are stable and firms are known to be extremely reluctant to reduce dividend payments) or a forecast of the next dividend (usually using the consensus forecast from equity analysts).

Dividend growth rate

287. The expected future dividend growth rate is difficult to estimate. What is required is an estimate of the future growth in dividends that is reflected in current stock prices. Proponents of this approach have extracted some information on dividend growth rates from equity analysts (i.e., broker research reports), however there is a range of views about how to best interpret this information. In particular, there is no technique for independently verifying any particular growth estimate.

288. Because it is difficult to obtain a precise estimate of dividend growth rates, recent regulatory submissions have also examined the implied required return on equity using a range of values for dividend growth, including setting dividend growth equal to:

a) GDP growth (5.5% nominal, 3% real) – on the basis that corporate profits and dividends should, on average, grow at about the same rate as the broad economy;

b) Inflation (2.5%) – on the basis that dividends should at least maintain their real value over time, on average; or

c) Zero – on the basis that dividends would certainly not be expected to decline over time, on average.

289. Regulatory submissions have also proposed to use the dividend growth model to examine the reasonableness of a particular proposed required return on equity, by calculating the dividend growth rate that is consistent with the proposed equity return (i.e., instead of estimating the dividend growth rate to calculate the required return on equity, the reverse calculation is performed). For example, in the recent DBP determination (WA gas pipeline regulated by the ERA), DBP submitted that the required return on equity proposed by the regulator implied future perpetual dividend growth of -3.5% p.a.

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Appendix 2: Summary of Tribunal merits reviews

Context

290. The NER and NGR provide for a merits review of the AER's determination for a particular regulated business, and a number of businesses have sought to have various AER WACC parameter estimates reviewed by the Tribunal. The following summary of Tribunal hearings and outcomes appears as an attachment to the submission from ETSA Utilities, CitiPower and Powercor Australia.

Summary from ETSA, CitiPower and Powercor

291. By way of summary of the Tribunal's reviews of AER WACC decisions to date:

    a) In the New South Wales DNSPs Review brought by EnergyAustralia (now AusGrid), Integral Energy (now Endeavour Energy) and Country Energy (now Essential Energy) (ACT File Nos 2, 4 and 6 of 2009):

        i) the DNSPs contended error by the AER in its decision to withhold its agreement to their proposed averaging periods for use in estimating the risk free rate and in the methodology for estimating the DRP; and

        ii) the Tribunal found error by the AER in its decision regarding the averaging period for estimation of the risk free rate.

    b) In the South Australian and Queensland DNSPs Review brought by ETSA Utilities, Energex and Ergon Energy (ACT File Nos 2 to 4 of 2010):

        i) the DNSPs contended that the AER erred in its decision to apply the value of gamma estimated in the 2009 SORI by reason of errors in that estimation;

        ii) the AER conceded error in the estimation of the distribution ratio used to estimate the value of gamma and, thus, the value for gamma applied in the South Australian and Queensland Distribution Determinations;

        iii) the Tribunal found error in the estimation of both the distribution ratio and the franking credit utilisation rate (or theta); and

        iv) the Tribunal ultimately determined that the appropriate value for gamma was 0.25 as compared to the 2009 SORI value for gamma of 0.65.

    c) In the ACT gas distribution network service provider review brought by ActewAGL Distribution (ACT File No 1 of 2010), ActewAGL Distribution contended that the AER erred in its methodology for estimation of the DRP and the Tribunal agreed.

    d) In the New South Wales gas distribution network service provider review brought by JGN (ACT File No 5 of 2010):

        i) JGN contended that the AER made errors in its methodology for estimation of the DRP and the same errors in its methodology for estimation of gamma found in the South Australian and Queensland DNSPs' Review;

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ii) the AER conceded error in its methodology for estimation of the DRP; and

iii) the Tribunal agreed that the AER had made the errors in its methodology for estimation of the DRP alleged by JGN and adopted its earlier findings of error in respect of the AER's methodology for estimation of gamma.

e) In the Victorian DNSPs Review brought by CitiPower, Powercor Australia, JEN, SPI and United Energy (ACT File Nos 6 to 10 of 2010) which proceedings are yet to be determined by the Tribunal:

i) the DNSPs contended that the AER made the same errors in its methodology for estimation of gamma found in the South Australian and Queensland DNSPs Review and an error in its methodology and estimation of the DRP;

ii) the AER has conceded error in the estimation of the franking credit utilisation rate (or theta) used to estimate the value of gamma and that it would be appropriate to apply the value for gamma previously determined by the Tribunal of 0.25; and

iii) the AER has also conceded the error in its methodology and estimation of the DRP alleged by the Victorian DNSPs.

Materiality of WACC errors

292. The submission from APA Group contains a report prepared by Ernst and Young seeking to quantify the effect of WACC estimates that the Tribunal has found to be in error. The following figure is drawn from that report:[105]

Table 1 Australian Competition Tribunal (ACT) WACC decisions

Decision/Date	Appellants	Decision[12]	WACC calculation Error
Application by ActewAGL Distribution [2010] ACompT 4 (Sep 2010)	ActewAGL	AER not at fault in its decision to exclude certain data from some data sources from consideration - It was unreasonable for the AER not to consider whether useful information could be obtained from	Debt risk premium increased to 3.89 per cent from 3.35 per cent, resulting in the allowed cost of capital increasing
Decision/Date	**Appellants**	**Decision**[12]	**WACC calculation Error**
		consideration - AER made an error in not properly considering whether a specific data observation was anomalous and should have been excluded	to 10.04 per cent from 9.72 per cent[13].
Application by Energex Limited (No. 5) [2011] ACompT 9 (May 2011)	Energex Ergon Energy ETSA Utilities	Allowed the three network operators to recover additional revenues of about $850 million. This is about a 5 per cent increase to total revenues over the five year regulatory period. Specifically, ETSA Utilities, Energex and Ergon Energy have been permitted to recover an additional $301 million, $298 million, and $243 million respectively.	Combined effect of the Tribunal's October and December 2010 decisions is to set the value of gamma set at 0.25. This compares with a value of 0.65 in the SORI.
Application by Jemena Gas Networks (NSW) Ltd (No. 5) [2011] ACompT 10	Jemena Gas Networks	Error found in relation to the AER's decision on the debt risk premium and gamma. Debt risk premium for JGN should be calculated using the Bloomberg fair value curve (as per JGN's basis of appeal).	Tribunal's decision supported the DRP proposed by Jemena Gas Networks of 4.48% (as opposed to the AER's DRP of 2.93%).

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[105] EY Report, pp. 9-10.

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293. Ernst and Young conclude that the correction of WACC estimation errors has had a material effect on allowed revenues.[106]

Motivation for merits reviews

294. One common theme among the reviews that are summarised above is that they have been initiated after the AER has proposed a departure from the previous regulatory precedent. Specifically:

   a) ENERGEX, Ergon Energy and ETSA Utilities sought a review when the AER proposed a departure from the previous regulatory precedent by changing the estimate of gamma from 0.5 to 0.65;

   b) ActewAGL and Jemena sought a review when the AER proposed a departure from the previous regulatory precedent by changing the method used to estimate debt risk premium by placing 100% weight on the (lower) CBA Spectrum estimate;

   c) APT and Envestra sought a review when the AER proposed a departure from the previous regulatory precedent by changing the method used to estimate debt risk premium by placing 50% weight on the (lower) estimate of the yield on the APT bond; and

   d) Envestra sought a review when the AER proposed a departure from the previous regulatory precedent by changing the estimate of market risk premium from the previously adopted value of 6.5% to 6.0%.

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[106] EY Report, p. 14.

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Appendix 3: Alternative methods for estimating debt risk premium

Overview

295. In this appendix we briefly survey the approaches to the estimation of the DRP adopted by regulatory authorities in other jurisdictions. The regulatory authorities and estimation approaches considered herein are not exhaustive and the inclusion of any particular estimation methodology should not be taken as an endorsement of that approach, nor should the omission of any particular methodology be taken to imply that it does not have merit or is unworthy of consideration.

Ofgem

296. The most recent determination issued by Ofgem was its fifth electricity distribution determination (referred to as EDPCR5). The determination was issued in December 2009 and relates to the period from 2010 – 2015. In the section which follows, we briefly outline Ofgem's approach to the estimation of the cost of debt in DCPR5. We then turn our attention to the proposed treatment of the cost of debt in future transmission and gas distribution determinations as outlined in Ofgem's latest strategy paper, introducing the RIIO (Revenue = Incentive + Innovation + Outputs) model.

EDCPR5

297. In its EDPCR5 determination, Ofgem explicitly detailed the methodology it used to form an estimate of the cost of debt capital. Note that Ofgem do not explicitly estimate the DRP, but estimate a total cost of debt which implicitly incorporates a risk free rate of interest and a DRP. Fundamental to Ofgem's approach was the estimation of a ten year trailing average cost of debt for a sample of companies with broad A and broad BBB credit ratings.[107] A small margin accounting for embedded debt, transaction costs and potential increases in the trailing average over the next five year period was then added to the ten-year trailing average to arrive at a final point estimate for the cost of debt. In describing the role of trailing averages in its estimation of the cost of debt, Ofgem stated:[108]

> We continue to believe that long term averages represent the most appropriate basis for setting the cost of debt.

298. Expanding upon this point, Ofgem stated:[109]

> In setting a WACC for the industry, we think that the use of long-term averages is the most reasonable way of reflecting an efficient long term cost of debt given the long lived nature of the assets the debt is financing. Furthermore, long-term averages offer investors a greater degree of predictability of allowed returns beyond the five years of a price control.

299. In estimating the cost of debt capital primarily with reference to a historical trailing average of the cost of debt, Ofgem rejected the submissions of certain distribution network operators ("DNOs")

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[107] A broad rating encompasses all ratings within a particular level, including plus and minus modifiers. For instance, a broad A rating includes bonds rated A-, A and A+. Similarly, a broad BBB rating includes bonds rated BBB-, BBB and BBB+; Ofgem, 2009, Electricity distribution price control review final proposals: allowed revenues and financial issues, p 9; Ofgem, 2009, Electricity distribution price control review: Final proposals, p 51.
[108] Ofgem, 2009, Electricity distribution price control review final proposals: allowed revenues and financial issues, p 9.
[109] Ofgem, 2009, Electricity distribution price control review final proposals: allowed revenues and financial issues, p 9.

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that the cost of debt should reflect their actual embedded cost of debt. In doing so, Ofgem noted the view of other network operators that doing this would significant weaken or remove the incentives for them to finance their business efficiently.[110] Further, Ofgem argued that:[111]

> Using actual levels of embedded debt could also, without an assessment of the efficiency of the DNO's debt books, benefit shareholders at customers' expense.

300. Ofgem further considered that it was unnecessary to incorporate considerations of embedded debt in its estimate of the cost of debt capital, as these would be accounted for through other mechanisms, including an allowance in excess of the historical trailing average cost of debt.[112] Moreover, it argued that:

> Investors purchasing a DNO will factor in any difference in the cost of any embedded long term debt and the typical allowed cost of debt set by Ofgem when agreeing a purchase price.

301. Similarly, Ofgem rejected submissions that the allowed cost of debt should be increased to reflect higher issuance costs during the global financial crisis. In doing so, it noted that it had already allowed headroom for increased issuance costs by adding a small margin to the historical trailing average cost of debt.

302. Having derived a point estimate of the cost of debt by computing a ten-year trailing average and adding a small margin, Ofgem then subjected their estimate to reasonableness checks by considering a broader range of evidence. Amongst the broader range of evidence considered by Ofgem were recent debt issuances by regulated companies, general market conditions, consultants' views and financeability tests. Notable amongst these are the financeability tests, which explicitly confront the question as to whether Ofgem's regulatory proposals are likely to expose network operators to financial distress if they are financed prudently and operating in an efficient manner.[113]

3.1.2 RIIO

303. Subsequent to EDPC5, Ofgem refined its approach to estimating the cost of debt in a paper outlining its strategy for the upcoming RIIO-T1 and GD1 price reviews in relation to energy transmission networks and gas distribution networks.[114] Going forward, Ofgem signalled that it would estimate the cost of debt based on a ten-year simple trailing average index to be updated mechanistically each year during the price control period. This index is to be constructed as an average of the iBoxx GBP Non-Financial indices of 10+ years maturity, with credit ratings of broad A and broad BBB. To convert the nominal cost of debt implied by this index to a real rate, Ofgem stated that they will deflate the index by the ten-year breakeven inflation index published by the Bank of England. Further, the regulator determined to make no adjustments to the index in respect of debt issuance fees, liquidity management fees, the new issue premium or the inflation risk premium.[115]

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[110] Ofgem, 2009, Electricity distribution price control review final proposals: allowed revenues and financial issues, p 9.
[111] Ofgem, 2009, Electricity distribution price control review final proposals: allowed revenues and financial issues, p 9.
[112] Ofgem, 2009, Electricity distribution price control review: Final proposals, p 51.
[113] Ofgem, 2009, Electricity distribution price control review: Final proposals, p 53.
[114] Ofgem, 2011, Decision on strategy for the next transmission and gas distribution price controls: RIIO-T1 and GD1 financial issues.
[115] Ofgem, 2011, Decision on strategy for the next transmission and gas distribution price controls: RIIO-T1 and GD1 financial issues, p 30.

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304. In determining that the cost of debt should be estimated by reference to an index, Ofgem rejected the use of a fixed allowance for the cost of debt. Explaining its rationale for this decision, Ofgem stated:[116]

> With current risk free rates at historical lows and debt premia on BBB and A rated UK corporates back to their pre-crisis lows, it is unlikely that the cost of debt has much scope to decline further. However, it is unclear if and when the market cost of debt will increase, how fast it will climb and what levels it will reach during RIIO-T1 and GD1. With that in mind, we do not think that a fixed cost of debt allowance could be set with any confidence. We consider indexation to be the most robust option available to us to protect both consumers and companies.

305. Further, in discussing the construction of its index for the cost of debt, Ofgem noted its decision to adopt a simple average reflected research which showed that a simple average index better matched the cost of debt of the network companies than other weighting schemes. Ofgem noted, however, that it would consider a departure from a simple averaging process in individual cases involving exceptional circumstances, stating that:

> If a company can show in its business plan that the 10-year simple average index is not appropriate for its circumstances, it can propose a different approach to weighting the index and an eventual transition to the 10-year simple index. We will consider the merits of such a proposal when evaluating the business plan and would need to satisfy ourselves that the adoption of a different weighting approach is both robust and justified. The caveat applies only to exceptional circumstances…

306. Finally, in determining that it was unnecessary to explicitly incorporate additional premiums for matters such as debt issuance costs, any new issue premium or inflation risk premiums, Ofgem considered that its cost of debt index already implicitly allows headroom for these costs. In support of this proposition, Ofgem noted that over the history of the iBoxx index, network companies have been able to issue debt at coupon rates that are, on average, 58 basis points below the market cost of debt on that day. Confronting the submissions of stakeholders that the cost of debt should incorporate an allowance for debt issuance costs and liquidity management fees, Ofgem stated:[117]

> We stated in December that the level of outperformance relative to the index is sufficient to cover debt issuance costs, and consider this to remain the case with the iBoxx index. Our decision, therefore, is to maintain an implicit allowance for the cost of issuing debt.

307. Similarly, in rejecting the inclusion of a new issue premium in the cost of debt, Ofgem stated that:[118]

> [Its cost of debt index is] consistently higher than the real coupons on UK regulated utilities' bonds. This suggests that the index is sufficiently high to account for the new issue premia, even if it does not specifically capture it in its calculations.

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[116] Ofgem, 2011, Decision on strategy for the next transmission and gas distribution price controls: RIIO-T1 and GD1 financial issues, p 20.

[117] Ofgem, 2011, Decision on strategy for the next transmission and gas distribution price controls: RIIO-T1 and GD1 financial issues, p 29.

[118] Ofgem, 2011, Decision on strategy for the next transmission and gas distribution price controls: RIIO-T1 and GD1 financial issues, p 29.

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308. Lastly, in responding to submissions that the cost of debt should incorporate an inflation risk premium, Ofgem acknowledged that:[119]

> The approach used to calculate the cost of debt index implicitly assumes that all network debt is index- linked. In reality, only a small proportion of the networks' debt is index linked and the networks are exposed to inflation risk on the rest of their debt profile.

309. However, Ofgem concluded that it was unnecessary to make any adjustment to its cost of debt index, on the basis that:[120]

> the Bank of England's 2.0 per cent inflation target for CPI would imply 2.9 % on RPI – exactly matching the measure by which we deflate our index.
> The above suggests that the inflation risk premium is countered by a liquidity premium on ILGs[121] of a similar magnitude.

Ofwat

310. Ofwat, the economic regulator of the water and sewerage industry in the United Kingdom, outlined its methodology for the estimation of the cost of debt in its final determination on future water and sewerage charges for the period 2010-15, issued in November 2009.[122] In this decision, Ofwat clarifies that it estimated the cost of debt as a weighted average of direct observations of yields from companies' existing debt portfolios and forward projections derived having regard to the advice of its consultants and recent market evidence.[123] In estimating this weighted average cost of debt, Ofwat assigned a weight of 75% to yields on existing debt and a 25% weight to new debt.[124]

311. As previously noted, Ofwat's estimate of the forward looking cost of debt was determined having regard to the advice of its consultants and recent market evidence. Amongst the consultants' advice which informed Ofwat's determination on the cost of debt was a report by Europe Economics.[125] In this report, Europe economics sought to estimate the cost of debt by examining a broad range of evidence, including:[126]

    a) Yields on corporate bonds with a credit rating of at least A-;

    b) Recent bond issuances, including those conducted by water companies and other issuers, with relatively greater weight placed on water company issuances; and

    c) Primary and secondary market evidence.

312. Contrary to the approach adopted by Ofgem, Ofwat incorporated an explicit allowance for transaction costs, commitment fees and costs associated with the maintenance of liquidity in its estimate of the cost of debt.[127]

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[119] Ofgem, 2011, Decision on strategy for the next transmission and gas distribution price controls: RIIO-T1 and GD1 financial issues, p 30.

[120] Ofgem, 2011, Decision on strategy for the next transmission and gas distribution price controls: RIIO-T1 and GD1 financial issues, p 30.

[121] ILGs refer to inflation linked gilts.

[122] Ofwat, 2009, Future water and sewerage charges 2010-15: Final determinations.

[123] Ofwat, 2009, Future water and sewerage charges 2010-15: Final determinations, p 130.

[124] Ofwat, 2009, Future water and sewerage charges 2010-15: Final determinations, p 130.

[125] Ofwat, 2009, Future water and sewerage charges 2010-15: Final determinations, p 131.

[126] Europe Economics, 2009, Cost of capital and financeability at PR09: Updated report by Europe Economics.

[127] Ofwat, 2009, Future water and sewerage charges 2010-15: Final determinations, p 131.

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UK Competition Commission

313. Following the 2009 price review, Bristol Water PLC sought a redetermination of Ofwat's final determination by the UK Competition Commission. The exact scope of review undertaken by the Competition Commission is beyond the scope of this report. For present purposes, however, it suffices to note that the Commission's role is analogous, in many respects, to a tribunal undertaking merits review. That is, the Commission is required to consider all available evidence as at the date of its decision in order to reach the best or most preferable decision.[128]

314. In forming an estimate of Bristol Water's cost of debt, the Competition Commission took a weighted average of the company's existing cost of debt and the cost of new debt. The cost of new debt was, in turn, estimated with reference to benchmark data from the bond market including yields on traded and recently issued bonds. In forming an estimate of the cost of new debt, the Commission also had regard to the views of investment banks and credit rating agencies with respect to the financial market conditions and future interest rate trends.

315. Departing from the weighting scheme adopted by Ofwat, the Competition Commission also determined that the preferable approach was to weight the cost of existing and new debt equally when estimating the overall cost of debt.

316. Together, the slightly different evidence considered by the Competition Commission and its amended weighting scheme prompted the Commission to determine a real cost of debt approximately 300 basis points higher than that estimated by Ofwat.

UK Office of Rail Regulation

317. The approach to the estimation of the cost of debt adopted by the Office of Rail Regulation ("ORR") in the UK is notable in that it directly confronts the impact of a regulated entity having an implicit guarantee from the government. Network Rail, the owner and operator of Britain's rail infrastructure, has a full faith and credit guarantee of the British Government by virtue of the Financial Indemnity Mechanism ("FIM").[129] For the benefit of this guarantee, Network Rail was required to pay the UK Department of Transport a fee reflecting the long-run value of the credit quality enhancement it receives as a result of the guarantee. In its 2008 price review, the ORR increased the cost of debt allowed to by 80 basis points to take account of the FIM fee payable by Network Rail to the Department of Transport. In allowing 80 basis points in respect of the FIM fee, the ORR noted that:[130]

> We believe that this fee level broadly reflects the long-run value of the credit enhancement that Network Rail benefits from as a result of the FIM.

318. Aside from this rather vague statement, however, no further explanation was given as to the manner in which the FIM allowance was determined. Notably, ORR also incorporated explicit allowances in its cost of debt for a risk buffer to enable Network Rail to manage business risk and normal

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[128] Competition Commission (UK), 2010, Bristol Water PLC: A reference under section 12(3)(a) of the Water Industry Act 1991, para 5.
[129] Office of Rail Regulation, 2008, Periodic review 2008: Determination of Network Rail's outputs and funding for 2009 – 14, p 227.
[130] Office of Rail Regulation, 2008, Periodic review 2008: Determination of Network Rail's outputs and funding for 2009 – 14, p 234.

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fluctuations in cash flow, and a ring-fenced investment fund to fund reinvestment and capital expenditure.[131]

Northern Ireland Authority for Utility Regulation

319. In its February 2010 final determination for the Water and Sewerage Service Price Control 2010 – 13, the Northern Ireland Authority for Utility Regulation (NIAUR) made an allowance for the cost of debt based upon Northern Ireland Water's observed real cost of debt. In explaining the manner in which it implemented this approach, NIAUR stated:

> The future real rate of interest on debt for NI Water was estimated by looking at the current borrowing rate faced by NI Water, together with a predicted future rate for PC10. We have collected information on the nominal rates offered by the 2027 government gilts. We have maintained for the final determination assumed RPI inflation of 2.3%....We have linked prices and the cost of capital to RPI in order to ensure that NI Water is not exposed to funding risks associated with changes in the RPI.

IPART

320. IPART (2011a) has revised its approach to estimating the debt margin. Their revised benchmark specification is a five-year term to maturity for Australian corporate bonds (to match a five-year estimate of the risk-free rate) with credit ratings within the range of BBB to BBB+. Importantly, the decision to adopt a five-year term to maturity is primarily based on theoretical considerations, with the relatively greater data availability at this tenor a secondary consideration. IPART summarises its approach as follows:

> 1. We will use data from the Australian and US bond markets and the Bloomberg BBB fair 5-year value curve. We will sample bonds from the Australian and US market that meet the following criteria:
> – bonds are issued either in AUD or USD by Australian firms
> – bonds have a remaining term to maturity of at least 2 years
> – bonds have a credit rating of BBB to BBB+ according to Standard & Poor's
> – bonds are fixed, unwrapped and have no embedded options
> – the issuing company is not affected by factors such as M&A activity
> – prices are available from Bloomberg.
> 2. We will adopt the median of the sample of observations to select a point estimate for the debt margin.
> 3. We will target a 5-year term to maturity for the debt margin, inflation adjustment and risk free rate.[132]

ERA

321. The Economic Regulation Authority of Western Australia has adopted a "bond yield" approach to estimating the DRP. Effectively, this involves using shorter-maturity bonds to estimate the DRP. Whereas the Authority continues to use a ten-year term to estimate other WACC parameters (risk-free rate and expected inflation) it will use shorter-term bonds to estimate DRP. The Authority recognises that this results in an internal inconsistency, but is of the view that:

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[131] Office of Rail Regulation, 2008, Periodic review 2008: Determination of Network Rail's outputs and funding for 2009 – 14, pp 227 - 228.
[132] IPART DRP Final Decision (2011) Draft Decision, p. 2.

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> the market relevance of the estimates of the debt risk premium should carry more weight than the requirement of consistency with other WACC parameters.[133]

322. The specific approach is a two-step one. First a sample of "representative" bonds is constructed as follows:

> the Authority proposes to adopt the following approach to determine the sample of Australian corporate bonds to be used to estimate the debt risk premium, using the "search" function from Bloomberg:
> • credit rating of BBB-/BBB/BBB+ by Standard & Poor's;
> • time to maturity of 2 years or longer;
> • bonds issued in Australia by Australian entities and denominated in Australian dollars;
> • inclusion of both fixed bonds303 and floating bonds; and
> • inclusion of both Bullet and Callable/ Putable [sic] redemptions.[134]

323. The second step is distil the yields on the bonds in the sample down to a single estimate using some form of weighted average. The Authority proposes that a number of alternative weighting schemes should be examined:

> a simple average (or equally weighted average);
> • a "number-of-years-until-maturity" approach (in which bonds with more years to maturity are given greater weight than bonds with fewer years to maturity);
> • an "amount-issued" approach (where more weight is given to bonds issued in greater amounts); and
> • an approach where the median306 of a sample is used. For a sample with an odd number of observations, the median value is the value of the single middle observation from the sample. If there is an even number of observations in the sample, then the median is calculated as the average of the two middle values.[135]

AER bond yield approach

324. In a number of recent draft decisions, the AER has also proposed to estimate DRP from a sample of bond yields. The proposed methodology is set out in, for example, the Powerlink Draft Decision. In essence, the AER proposes to construct a representative sample of bonds and to estimate the DRP using the (equally-weighted) mean yield to maturity of the bonds in the sample. The AER states that it:

> considers the sample based average of relevant observed bonds would result in an appropriate estimate of the DRP.[136]

325. Unlike the IPART and ERA approaches, the AER proposes to restrict the sample to bonds with approximately ten years to maturity. In the Powerlink Draft Decision, the AER selected a sample of 9 bonds with maturities from 7.7 to 11.0 years and credit ratings from BBB to A-. The AER notes that:

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[133] DBP Draft Decision, Paragraph 554.
[134] DBP Draft Decision, Paragraph 542.
[135] DBP Draft Decision, Paragraph 556.
[136] Powerlink Draft Decision, p. 223.

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> The sample has an average remaining term of approximately 10 years, and an average credit rating between BBB and BBB+.[137]

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[137] Powerlink Draft Decision, p. 223.

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