ABN 19 622 755 774

201 Elizabeth Street (cnr Park St)
PO Box A1000 Sydney South
New South Wales 1235 Australia
Facsimile (02) 9284 3456
Telephone (02) 9284 3000
Web http://www.transgrid.com.au
DX 1122 Sydney

Mr Mike Buckley
General Manager Network Regulation North
Australian Energy Regulator
GPO Box 3131
Canberra ACT 2601

Email: aerinquiry@aer.gov.au

Dear Mike

Submission of expert opinion supporting TransGrid's revised Revenue Proposal

In its revised Revenue Proposal submitted to the Australian Energy Regulator (AER) on 14 January 2009, TransGrid proposed a revised averaging period for the determination of the nominal risk free rate and included expert opinion provided by Competition Economists Group (CEG).

TransGrid's nomination of an averaging period on 14 January 2009 is in accordance with section 6A.6.2(c)(2)(i) of the National Electricity Rules (NER). As a consequence, TransGrid considers that the AER is required to respond to this nomination within 30 business days of the date of submission, that is, by 26 February.

TransGrid wishes to lodge the attached supporting material:

- Attachment A – Review of TransGrid approach to WACC averaging period, Professor Stephen Gray, Professor of Finance (University of Queensland, Business School), Strategic Finance Group.
- Attachment B – The WACC and the Averaging Period, Professor Bruce D. Grundy, Professor of Finance (University of Melbourne), including reference papers.

Under the National Electricity Law (NEL) and the NER, the averaging period used to estimate the risk free rate and thus the cost of capital should be commensurate with the return required by investors in a comparable commercial enterprise and should provide the transmission network service provider (TNSP) with a reasonable opportunity to recover at least its efficient costs.

In order to achieve an appropriate rate of return that meets these requirements, TransGrid, in its revised Revenue Proposal, has nominated an averaging period prior to the period affected by the escalation of the global financial crisis (GFC). It is Professor Gray's expert opinion that "an averaging period contaminated by the financial crisis will produce an estimate of the risk free rate and, accordingly, an estimate of the required return on equity at historically low levels... below the true cost of equity."[1] He supports this position by demonstrating that the AER's approach in its Draft Decision would provide a return on equity that is only marginally higher (less than 1%) than the yield to debt holders[2]. Professor Gray considers this unreasonable and implausible, particularly given market indicators show that equity investors are requiring

[1] Strategic Finance Group, Review of TransGrid approach to WACC averaging period, 13 Feb 2009, page 2
[2] Strategic Finance Group, Review of TransGrid approach to WACC averaging period, 13 Feb 2009, pages 13

higher returns. Analysis of dividend yields and spreads[3] indicate that some of the recent significant falls in equity values are likely to be a result of investors requiring an increase in the return on equity, rather than a lower return on equity that results from the mechanistic application of the NER requirement proposed in the Draft Decision.

Professor Gray further states that a downward bias in return on equity is likely to be observed due to a bias in the risk free rate. The AER has used nominal Commonwealth government securities (CGS) as a proxy for the risk free rate, but Professor Gray asserts this is biased downwards due to a liquidity premium being paid by investors under the current market conditions that has reduced yields[4]. Professor Grundy demonstrates in his report that if return on equity were obtained by adding 6% to the yield on 10 year nominal CGS that the "estimates would suggest that as the GFC has become more severe, investors' required return on equity... has reached a record low over the past quarter century"[5].

Professor Grundy notes that the yield on CGS is one measure that can be used as a proxy for the risk free rate, which is the required return on zero beta securities. However, when it is observable in the market that other zero beta securities such as NSW Treasury securities have higher yields, then under the CAPM the use of CGS will result in an estimate of return on equity that is downward biased. His report shows that the gap between the yields on NSW Treasury securities and CGS has grown as the GFC has gathered momentum and that the downward bias in CGS is greater in the period from 7 September 2008.[6]

The NER does not specify a set of pre-determined business days prior to the beginning of the regulatory period for the period that should be used to calculate the moving average. Professor Grundy asserts that this is because this may result in unintended outcomes, such as the downward bias of CGS used as a proxy for the risk free rate.[7]

The deemed parameters in the NER imply that TNSPs have the same risk as the market portfolio, reflected by a beta of 1. Thus the CAPM implies that return on equity for a TNSP is equal to the return on the equity market as a whole. Professor Grundy states that the CAPM does not imply that the best possible estimate for the return on equity is obtained by adding 6% (the NER deemed MRP) to the risk free rate determined by a moving average period that is as close as possible to the start of the regulatory period. He asserts that the NER requires that the risk free rate be determined by selecting a period such that adding 6% to that rate gives the best possible estimate of the return on equity, which equates to the return on the equity required by the market as a whole[8].

Professor Grundy also asserts that the increased "uncertainty associated with the GFC is expected to lead to an increase in the MRP" as economic theory states that when "risk is higher, so also is the required return." He references research into the link between the MRP and volatility of future market returns to demonstrate that "when an increase in risk induces a flight to quality and lower yields on government securities, not only does the MRP increase, but it increases *more* than one for one." However, with the MRP fixed by the NER there will be a downward bias "relative to investors' true required return".[9] Thus when the return on equity is to be estimated by summing a downward biased CGS rate and a constant 6% MRP, which is also downward biased, the resultant estimate will clearly be biased down.

TransGrid asserts that the use of an averaging period that is contaminated by the GFC will be less reliable and more biased than its proposed period ending 5 September 2008. Professor Grundy agrees and

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[3] Strategic Finance Group, Review of TransGrid approach to WACC averaging period, 13 Feb 2009, pages 14-16
[4] Strategic Finance Group, Review of TransGrid approach to WACC averaging period, 13 Feb 2009, pages 19-21
[5] Grundy, Professor Bruce D., The WACC and the Averaging Period, 16 Feb 2009, pages 8
[6] Grundy, Professor Bruce D., The WACC and the Averaging Period, 16 Feb 2009, pages 10-12
[7] Grundy, Professor Bruce D., The WACC and the Averaging Period, 16 Feb 2009, pages 6
[8] Grundy, Professor Bruce D., The WACC and the Averaging Period, 16 Feb 2009, pages 2-4
[9] Grundy, Professor Bruce D., The WACC and the Averaging Period, 16 Feb 2009, pages 12-17

states that in his expert opinion "the use of an averaging period close to the date of the final decision (i.e. February/March 2009) will not provide an unbiased estimate of the commercial return." Professor Grundy notes that 7 September 2008 marks the beginning of a period of greater investor uncertainty. He states that a period after this date combined with the NER requirements for a fixed MRP "will produce the apparent result that return on equity has declined as the GFC has intensified...Such a result is inconsistent with both basic economic theory of a risk return tradeoff and the requirement of Clause 6A.6.2(b) of the NER".[10]

Under current market conditions the bias in the risk free rate is compounded in terms of the real return on capital by the AER's approach to inflation. Professor Grundy's analysis leads him to conclude that if RBA inflation forecasts are used it is "inappropriate" to use an averaging period that after 7 September 2008.[11]

Professor Gray is of the opinion that the AER's inflation approach is internally inconsistent and results in implausible outcomes. He notes that the issues with inconsistencies and estimation of inflation have increased due to the GFC and that if an averaging period prior to September 2008 is used then these issues would be immaterial[12]. TransGrid's revised Revenue Proposal states that an RBA inflation forecast used in conjunction with the averaging period ending 5 September 2008 would be acceptable to TransGrid.

The AER have stated that CAPM theory supports an averaging period close to the date of the Final Decision.[13] Professor Gray contends that CAPM theory makes no such claim and that a date close to the Final Decision is unlikely to provide the best estimate of the return on equity, for the reasons highlighted above.[14]

The AER has taken the position in TransGrid's Draft Decision that the Bloomberg-based bond yield proxy would provide a more consistent estimate of the cost of debt.[15] Professor Grundy states that this position taken by the AER is difficult to rationalise as Bloomberg estimates are now consistently lower than CBA Spectrum, when the reason for rejecting the use of CBA Spectrum estimates in the past was due to their downward bias.[16] Professors Grundy and Gray conclude that an average of CBA Spectrum and Bloomberg yields would provide a "prudent estimate"[17] that would be "equally unbiased and more precise" under current market conditions.[18] TransGrid's revised Revenue Proposal applies an average of the two services' estimates.

If you have any queries in relation to this submission please contact Mr John Howland on (02) 9284 3509.

Yours sincerely

16/2/'09

Peter McIntyre
General Manager/Network Development and Regulatory Affairs

[10] Grundy, Professor Bruce D., The WACC and the Averaging Period, 16 Feb 2009, page 18
[11] Grundy, Professor Bruce D., The WACC and the Averaging Period, 16 Feb 2009, pages 26
[12] Strategic Finance Group, Review of TransGrid approach to WACC averaging period, 13 Feb 2009, pages 27-30
[13] AER, Draft decision, TransGrid transmission determination 2009-10 to 2013-14, page 92
[14] Strategic Finance Group, Review of TransGrid approach to WACC averaging period, 13 Feb 2009, pages 17-18
[15] AER, Draft decision, TransGrid transmission determination 2009-10 to 2013-14, page 93
[16] Grundy, Professor Bruce D., The WACC and the Averaging Period, 16 Feb 2009, pages 21
[17] Grundy, Professor Bruce D., The WACC and the Averaging Period, 16 Feb 2009, page 22
[18] Strategic Finance Group, Review of TransGrid approach to WACC averaging period, 13 Feb 2009, pages 3

Review of TransGrid approach to WACC averaging period

Report prepared for TransGrid

14 February 2009

PO Box 29, Stanley Street Plaza
South Bank QLD 4101
Telephone +61 7 3844 0684
Email s.gray@sfgconsulting.com.au
Internet www.sfgconsulting.com.au

STRATEGIC FINANCE GROUP
SFG CONSULTING

Level 1, South Bank House
Stanley Street Plaza
South Bank QLD 4101
AUSTRALIA

Contents

Executive summary and conclusions

Instructions

1. The Strategic Finance Group: SFG Consulting (SFG) has been engaged by TransGrid to provide an expert opinion on several matters relating to the appropriate estimate to be used for the risk-free rate parameter in the calculation of the weighted-average cost of capital (WACC).

2. Specifically, we have been asked by TransGrid to provide an expert opinion as to whether:

   a. An averaging period close to the date of the final decision (i.e., in February/March 2009) would provide a reliable and unbiased estimate of the required return on equity given the current global financial crisis, and whether an averaging period prior to 7th September 2008 would provide a more reliable and unbiased estimate;

   b. Capital Asset Pricing Model (CAPM) theory supports the selection of an averaging period close to the date of the final decision;

   c. The global financial crisis has resulted in a historically high liquidity premium being paid for government bonds, pushing down the yield on nominal Commonwealth Government Securities (CGS);

   d. The mechanistic application of the National Electricity Rules (NER) requirement as proposed in the Draft Decision would indicate a low required return on equity, whereas other evidence points to a high required return on equity currently;

   e. The divergence in the bond yields provided by Bloomberg and CBA Spectrum data services indicate that illiquidity in the market is affecting the reliability of these estimates and that averaging the two would provide a more reliable estimate; and

   f. The RBA inflation forecasts are the most appropriate forecast to apply to determine the real cost of capital, particularly where the averaging period coincides with the current period of abnormal market conditions.

Conclusions

3. Our main conclusions in relation to each of the questions we have been asked to address are as follows:

   a. The selection of an averaging period contaminated by the financial crisis will produce an estimate of the risk free rate and, accordingly, an estimate of the required return on equity at historically low levels. This is almost certain to produce estimates below the true cost of equity. This conclusion is corroborated by the fact that variables identified in the finance literature as being strongly related to required returns on equity are currently indicating high (not historic low) required returns on equity. Moreover, the approach set out in the Draft Decision implies that the required return on equity is only marginally higher than the yield required by debt holders (for their fixed set of contractual payments). Specifically, the estimates proposed in the Draft Decision imply that lenders require the firm to promise them a return of 9.38% before they will lend money under contractual terms at a fixed rate, but that shareholders require a total return of only 10.09% to provide residual equity capital. Such a low equity risk premium is not plausible, especially in the current market circumstances.

b. Under the CAPM, considerations about averaging periods, the term of the risk free rate, and the best proxy for the risk free rate do not arise. In practice, of course, the model needs to be implemented and parameters need to be estimated, but theory does not spell out how to implement the model in practice or how to obtain the best and most reliable parameter estimates. These are issues for econometric analysis, statistics, and most importantly common sense. We set out some general principles in this regard and conclude that in the current market circumstances, an averaging period close to the date of the final decision is unlikely to meet the objective of obtaining the best estimate of the required return on equity as a step in the implementation of the CAPM-WACC framework.

c. Nominal CGS yields are at their lowest levels in 40 years. There is evidence consistent with the decline in these yields being driven by the market paying a liquidity premium for these bonds. For example, there has been a dramatic increase in the spreads between nominal CGS and State Government debt and since June 2008 yields on nominal 10-year CGS have fallen sharply while yields on inflation-indexed CGS have remained steady. By far the most plausible explanation of these results is that a surge in demand for nominal CGS (due primarily to their liquidity) has resulted in a liquidity premium being paid for these bonds, which in turn has lead to a squeezing of yields.

d. It is not necessarily the case that a fall in equity values must be caused by an increase in the required return on equity – a fall in expected future profits will also lead to a decline in equity prices. However, an implausibly large reduction in expected corporate profits would be required to reconcile equity market movements with the required return on equity estimated using the approach set out in the Draft Decision. The much more likely explanation is that at least some of the decline in equity values has resulted from an increase in the required return on equity.

e. None of the material available to us provides a strong reason to prefer the estimates of BBB+ bond yields from one data service over those provided by the other (i.e., CBA Spectrum estimates vs. the AER's extrapolation of Bloomberg data). Consequently, we conclude that the statistical properties of the average estimate (equally unbiased and more precise) make it more reliable than either of the individual estimates.

f. The approach in the Draft Decision to (a) estimating expected inflation using the RBA forecast approach and (b) estimating the nominal risk free rate using up-to-date yields on nominal CGS cannot be justified and leads to implausible outcomes:

   i. It assumes that investors require a real return of only 1.28% from risk free investments, but this is inconsistent with the fact that nearly double this return is presently available from inflation-indexed CGS.

   ii. The implausible results that flow from the approach in the Draft Decision arise due to an inconsistency in the way CGS yields are interpreted. Current market yields on CGS are considered by the AER to be reliable enough to estimate the risk free rate but are not considered by the AER to be reliable enough to estimate expected inflation.

   iii. These problems relating to estimation and inconsistencies have been sharpened in the present market circumstances and particularly since September 2008. The use of an averaging period prior to September 2008 avoids these complications as the two methods for estimating expected inflation provided more consistent results

prior to the dramatic decline in nominal CGS yields that began in September 2008. In our view, this is the preferred approach as it also results in a more reliable estimate of the required return on equity, within the constraints of the Rules.

iv. If, however, an averaging period close to the date of the final determination is to be used, it is important that it is applied consistently throughout the Decision. Consistency could be maintained by:

1. Using current market yields for estimating the nominal risk-free rate *and* estimating expected inflation; or

2. Using the RBA forecast approach for both purposes. This would involve estimating the nominal yield on CGS as the sum of the inflation-indexed yield and expected inflation using the RBA forecast approach. Of the two approaches that use an averaging period close to the date of the Decision, this approach is more likely to produce an estimate of the required return on equity that is more plausible and economically reasonable and should be preferred.

1. Regulatory setting

Overview

4. The relevant regulatory framework is set out in the National Electricity Rules[1] (the Rules) and the National Electricity Law[2] (NEL). In this section, we set out the relevant provisions of the regulatory framework as well as our interpretation of these provisions, insofar as they are relevant to our brief.

5. Our conclusions are that:

   a. The estimate of the risk free rate must be based on the yield of ten-year Commonwealth Government Securities (CGS), averaged over some period;

   b. The estimate of the required return on equity is obtained by adding 6% to the estimate of the risk-free rate; and

   c. The averaging period used to estimate the risk free rate should be such that the resulting estimate of the cost of equity:

      i. is commensurate with the return required by investors in a comparable commercial enterprise and with the prevailing conditions in the market for funds, and

      ii. provides the business with a reasonable opportunity to recover costs (including the cost of funds) and with incentives to promote investment.

The WACC requires an estimate of the required return on debt and equity finance

6. The Rules set out a building block approach for determining the revenue requirement for the Transmission Network Service Provider (TNSP). One of the building blocks is the return on capital. The Rules require that the return on capital component of the revenue requirement must be calculated as a nominal weighted-average cost of capital (WACC). Specifically, Clause 6A.6.2(b) of the Rules requires that:

> The rate of return…must be calculated as a nominal post-tax weighted average cost of capital ("WACC") in accordance with the following formula:
>
> $$WACC = k_e \frac{E}{V} + k_d \frac{D}{V}$$
>
> where:
>
> k_e is the return on equity…;
>
> k_d is the return on debt…;
>
> $\frac{E}{V}$ is the market value of equity as a proportion of the market value of equity and debt, which is $1 - \frac{D}{V}$; and

[1] National Electricity Rules, Version 24.
[2] National Electricity (South Australia) Act 1996 – National Electricity Law.

> $\frac{D}{V}$ is the market value of debt as a proportion of the market value of equity and debt, which is deemed to be 0.6.[3]

7. That is, under the Rules, the AER must estimate the required return on equity (k_e) and the required return on debt (k_d). The proportions of debt and equity finance are fixed at 60% and 40% respectively.

The estimate of the required return on debt is independent of the estimate of the risk-free rate

8. The Rules set out the manner in which the required return on debt must be estimated. Clauses 6A.6.2(b) and (e) of the Rules require that:

> k_d is the return on debt and is calculated as:
>
> $r_f + DRP$
>
> where:
>
> DRP is the debt risk premium for the regulatory control period….The debt risk premium for a regulatory control period is the premium determined for that regulatory control period by the AER as the margin between the annualised nominal risk free rate and the observed annualised Australian benchmark corporate bond rate for corporate bonds which have a BBB+ credit rating from Standard and Poors and a maturity equal to that used to derive the nominal risk free rate.

9. That is, the required return on debt must be estimated as the sum of the estimated risk-free rate plus the estimated debt risk premium. The debt risk premium, in turn, must be estimated as the yield on BBB+ corporate bonds less the estimated risk-free rate. The net effect of this is that the required return on debt must be estimated as the yield on BBB+ corporate bonds:

$$\begin{aligned} k_d &= r_f + DRP \\ &= r_f + \left(Yield_{BBB+} - r_f\right) \\ &= Yield_{BBB+} \end{aligned}$$

10. This point is also made by CEG (2008, Paragraph 15) who conclude that "the measurement of the risk free rate actually plays no role in setting the cost of debt." We agree with CEG's assessment and conclusion on this point.

11. Thus far, we have established that the Rules require the AER to estimate the required return on equity (k_e) and the required return on debt (k_d). The estimate of the required return on debt is independent of the estimate of the risk-free rate. Consequently, the risk-free rate only has an impact on the estimate of the required return on equity – so that is the focus of the remainder of this section.

[3] Rules, Clause 6A.6.2(b)

The estimate of the required return on equity must be 6% greater than the regulator's estimate of the risk-free rate

12. The Rules also specify the manner in which the required return on equity must be estimated. Clause 6A.6.2(b) of the Rules requires that:

> k_e is the return on equity (determined using the Capital Asset Pricing Model) and is calculated as:
>
> $$k_e = r_f + \beta_e \times MRP$$
>
> where:
>
> r_f is the nominal risk free rate for the *regulatory control period* determined in accordance with paragraph (c);
>
> β_e is the equity beta, which is deemed to be 1.0; and
>
> MRP is the market risk premium, which is deemed to be 6.0%.[4]

13. That is, under the Rules, the required return on equity must be calculated as the sum of (a) the estimate of the risk-free rate, and (b) 6%. The only discretion for the proposing regulated firm and regulator is in selecting the appropriate estimate of the risk-free rate.

The estimate of the risk-free rate must be the average yield on 10-year government bonds

14. As set out above, the only discretion available when estimating the required return on equity is in selecting the appropriate estimate of the risk-free rate. The Rules provide some further restrictions on the manner in which the risk-free rate must be estimated. Clause 6A.6.2(c) of the Rules requires that:

> The nominal risk free rate for a regulatory control period is the rate determined for that regulatory control period by the AER on a moving average basis from the annualised yield on Commonwealth Government bonds with a maturity of 10 years using:
>
> (1) the indicative mid rates published by the Reserve Bank of Australia; and
>
> (2) a period of time which is either:
>
> (i) a period ('the agreed period') proposed by the relevant Transmission Network Service Provider, and agreed by the AER (such agreement is not to be unreasonably withheld); or
>
> (ii) a period specified by the AER, and notified to the provider prior to the commencement of that period, if the period proposed by the provider is not agreed by the AER under subparagraph (i).[5]

[4] Rules, Clause 6A.6.2(b)
[5] Rules, Clause 6A.6.2(c)

15. Since the market risk premium and beta are fixed under the rules, within the Sharpe CAPM the only discretion available to the proposing regulated firm and the regulator when estimating the required return on equity relates to the selection of the risk-free rate. This is further constrained by the Rules which require that the risk-free rate must be estimated as the average yield on 10-year CGS. Consequently, the only discretion available relates to (a) the averaging period that is used, and possibly (b) which 10-year CGS are used (i.e., nominal or inflation-indexed) as the basis for this estimate.

Investors in the regulated business must be allowed to earn reasonable returns in the circumstances

16. The Rules and the National Electricity Law provide some guidance on the objectives that must be met when estimating the required return on debt and equity, and consequently the WACC and the allowed return. Clause 6A.6.2(b) of the Rules requires that:

> The rate of return for a Transmission Network Service Provider for a regulatory control period is the cost of capital as measured by the return required by investors in a commercial enterprise with a similar nature and degree of non-diversifiable risk as that faced by the transmission business of the provider.[6]

17. Consequently, the Rules require the cost of capital to be commensurate with the return that would be required by investors in a comparable commercial enterprise.

18. On this point, the meaning and intention of the Rules is set out in more detail in relation to Reviews of WACC parameters that might be conducted by the AER. Although the present matter does not fall under a general review of WACC parameters, the clauses dealing with such a review provide some guidance as to what is required in an estimate of required returns. Clause 6A.6.2(j)(1) of the Rules requires that:

> In undertaking a review…the ***AER*** must have regard to…the need for the rate of return…to be a forward looking rate of return that is commensurate with prevailing conditions in the market for funds and the risk involved in providing prescribed transmission services.[7]

19. That is, the Rules refer to the estimates of required return being "measured by the return required by investors in a commercial enterprise" and as being "commensurate with prevailing conditions in the market for funds."

20. The National Electricity Law (NEL) also contains a number of relevant provisions. Section 7A(2) of the NEL sets out one of the relevant objectives of the Law as:

> A regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs…[8]

[6] Rules, Clause 6A.6.2(b)
[7] Rules, Clause 6A.6.2(j)(1)
[8] NEL, s. 7A(2)

21. Similarly, Section 7A(3)(a) of the NEL sets out an objective of the Law as being:

> 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…[9]

22. That is, the objectives of the NEL include allowing returns such that there is "a reasonable opportunity to recover at least the efficient costs" and an incentive "to promote…efficient investment."

Summary of relevant aspects of the regulatory setting

23. The logic of the steps set out above, under the Rules and NEL, is as follows:

a. The return on capital component of the revenue requirement must be calculated as a nominal WACC;

b. This requires estimates of the required return on equity (k_e) and the required return on debt (k_d);

c. The estimate of the required return on debt is independent of the estimate of the risk-free rate. Consequently, the risk-free rate only has an impact on the estimate of the required return on equity;

d. The required return on equity must be calculated as the sum of (a) the estimate of the risk-free rate, and (b) 6%. In relation to the Sharpe CAPM, the only discretion for the proposing regulated firm and regulator is in selecting the appropriate estimate of the risk-free rate (see Paragraph 15 in this regard);

e. The risk-free rate must be estimated as the average yield on 10-year CGS. Consequently, the only discretion available to the proposing regulated firm and the regulator is the averaging period to be selected and possibly which 10-year CGS are used (i.e., nominal or inflation-indexed) as the basis for this estimate;

f. The Rules refer to the estimates of required return being "measured by the return required by investors in a commercial enterprise" and as being "commensurate with prevailing conditions in the market for funds"; and

g. The objectives of the NEL include allowing returns such that there is "a reasonable opportunity to recover at least the efficient costs" and an incentive "to promote…efficient investment."

24. In summary, our interpretation of the relevant regulatory framework, so far as it applies to the questions we have been asked to address, is that:

[9] NEL, s. 7A(3)(a)

a. When estimating the required return on equity using the Sharpe CAPM, the only discretion available to the proposing regulated firm and the regulator is in selecting the appropriate estimate of the risk-free rate, and this must be done with reference to the yield on 10-year CGS over some averaging period (see Paragraph 15 in this regard).

b. The resulting estimate of the required return on equity must be commensurate with the return required by investors in a comparable commercial enterprise and with the prevailing conditions in the market for funds. It must also provide the business with a reasonable opportunity to recover costs (including the cost of funds) and with incentives to promote investment.

25. Consequently, it is our interpretation of the relevant regulatory framework that the averaging period used to estimate the risk free rate in (a) above should be selected in a way that best meets the requirements and objectives set out in (b) above.

2. Selection of an averaging period to produce an unbiased return on equity

Unbiasedness

26. We have been asked to provide an opinion on whether:

> An averaging period close to the date of the final decision (i.e., in February/March 2009) would provide a reliable and unbiased estimate of the required return on equity given the current global financial crisis, and whether an averaging period prior to 7th September 2008 would provide a more reliable and unbiased estimate;

27. An estimation procedure is unbiased if it produces estimates which are equally likely to be above or below the true (but unobservable) parameter value.

28. The estimation procedure for the required return on equity is set out in Clause 6A.6.2(b) of the Rules. This requires that the required rate of return on equity be calculated as the sum of (a) the estimate of the risk-free rate, and (b) a fixed risk premium of 6%. In relation to the Sharpe CAPM, the only discretion for the proposing regulated firm and regulator is in selecting the appropriate estimate of the risk-free rate and this must be done with reference to the yield on 10-year CGS over some averaging period (see Paragraph 15 in this regard).

29. Consequently, the question is whether an averaging period close to the date of the final decision, or prior to September 7 2008, is more likely to produce an estimate of the required return on equity that is equally likely to be above or below the true (but unobservable) value.

Is the present required return on equity likely to be low?

30. In Section 4 of this report we show that the yield on nominal 10-year CGS is presently lower than at any point in the last 40 years. Consequently, if a very recent averaging period is used, the result will be an estimate of the required return on equity that is lower than at any point in the last 40 years. The question is whether such an estimate is equally likely to be above or below the true required return on equity.

31. CEG (2008, Para 106-110) cite evidence that financial markets are currently being affected by a global financial crisis which reached its present level of intensity in September 2008. For instance, they note that the International Monetary Fund (IMF) in its October 2008 World Economic Outlook stated:

> The financial crisis that first erupted with the U.S. subprime mortgage collapse in August 2007 has deepened further in the past six months and entered a tumultuous new phase in September. The impact has been felt across the global financial system, including in emerging markets to an increasing extent. Intensifying solvency concerns have led to emergency resolutions of major U.S. and European financial institutions and have badly shaken confidence.[10]

[10] CEG (2008) citing OECD, Economic Outlook No. 84, Editorial: Managing the global financial crisis and the economic downturn and summary of projections, Klaus Schmidt-Hebbel, OECD Chief Economist, page 3.

32. CEG (2008) note that the financial crisis has resulted in a flight from risk and a corresponding "flight to safety and liquidity." They describe the behaviour typical of investors in these circumstances and its impact upon bond yields as follows:

> investors reduce their demand for corporate debt and equity and increase their demand for government bonds (which are low risk). This increases the price of government bonds and, thereby, reduces government bond yields [11]

33. The reaction of investors in a financial crisis described by CEG is consistent with recent evidence. On 15 January 2009, the nominal yield on 10-year CGS was 3.86%,[12] its lowest point since July 1969.

34. CEG (2008) indicate the likely outcome of selecting an averaging period close to the final determination date while the financial crisis persists:

> Adopting an averaging period contaminated by the current financial crisis will likely result in an aberrant and historically unprecedentedly low estimate of the risk free rate. Under the Rules this will flow through to a correspondingly low estimate of the cost of equity.[13]

35. This leads CEG to conclude that the selection of an averaging period proximate to the date of the final determination will not produce an unbiased estimate of the required return on equity. Rather, they state:

> if current or similar market conditions persist in the averaging period specified by the AER, applying an averaging period which is closely aligned to the date of the final determination will provide a *biased* rate of return on equity that is *inconsistent* with equity market conditions at the time of the final determination.[14]

36. Our analysis supports the conclusion that the selection of an averaging period affected by the current financial crisis which is proximate to the final date of determination is unlikely to provide an unbiased estimate of the required return on equity.

37. In forming this view, we considered whether the selection of an averaging period proximate to the date of the final determination is likely to produce estimates which are plausible or economically reasonable in the circumstances. There are two primary reasons for our conclusion. First, the required return on equity is only marginally above the yield to maturity on investment-grade debt. Second, there is empirical evidence that dividend yields, debt spreads and term spreads are positively associated with required returns to equity holders, and the current levels of these factors suggest that required returns on equity are high, not at their lowest level in 40 years.

Required return on equity vs. debt

38. CBA Spectrum reports that, as at 2 February 2009, the yield to maturity on various debt securities is as summarised in Table 1 below. This data was the most recently available data when drafting

[11] CEG (2008), Para 111.
[12] RBA statistics.
[13] CEG (2008), Para 41.
[14] CEG (2008), Para 42..

of this report commenced and consequently provides the best available reference point for the data that will be available at the time of the Final Decision.

Table 1. Yield to maturity of various debt securities

Credit Rating	Yield to maturity 10 years (%)
AAA	7.88
AA+	7.99
AA	8.56
AA-	8.69
A+	8.77
A	8.87
A-	9.03
BBB+	9.38
BBB	9.70

Source: CBA Spectrum, yield on 10-year debt securities, 2 February 2009.

39. By way of comparison, we estimate the risk free rate implied from 10-year CGS yields using an averaging period of 20 days duration ending on 2 February 2009 at 4.09%.[15] Adding a risk premium of 6%, this implies a required return on equity of 10.09%.

40. We note that all of these yields are very high relative to the required return on higher risk equity. As outlined above, the required return on equity implied by a 20-day averaging period ending on 2 February 2009 is 10.09%. In comparison, applying the Rules with respect to the cost of debt using CBA Spectrum data at 2 February 2009 implies a cost of debt of 9.38%. These results imply that lenders require the firm to promise them a return of 9.38% before they will lend money under contractual terms at a fixed rate, but that shareholders require a total return of only 10.09% to provide residual equity capital. That is, the risk premium for equity relative to BBB+ debt implied by the Draft Decision is only 71 basis points.

41. CBA Spectrum reports that the average spread between 10-year BBB+ bond yields and the corresponding CGS between 1998 and 2006 was 125 basis points. This is an estimate of the average risk premium required for 10-year BBB+ debt. This can be compared with the MRP of 6%, which is an estimate of the average risk premium for equity. That is, on average, the estimated risk premium on equity has been 475 basis points more than the risk premium on BBB+ debt. But the estimates proposed in the Draft Decision imply that investors now require only 71 basis points more in expected return on equity capital than they require on BBB+ debt. This does not seem reasonable in the current economic environment.

42. A component of the yield to maturity on debt is compensation for bearing default risk. For the ten-year period ending in 1996, Elton, Gruber, Agrawal and Mann (2001) estimate this default risk premium for ten-year bonds at 5 basis points for AA-rated debt and 41 basis points for BBB-rated debt. The relatively high cost of debt currently observed is likely to be partly attributable to an increase in the probability of default, and hence an increase in the default risk premium.

43. However, it is implausible that investors would willingly accept a return on their residual equity investment (which ranks behind the assumed 60% debt financing) only marginally higher than that which could be obtained in the form of contractually agreed fixed income payments.

[15] Again, this data was the most recently available data when drafting of this report commenced and consequently provides the best available reference point for the data that will be available at the time of the Final Decision.

44. In the absence of a default, an investor who holds a debt security from its inception to its maturity receives a guaranteed series of payments that are certain in timing and amount. Even in the event of default, debt holders may receive some payment while equity holders receive nothing.

45. In contrast, equity investors are guaranteed nothing. They hold a residual claim that ranks after the debt holders and are only entitled to some return after the debt holders have received everything they are due. Moreover, the existence of debt in the capital structure of a firm increases the risk borne by shareholders. It follows that an equity investment in a firm with 60% gearing is considerably riskier than a loan made to that firm. Consequently, a rational shareholder would require a higher expected return than debt holders in the same firm – but a required return on equity estimated using a very recent averaging period produces an estimate that implies a risk premium of only 71 basis points above the yield required by debt holders in the same firm who are contractually bound to receive a fixed series of payments.

Market indicators that required returns are high

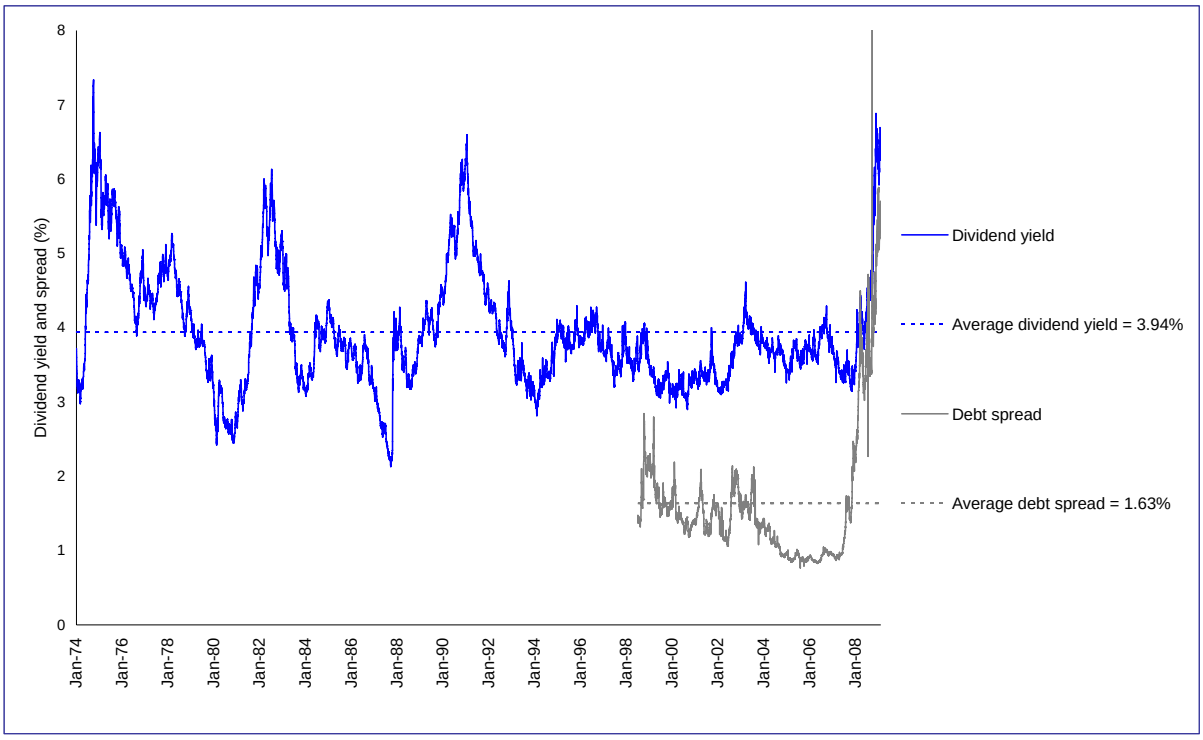
46. The finance literature provides evidence that dividend yields and default spreads are positively associated with future equity market returns relative to Treasury bill rates (Fama and French, 1988 and 1989; and Keim and Stambaugh, 1986). This does not imply that equity market returns can be forecast with precision or that these variables provide investors with a trading strategy which generates abnormally high returns. What it does imply is that the bond and equity market prices appear to be affected by similar risk considerations. This means that low equity prices (relative to trailing dividends) and low corporate bond prices (relative to promised repayments) reflect investors' expectations for risk and therefore their required return for bearing that risk, in both the equity and debt markets.

47. The figure below shows historical values for these variables relative to their average levels for Australia.[16][17] At 2 February 2009, the trailing dividend yield on the All Ordinaries Index was around 6.5%, compared to a long-term average of 3.9%, and the BBB-rated debt spread was around 5.3%, compared to a long-term average of 1.6%.

[16] Dividend yield is estimated on an annual trailing basis. To estimate the previous year's dividends we first compute the difference between the total returns and percentage price changes on the Australian market for each day of trade. Second, we convert the percentage return from dividends into a total number of points on the accumulation index attributable to the receipt of dividends. Third, we accumulate the total dividend points for the previous twelve months and divide by the ending value for the accumulation index. This provides us with an estimate of total dividends for the previous 12 months relative to the current value of the index. From 29 May 1992 – 5 February 2009 the market index is the All Ordinaries Index. From 1 January 1973 to 28 May 1992 the market index is the Datastream Total Market Australian Index.

[17] The default spread is the estimated yield to maturity on BBB-rated corporate debt relative to the yield-to-maturity on 10-year CGS.

Figure 1. Dividend yield and debt spreads in Australia



48. As discussed in Section 5 with respect to earnings expectations, the high dividend yield is likely to reflect both expectations of lower dividends in 2009 compared to 2008, as well as a higher required return for bearing risk. And as mentioned above, a component of the debt spread reflects investor expectations for default. However, these are the same measures which prior research has found to be associated with future equity market returns.

Conclusions

49. The selection of an averaging period contaminated by the financial crisis will produce an estimate of the risk free rate which is at or around historic lows and, accordingly, an estimate of the required return on equity at historically low levels.

50. It follows that the selection of an averaging period affected by the financial crisis will not give rise to an estimation procedure which produces estimates which are equally likely to be above or below the true (but unobservable) cost of equity. Rather, it is almost certain to produce estimates below the true cost of equity.

51. Moreover, the estimates of the required return on equity produced via this estimation procedure are likely to be implausibly similar to the returns available from highly rated debt and accordingly are not economically reasonable.

52. In producing estimates which are almost certain to be below the true cost of equity and which lack economic reasonableness, the use of an averaging period contaminated by the financial crisis is likely to be inconsistent with the objectives of the NEL. The required return on equity implied by an averaging period of 20 days duration ending 2 February 2009 is implausibly similar to the returns on highly rated debt and accordingly is not commensurate with the return required by investors in a comparable commercial enterprise and with the prevailing conditions in the market for funds. Moreover, given it is almost certain to underestimate the true cost of equity, it will

likely fail to provide businesses with a reasonable opportunity to recover costs or incentives to promote efficient investment.

3. Selection of an averaging period consistent with CAPM theory

53. We have been asked to provide an opinion on whether:

> CAPM theory supports the selection of an averaging period close to the date of the final decision.

54. The CAPM is a very simple model that is silent on issues about averaging periods, the term of the risk free rate, and whether government bonds are an appropriate proxy for the risk free rate. Under the CAPM of Sharpe (1964), investments occur over a single period. At the start of the period all investors are endowed with an amount of wealth. Because different investors have different wealth and different attitudes towards risk, trade occurs. The outcome of this trade is that each investor will have an optimal portfolio (given their wealth and risk preferences) and the market will be in equilibrium. This all occurs at the start of the single period. Nothing happens during the period. At the end of the period investments pay off, investors consume these payoffs, and then die (or, alternatively, "the model ends").

55. In constructing their portfolios, investors weigh up the returns they might expect on risky investments against the return they can obtain from the risk free asset. There is a single risk free asset, all investors know the risk free rate of return, and all investors can borrow or lend as much as they like (according to their initial wealth and risk preferences) at this single and known risk free rate.

56. That is, under the CAPM considerations about averaging periods, the term of the risk free rate, and the best proxy for the risk free rate simply do not arise.

57. In practice, of course, the model needs to be implemented and parameters need to be estimated. The point of the above discussion is that theory does not spell out how to implement the model in practice or how to obtain the best and most reliable parameter estimates. These are issues for econometric analysis, statistics, and most importantly common sense. In this regard, some general principles can be laid out. Two of those principles, relevant to the particular question at hand, are that:

a. Parameters must be estimated in a consistent way throughout the process. There are two aspects of consistency:

   i. Where a parameter is used in two or more places in the valuation exercise, the same consistent value should be used in all places; and

   ii. Where different parameters are related, those two parameters should be estimated in a consistent manner. For example, it would be wrong to estimate two related parameters using different techniques, so that the resulting estimates are implausible relative to one another.

b. The results of the estimation exercise should be tested for plausibility and economic reasonableness. It would be wrong to conduct a mechanical estimation exercise and to adopt the results in an unquestioning way, especially where those results are implausible or make no economic sense.

58. In the case at hand, this is relevant insofar as the estimated required return on equity depends on the estimates of the risk free rate and the market risk premium. The rules require that the required return on equity be estimated by adding 6% to the estimate of the risk free rate. An

averaging period close to the date of the final decision would certainly provide the most up-to-date estimate of the yield on 10-year CGS. As set out in the previous section, however, it is not at all clear that this would provide the best estimate of the required return on equity – or even an estimate that is plausible and economically reasonable.

59. In summary, CAPM theory does not spell out how to implement the model in practice or how to obtain the best and most reliable parameter estimates. These are issues for econometric analysis, statistics, and most importantly common sense. CAPM theory certainly does not suggest that an averaging period close to the date of the final decision, when added to a risk premium of 6%, provides an appropriate estimate of the current required return on equity.

60. As set out in Section 2 above, in the current market circumstances, an averaging period close to the date of the final decision is unlikely to meet the objective of obtaining the best estimate of the required return on equity as a step in the implementation of the CAPM-WACC framework. Rather, the use of an averaging period close to the date of the final decision in the current context is likely to provide an estimate that is downwardly biased by such an amount that it is implausible.

4. Nominal CGS yields in the financial crisis

Reduction in nominal CGS yields

61. We have been asked to provide an opinion on whether:

> The global financial crisis has resulted in a historically high liquidity premium being paid for government bonds, pushing down the yield on nominal CGS.

62. Analysing RBA data from July 1992 to the present, CEG (2008, Para. 125) report that nominal CGS yields were at historic lows in January 2009. Figure 2 below sets out historic yields on nominal 10-year CGS using all monthly data available from the RBA for the period July 1969 to January 2009. This is a longer period than that examined by CEG and it confirms their conclusion. Indeed at no time in the last 40 years have 10-year nominal CGS yields been as low as they are at present. Clearly, something has caused an unprecedented reduction in yields or (equivalently) an unprecedented increase in the prices of nominal CGS.

Figure 2. Nominal 10-year CGS yields

Source: Reserve Bank of Australia

Has the reduction in CGS yields been caused by liquidity effects?

63. It is apparent from Figure 2 above that nominal 10-year CGS yields are at their lowest point since RBA data became available in July 1969. It is also apparent that nominal 10-year CGS yields began a substantial decline from 6.57% on 3 July 2008 reaching their lowest daily point since July 1969 on 15 January 2009 at 3.86%. The timing of this decline corresponds closely with the intensification of the financial crisis in September 2008.

64. CEG (2008) present a range of comparisons and conclude that the decline in nominal CGS yields is most likely attributable to liquidity effects associated with the credit crisis. In essence they conclude that a surge in demand for nominal CGS (due primarily to their liquidity) has resulted in a liquidity premium being paid for these bonds and consequently a squeezing of their yields.

Nominal CGS vs. state government bonds

65. As evidence of the presently high liquidity premium, CEG (2008) point to the sudden widening in the spread between yields on CGS and State Government debt. In particular, they note that:

> The historical average difference in yields has been around 20 basis points (0.20%). However, with the advent of the financial crisis this has risen to 120bp…This is an unprecedented difference in yields.[18]

66. While there may be a small difference in the default risk associated with CGS and State Government debt, both are essentially risk free. CEG (2008) note that the spread:

> simply cannot be explained by the difference in default probabilities between the Commonwealth and State Governments. Rather, it is strong evidence of the heightened demand for the liquidity of CGS in a financial crisis (noting that State Government debt is less commonly traded and less liquid than nominal CGS).[19]

67. This leads CEG (2008, Para 133) to conclude that the increased spread between nominal CGS and State Government debt has arisen due to heightened demand for the liquidity of nominal CGS in the current financial crisis.

Nominal CGS vs. inflation-indexed CGS

68. CEG (2008) also examine the break-even inflation rate, which is essentially the difference in yields between more liquid nominal CGS and relatively less liquid inflation-indexed bonds of identical maturity. CEG explain the link between the breakeven inflation rate and the quantum of a liquidity premium as follows:

> In normal times, with a low liquidity premium, the break even inflation rate is a measure of investors' expected inflation… In periods of a high liquidity premium we expect to see the break-even inflation rate reduced below investors' expectations of expected inflation.[20]

69. CEG (2008, Figure 12) set out a graph pointing to the fall in the break even inflation rate as evidence that investors are paying a high premium for the liquidity of nominal CGS. We reproduce that graph in Figure 3 below. The key feature of this graph is that since June 2008 yields on nominal 10-year CGS have fallen sharply while yields on inflation-indexed CGS have remained steady (and since October 2008 have even risen slightly).

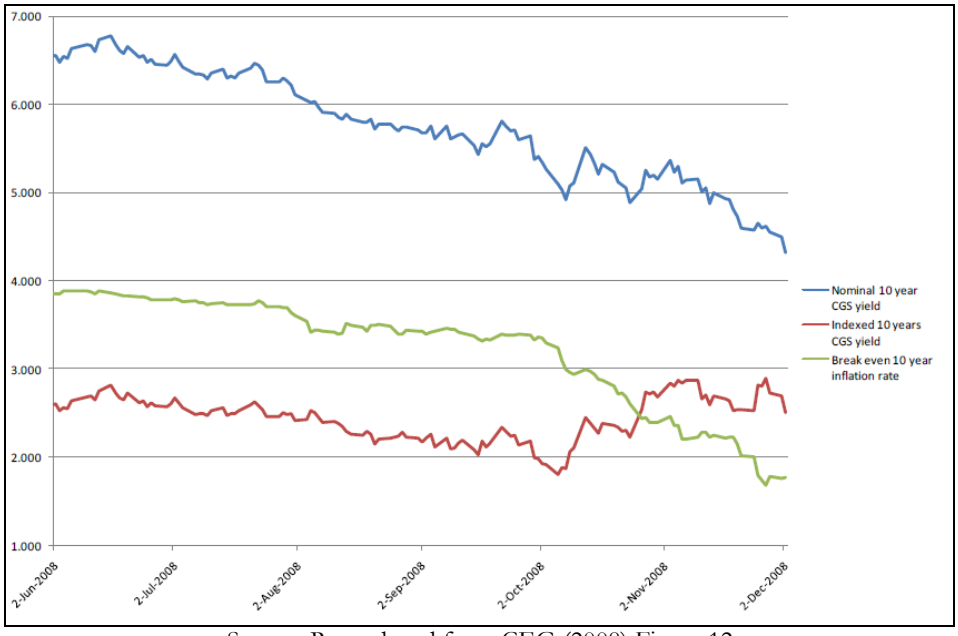
70. CEG (2008) report that:

> From 2nd June 2008 to 2 December 2008 10 year nominal CGS yields have fallen 2.24% while indexed bond yields have effectively remained steady (falling only 0.09%). As a consequence, the break even inflation rate on 2 December 2008 had dropped to 1.77%.[21]

[18] CEG (2008, Para. 132).
[19] CEG (2008, Para. 133).
[20] CEG (2008, Para 230).
[21] CEG (2008, Para 238).

71. These results are consistent with the view that a surge in demand for nominal CGS (due primarily to their liquidity) has resulted in a liquidity premium being paid for these bonds, which in turn leads to a squeezing of their yields.

Figure 3. Nominal and inflation-indexed 10-year CGS yields



Source: Reproduced from CEG (2008) Figure 12

Conclusions

72. The evidence outlined above indicates that yields on 10-year nominal CGS have undergone a substantial decline beginning in August 2008, reaching their lowest point since July 1969 in January 2009. That is, nominal CGS yields are at their lowest levels in 40 years.

73. There is evidence consistent with the decline in nominal CGS yields being driven by the market paying a liquidity premium for these bonds:

a. There has been a dramatic increase in the spreads between nominal CGS and State Government debt (which has a default probability almost as low as CGS); and

b. Since June 2008 yields on nominal 10-year CGS have fallen sharply while yields on inflation-indexed CGS have remained steady (and since October 2008 have even risen slightly).

74. By far the most plausible conclusion from these results is that a surge in demand for nominal CGS (due primarily to their liquidity) has resulted in a liquidity premium being paid for these bonds, which in turn has lead to a squeezing of yields.

5. Present required return on equity

75. We have been asked to provide an opinion on whether:

> The mechanistic application of the NER requirement as proposed in the Draft Decision would indicate a low required return on equity, whereas other evidence points to a high required return on equity currently.

76. The NER requirement that is referred to in our instructions is the process of estimating the required return on equity by adding 6% to the estimate of the risk free rate, which is computed as the average yield on 10-year CGS over a period to be selected.

77. The Draft Decision proposes an up-to-date 20 day averaging period. If this had been applied on 2 February 2009 using 10-year nominal CGS, the estimated required return on equity would have been 10.09%. Had it been implemented on 30 June 2008, the required return on equity would have been 12.59%. That is, the NER requirement and the AER's proposed averaging period together imply that the required return on equity in June 2008 was 25% higher than it is presently. This further implies that investors now require a substantially lower expected return in order to commit equity capital to a firm – that the cost of obtaining equity funds has fallen dramatically.

78. The required return on equity is, in essence, the discount rate that equates the expected future cash flows to equity to the current market value of equity. That is, we forecast expected future cash flows to equity, discount them using an estimate of the required return on equity, and the result is an estimate of the market value of equity:

$$\begin{matrix} Equity \\ Value \end{matrix} = \sum_{t=1}^{\infty} \frac{Cash\ \ flow\ to\ equity_t}{(1+k_e)^t}$$

79. It is clear that in recent times the market value of equities has fallen sharply. From 30 June 2008 to 2 February 2008 the All Ordinaries Index fell by 35%, bringing its total decline to 50% from its peak on 1 November 2007. That is, the left hand side of the above equation has fallen by 35% since June last year.

80. But this fall does not necessarily imply that the required return on equity has increased. If all of the forecast cash flows to equity were reduced by 35%, the equity value would fall by 35% even if the required return on equity were unchanged. That is, if all of the cash flows to equity on the right hand side of the equation above were reduced by 35%, the total equity value would reduce by 35% even if the required return on equity (k_e) remained constant. Of course, this would require that *all* expected future cash flows are decreased by 35% – not just cash flows for a few years, but all cash flows in perpetuity.

81. If corporate profits are not expected to fall by this much in perpetuity, the decline in equity values could only be reconciled via an increase in the required return on equity. That is, if on the right hand side of the above equation cash flows to equity (in perpetuity) fall by less than 35%, the required return on equity would have to be higher in order to reconcile with the 35% fall in equity values on the left hand side of the equation.

82. In addition, CEG (2008, Para 119-120) cite evidence from the RBA that trailing and forecast price-earnings ratios in the Australian share market are "around their lowest levels since 1991."[22] The price-earnings ratio provides a measure of the amount investors are willing to pay for a dollar of earnings. The low price-earnings ratio is likely to result from two factors – reduced investor expectations for future earnings *and* an increase in investors' required return for risk.

83. As set out in Paragraph 77 above, the approach adopted in the Draft Decision implies that the required return on equity has fallen by 25% since June last year, over which time the All Ordinaries Index has fallen by 35%. A reconciliation of these two quantities would require expected cash flows to equity holders (or loosely speaking "corporate profits") to have declined (in perpetuity) by an implausibly large magnitude.

84. The decline in the market's price-earnings ratio is consistent with the increase in the dividend yield (prices relative to trailing dividends) and debt spreads, discussed in Section 2. These factors suggest that equity prices reflect investors' relatively high return requirements, given their perceptions of risk in the present market.

85. In summary, it is not necessarily the case that a fall in equity values must be caused by an increase in the required return on equity – a fall in expected future profits will also lead to a decline in equity prices. However, an implausibly large reduction in expected corporate profits for an implausibly long period of time would be required to reconcile equity market movements with the required return on equity estimated using the approach set out in the Draft Decision. Based on this analysis, by far the most plausible conclusion is that the required return on equity has risen over this period. This conclusion is consistent with the analysis in Section 2 above, where we showed that dividend yields and debt spreads are presently at levels consistent with higher required returns on equity.

[22] CEG (2008) citing the RBA November 2008 Statement of Monetary Policy.

6. Bloomberg and CBA bond yields

86. We have been asked to provide an opinion on whether:

> The divergence in the bond yields provided by Bloomberg and CBA Spectrum data services indicate that illiquidity in the market is affecting the reliability of these estimates and that averaging the two would provide a more reliable estimate.

87. In assessing the reliability of Bloomberg and CBA Spectrum yield estimates, it is useful to begin with a discussion of why yields must be *estimated* rather than observed or measured. In the present case, the relevant yield is that of 10-year BBB+ corporate bonds in the Australian market. If there were many such bonds in existence and they traded frequently, there would be a rich supply of market prices for these bonds and consequently a rich supply of estimated yields. An average (or median) of these yields could then be used as a general estimate of the yield on 10-year BBB+ corporate bonds.

88. However, 10-year BBB+ Australian corporate bonds are very rare – there has never been a sufficient number of these bonds to obtain a reliable estimate of their yield from market data. Indeed for much of the time there are none of these bonds at all. Consequently, data services provide estimates using different techniques to "extrapolate" information from the market prices that are available. These techniques take information from bonds with similar ratings and terms to maturity and extrapolate it to provide an estimate of the 10-year BBB+ yield. For example, the yield on an 8-year A- bond or a 9-year BBB bond would presumably provide some information that is relevant to estimating the yield on 10-year BBB+ bonds.

89. Different data services use different statistical techniques to estimate the yield on 10-year BBB+ bonds from the market data that is available. Consequently, different data services will produce different yield estimates. When there are more data points (i.e., more market prices from the trading of bonds) close to 10-year BBB+, these data points will "tie down" all estimation techniques and the estimates published by different data services will converge. For example, if there are many trades of corporate bonds with maturities close to 10-years and ratings close to BBB+, the estimation techniques will seek to "fit" these data points. If, however, there are very few such data points, the estimation techniques have to rely more on extrapolation or models than on objective data points. This can result in a greater divergence between the estimates provided by different services.

90. Indeed, in the Draft Decision the AER notes that Bloomberg no longer publishes estimated yields for 10-year BBB+ Australian corporate bonds.

> In late October 2007, Bloomberg ceased publication of its BBB fair yields for bonds with 9 or 10-year maturities. The AER understands that the decision to cease publication was based on a lack of data for these long-dated corporate bonds (within the BBB credit rating category) from which Bloomberg could produce a fair yield. The longest maturity BBB bond fair yield now published by Bloomberg is 8 years.[23]

91. To obtain an approximation of the Bloomberg 10-year BBB+ estimate the AER takes the Bloomberg estimate of the 8-year BBB+ yield and adds to it the difference between 10-year and 8-year yields on A-rated bonds. It is logical to conclude that if Bloomberg believed this approach

[23] Draft Decision, p. 94.

would provide reliable estimates of the yield on 10-year BBB+ bonds, Bloomberg itself would use it. The fact that Bloomberg provides no such estimates is consistent with the view that the available data does not provide for any sufficiently reliable estimate to be produced.

92. CEG (2008, Section 3.2.3) demonstrate a recent dramatic increase in the divergence between the CBA Spectrum and Bloomberg (as reconstructed by the AER) estimates of the yield on 10-year BBB+ Australian corporate bonds. This is consistent with a lack of traded market prices of anything approximating 10-year BBB+ bonds. If there is no data to tie the estimates down, there must be greater reliance on extrapolation or models than on objective data points and this results in a divergence of estimates.

93. CEG (2008, Para 73) also cites a report by Deloitte that concludes that BBB+ debt "effectively vanished from capital markets" in 2008 and that there is very little liquidity in debt with five years or more to maturity.

94. All of this is consistent with the view that illiquidity in the market for 10-year BBB+ Australian corporate bonds has affected the reliability of the yield estimates produced by CBA Spectrum and Bloomberg. If there is no data to tie the estimates down, there must be greater reliance on extrapolation or models than on objective data points and this decreases the reliability of the resulting estimates.

95. That is, each estimate of the 10-year BBB+ yield tells us how a particular modelling approach extrapolates the available market data out to 10 years (from data points with much shorter maturity) and down to BBB+ (from data points with higher ratings). Different modelling/extrapolation techniques result in different estimates.

96. Suppose we have two estimates of an unknown parameter, both of which are unbiased, and there is no reason to believe that one is more precise or reliable than the other. In general, an average of those two estimates will be more reliable than either individual estimate. There are two features of this combined estimate to consider:

a. *Unbiasedness*: If an estimation procedure is unbiased, it produces an estimate that is equally likely to be above or below the true (but unobservable) parameter value. Consequently, if we have two unbiased estimates, the average of those two is also unbiased.

b. *Precision*: Precision is estimated in terms of the standard error of the estimate. This is a measure of how far the estimate might be away from the true (but unobservable) parameter value. If each of the two unbiased estimates has a standard error of σ (the usual symbol for standard deviation) and the errors from each estimate are unrelated to each other, the standard deviation of the combined estimate (i.e., the average of the two individual estimates) is $\sigma/\sqrt{2}$. That is, the combined estimate is approximately 30% more precise than either of the individual estimates.[24]

97. In the case at hand, unless there is a strong reason to prefer the estimates from one data service over those provided by the other, our view is that the average estimate is more reliable than either of the individual estimates. In this regard, we note that CEG (2008) provide a discussion about the relative merits and reliability of each data service. The key points from this discussion are that some years ago issues were raised in relation to aspects of CBA Spectrum estimates and that CBA Spectrum has since revised its methodology, and that Bloomberg does not report estimates

[24] The improvement in precision is reduced if the error in the two estimates is correlated. But there is some improvement in precision so long as the two estimation errors are not perfectly positively correlated.

of 10-year BBB+ yields so these estimates are produced by the AER using various other data from Bloomberg.

98. In summary, none of the material available to us[25] provides a strong reason to prefer the estimates from one data service over those provided by the other. Consequently, we conclude that the statistical properties of the average estimate make it more reliable than either of the individual estimates.

[25] A detailed review of the specific processes used by each of the data services is beyond the scope of this report.

7. Inflation forecasts

Which estimate is better?

99. We have been asked to provide an opinion on whether:

> The RBA inflation forecasts are the most appropriate forecast to apply to determine the real cost of capital, particularly where the averaging period coincides with the current period of abnormal market conditions.

100. Two alternative methods have been proposed for estimating expected inflation over the regulatory period:

a. RBA inflation forecasts – which are based on specific RBA forecasts of inflation for two years, followed by an assumption that in later years inflation is expected to be at 2.5% which is the mid-point of the RBA target range; and

b. Breakeven expected inflation – which is effectively the difference between the yields on nominal and inflation-protected government bonds.[26]

101. We note that there is quite general agreement that the breakeven inflation estimate is unlikely to be a reliable estimate of expected future inflation in the current market environment:

a. In previous decisions, the AER decided to cease using this approach due to concerns about how liquidity issues in the markets (particularly the market for inflation-indexed CGS) might affect the reliability of estimates produced in this way;

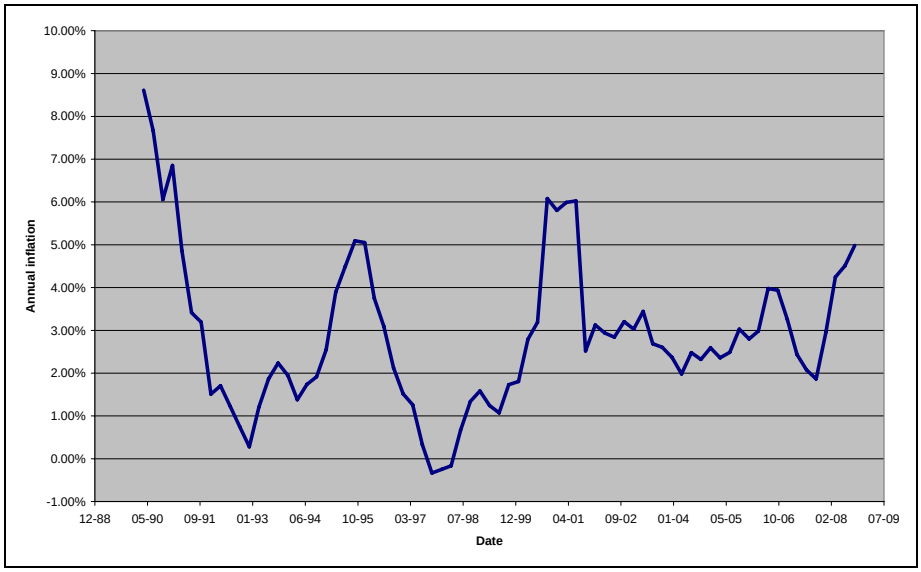
b. The US Federal Reserve has recently ceased to report estimates based on this approach because "the extreme rush to liquidity is affecting the accuracy of the estimates;"[27] and

c. CEG (2008) point out that when the breakeven technique is applied to very recent data, the resulting estimates of expected inflation are extremely low. CEG reports that using data as at 2 January 2009, the breakeven method estimates expected inflation at only 1.43%, which is substantially below any present market forecast.

102. The alternative method for estimating expected future inflation is the RBA forecast approach adopted by the AER. This approach takes the RBA inflation forecast for each of the next two years and then assumes expectations of 2.5% inflation for all subsequent years on the basis that this is the mid-point of the RBA's target range for inflation. This approach is based on the assumption that the RBA is an effective manager of inflation, will be able to keep inflation within the target band, and that actual inflation is (on average) equally likely to be above or below the 2.5% mid-point. However, it is not clear that these assumptions are supported by data. Figure 4 below plots actual inflation outcomes based on the All Groups CPI index reported by the RBA. Since 1990, actual inflation has varied considerably with many observations well outside the 2-3% target band. Even in the period since 2000 (which might be more representative of current practice or current circumstances) there are many observations outside the 2-3% target band, with a disproportionate number of observations above the top end of the band. Having seen this data, it is not clear that the best estimate of inflation three years or more into the future is 2.5%.

[26] The breakeven inflation estimate is actually obtained by applying the Fisher equation to nominal and inflation-protected bond yields. The simple difference between the two yields provides a reasonably close approximation.
[27] See CEG (2008, pp. 43-44).

Figure 4. Actual inflation outcomes



Source: Reserve Bank of Australia, Table G2 – All Groups CPI

103. In summary, neither of the proposed methods is likely to produce a precise and reliable estimate of expected future inflation. To some extent, this is because inflation is difficult to forecast and inflation expectations are difficult to measure. However, the ability to estimate expected future inflation is also affected by the recent turbulence in financial markets and the flow-on effect this is having on the real economy. In essence, the task of estimating expected future inflation is, in the current circumstances, a very difficult one.

104. Nevertheless, an estimate of expected future inflation is required for the PTRM, and two alternative methods have been proposed. The AER has adopted the RBA forecast approach on the basis that it provides the better estimate of the two alternatives. In this regard the AER quotes Clause 6A.5.3(b)(1) of the Rules which requires:

> … a methodology that the AER determines is likely to result in the best estimates of expected inflation.[28]

105. As set out above, there is some agreement that in the current market conditions the breakeven approach is producing unreliable estimates of expected future inflation. However, the RBA forecast approach is based on RBA forecasts for only two years, followed by an assumption that the market expects 2.5% inflation for each year thereafter. Neither estimate is likely to be precise and reliable in the current circumstances. In our view, the key issue here is that whichever estimate is selected, it should be applied consistently throughout the regulatory framework.

Consistent application of estimates

106. CEG (2008, Section 4.7.4) state that all parameters must be estimated on a consistent basis within the regulatory framework, and we agree with this view. Indeed it is difficult to see how an estimate of the WACC for the TNSP can be consistent with the Rules set out in Section 1 above if that WACC estimate is based on individual parameter estimates that are not internally consistent with each other. In this regard, CEG note that:

[28] Draft Decision, p.95.

a. In adopting the RBA forecast approach, the AER has effectively determined that the breakeven approach is unreliable. This can only be because the AER considers that the yields on either nominal or inflation-indexed CGS (or both) do not properly reflect the relevant risk-free rate of interest in the current circumstances; and

b. In proposing to use up-to-date observations of the yield on nominal CGS as the estimate of the nominal risk-free rate, the AER has effectively determined that nominal CGS provide a reliable estimate of the nominal risk free rate in the current circumstances.

107. Logically, the only way these two aspects of the Draft Decision can be reconciled is if the AER is of the view that:

a. The current yield on nominal CGS provides a reliable estimate of the current nominal risk free rate; but

b. The current yield on inflation-indexed CGS does not provide a reliable estimate of the current real risk free rate.

108. CEG argue that this is inconsistent with the observed data. In their Figure 5 (p. 44) CEG plot the recent movements in the yields of nominal and inflation-indexed CGS since June 2008. That figure shows that the yields on inflation-indexed CGS have been steady, but that yields on nominal CGS have fallen sharply.

109. CEG (p. 46) attribute this fall in the yield on nominal CGS to a flight to the liquidity of nominal CGS. That is, prices of nominal CGS have been pushed up by investors willing to pay a liquidity premium for liquid bonds. This premium is a payment for a feature of these bonds (i.e., high liquidity) other than the fact that they are risk free. CEG (Section 4.6) also note that other bonds that are effectively risk free (but which have lower liquidity than nominal CGS) presently have considerably higher yields. This leads to the conclusion that the yield on nominal CGS may, in the present market conditions, underestimate the nominal risk free rate.

110. In summary, we have noted above that the approach in the Draft Decision to estimating (a) expected inflation and (b) the nominal risk free rate can only be reconciled if nominal CGS are presently considered to provide a reliable estimate of the nominal risk free rate but inflation-indexed CGS are not considered to provide a reliable estimate of the real risk-free rate. But for the reasons set out above, it is difficult to justify such a position in the present market circumstances.

111. Moreover, CEG (Section 4.8) demonstrate that using (a) up-to-date nominal CGS yields to estimate the nominal risk free rate and (b) the RBA forecast approach to estimate expected inflation results in an allowed real risk free rate of 1.28%. That is, the assumption underlying the Draft Decision is that investors would be willing to provide capital to the TNSPs on the basis of receiving a real risk free return of 1.28% (plus a risk premium commensurate with the risk of the TNSPs.) But investors can presently receive a real risk free return from inflation-indexed CGS that is almost twice this amount. This base real risk free return of 1.28% is inconsistent with the reality that investors can obtain almost twice this return in the current market. Moreover, CEG (Para. 143) note that, if anything, the yields on inflation-indexed CGS are biased downwards due to an excess demand relative to supply. This further sharpens the inconsistency between the implied 1.28% allowed real return and current market prices.

112. We conclude that:

a. The approach in the Draft Decision to (a) estimating expected inflation using the RBA forecast approach and (b) estimating the nominal risk free rate using up-to-date yields on nominal CGS can only be reconciled if nominal CGS are presently considered to provide a reliable estimate of the nominal risk free rate but inflation-indexed CGS are not considered to provide a reliable estimate of the real risk-free rate. It is difficult to justify this position in the present market circumstances – nominal CGS yields have dropped dramatically in recent months whereas inflation-indexed CGS yields have been quite stable;

b. Moreover, the approach in the Draft Decision assumes that investors require a real return of only 1.28% from risk free investments. But this is inconsistent with the fact that nearly double this return is presently available from inflation-indexed CGS.

c. The implausible results that flow from the approach in the Draft Decision arise due to an inconsistency in the way CGS yields are interpreted. Current market yields on CGS are considered by the AER to be reliable enough to estimate the risk free rate but are not considered by the AER to be reliable enough to estimate expected inflation.

d. These problems relating to estimation and inconsistencies have been sharpened in the present market circumstances and particularly since September 2008. The use of an averaging period prior to September 2008 avoids these complications as the two methods for estimating expected inflation provided more consistent results prior to the dramatic decline in nominal CGS yields that began in September 2008. In our view, this is the preferred approach as it also results in a more reliable estimate of the required return on equity, within the constraints of the Rules.

e. If, however, an averaging period close to the date of the final determination is to be used, it is important that it is applied consistently throughout the Decision. Consistency could be maintained by:

    i. Using current market yields for estimating the nominal risk-free rate *and* estimating expected inflation; or

    ii. Using the RBA forecast approach for both purposes. This would involve estimating the nominal yield on CGS as the sum of the inflation-indexed yield and expected inflation using the RBA forecast approach. Of the two approaches that use an averaging period close to the date of the Decision, this approach is more likely to produce an estimate of the required return on equity that is more plausible and economically reasonable and should be preferred.

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The WACC and the Averaging Period

Professor Bruce D. Grundy

University of Melbourne

16 February, 2009

1. Background

Section 6.5.2(c) of the National Electricity Rules (NER) requires that a value for the risk free rate for the regulatory control period be determined on a moving average basis from the annualised yield on 10 year Commonwealth Government Securities (CGS). The Yield on CGS is to be determined from indicative mid rates published by the RBA over a period of time. Throughout this report this period of time is referred to as the *moving average period*. The Rules allow the regulated business to propose such a period of time to the AER and, if the latter agrees, then this period becomes the "agreed period". The Rules require that the AER must not unreasonably withhold their agreement. If the AER does withhold its agreement, it must specify a period.

TransGrid has asked that I provide a report addressing the issues enumerated at the end of their brief to me. That brief is included at the end of this report.

This report is broken into sections that consider in turn:

- **The Return on Capital and the NER**
- **The Determination of the *Moving Average Period***
- **The Measurement of the Return on Debt**
- **Real Rates, Inflation Forecasts and the *Moving Average Period***

My conclusions re issues 3, 4, 5, 1 and 2 of the TransGrid brief are provided in that order in the section titled **The Determination of the *Moving Average Period.***

My conclusion re issue 6 of the TransGrid brief is provided in the section titled **The Measurement of the Return on Debt**.

My conclusion re issue 7 of the TransGrid brief is provided in the section titled **Real Rates, Inflation Forecasts and the Moving Averaging Period**.

2. The Return on Capital and the NER

1. Clause 6A.6.2 of the NER requires that the return on capital for a Transmission Network Service Provider (TNSP) be calculated as a weighted average of the return on equity, k_e, and the return on debt, k_d.

The return on equity

2. According to the NER the return on equity for a TNSP is to be calculated by using the CAPM as

$$k_e = r_f + \beta_e \times MRP \qquad (1)$$

where r_f is the nominal risk free rate for the regulatory control period determined in accordance with paragraph (c) of Clause 6A.6.2 as a moving average of the annualised yield on Commonwealth Government bonds with a maturity of 10 years using the indicative mid rates published by the Reserve Bank of Australia. I use the term the *moving average period* to denote the period over which the moving average is to be calculated as set out in parts (i) and (ii) of subparagraph (2) of paragraph (c) of Clause 6A.6.2. β_e is the equity beta, which is deemed to be 1.0. MRP is the market risk premium, which is deemed to be 6.0%.

3. Therefore the return on equity is to be calculated as r_f plus 6% where r_f is the nominal risk free rate for the regulatory control period.

4. This result is the outcome of deeming that (i) expected returns are determined by the CAPM, (ii) the beta of the equity of the Transmission Network Service Provider is 1.0 and (iii) the MRP is 6%. To fully understand the impact of (i), (ii) and (iii), it is instructive to expand expression (1) as

$$\begin{aligned} k_e &= r_f + \beta_e \times \text{MRP} \\ &= r_f + \beta_e \times (k_m - r_f) \\ &= r_f + 1.0 \times (k_m - r_f) \\ &= k_m \end{aligned}$$

where k_m is the return on equity market.

5. A β_e of 1.0 means that the NER is deeming that the equity of a Transmission Network Service Provider has the same risk as the market portfolio. The CAPM implies that the return on equity for a Transmission Network Service Provider is then equal to the return on the equity market as a whole.

6. In determining k_e for the regulatory control period the NER requires that 6% be added to the value of r_f determined over the *moving average period.* The value of r_f determined over the *moving average period* is termed in the NER the risk free rate for the regulatory control period. A value of 1.0 for β_e and the CAPM provide a clear guide to the AER in exercising its judgment in determining whether to accept the *moving average period* proposed by the regulated entity. The proposed *moving average period* should only be rejected if the sum of r_f over the *moving average period* plus 6% gives an inappropriate estimate of k_e for the regulatory control period. This is equivalent to determining whether the proposed *moving average period* is such that the sum of r_f over that period plus 6% gives an appropriate estimate of k_m for the regulatory control period.

7. CAPM theory does <u>not</u> imply that the best possible estimate of k_e for the regulatory control period is obtained by adding 6% to the best possible estimate of the risk-free rate for the regulatory control period.

8. CAPM theory does <u>not</u> imply that the best possible estimate of k_e for the regulatory control period is obtained by adding 6% to the moving average of r_f

over a *moving average period* that is as close as possible to the start of the regulatory control period.

The return on debt

9. According to the NER the return on debt for a TNSP is to be calculated as

$$k_d = r_f + DRP \quad (2)$$

where the DRP is the debt risk premium for the regulatory control period determined in accordance with paragraph (e) of Clause 6A.6.2. The DRP is determined as the margin between the nominal risk free rate and the Australian benchmark corporate bond rate for corporate bonds which have a BBB+ credit rating from Standard and Poors and a maturity of 10 years.

10. The NER does not state whether the *moving average period* used to determine both the DRP and the value of r_f whose sum together equals k_d should be the same as the *moving average period* used to determine the value of r_f used in determining k_e.

11. The subtraction of r_f in determining the value of the DRP used in (2) is naturally exactly offset by the addition of r_f in (2). In effect, the return on debt is calculated as a moving average of the observed annualized Australian benchmark corporate bond rate for bonds which have a BBB+ credit rating from Standard and Poors and a maturity of 10 years. The return on debt is determined by the choice of the *moving average period* over which the corporate bond rates are averaged. Conditional on the choice of the *moving average period*, the return on debt is not affected by the realized value of r_f over that period.

12. Despite the appearance of r_f in both expressions (1) and (2), the two moving average values for k_d and k_e are not linked by a common dependence on r_f— conditional on the choice of the *moving average period*, the return on debt is not affected by the realized value of r_f. The two moving average values for k_d and k_e are though potentially linked in the sense that the AER may implement a common *moving average period* in its calculation of k_d and k_e.

13. It need not be the case that the *moving average period* that gives the best estimate of k_e for the regulatory control period is the same *moving average period* that gives the best estimate of k_d for the regulatory control period. But when possible, for consistency within the AER's Final Decision it will be optimal to select the same *moving average period* in determining k_e as the *moving average period* used in determining k_d.

14. It is my opinion on the basis of the analysis in this report, that the 20 business day period finishing on Friday 5 September 2008, i.e., the period proposed in the *TransGrid Revised Revenue Proposal – January 2009,* will provide appropriate estimates for both k_e and k_d.

NER requirements and the determination of the return on equity

15. Subparagraph (2) of paragraph (c) of Clause 6.A.6.2 of the NER requires that the *moving average period* be a period of time which is either a period proposed by the relevant TNSP and agreed by the AER (such agreement is not to be unreasonably withheld) or a period specified by the AER.

16. In exercising its judgment as to whether to accept the period proposed by the TNSP or to instead specify a different period, and in selecting any different period, the AER is bound by Clause 6A.6.2(b) of the NER. 6A.6.2(b) states that:

    The rate of return for a Transmission Network Service Provider for a regulatory control period is the cost of capital as measured by the return required by investors in a commercial enterprise with a similar nature and degree of non-diversifiable risk as that faced by the transmission business of the provider…

17. The return on equity is the return required by equity investors in a commercial enterprise with a similar nature and degree of non-diversifiable risk as that of the transmission network service provider. The similar nature of the enterprise and degree of non-diversifiable risk means that the return on equity is the return required by equity investors in a commercial enterprise whose shares have a beta of 1.0. According to the CAPM, equity investors in a commercial enterprise whose shares have a beta of 1.0 have a required return equal to the expected return on the market portfolio.

18. Clause 6A.6.2(b) of the NER and the definition of k_e in that Clause require the AER to determine the *moving average period* so that the sum of the moving average of r_f over the *moving average period* plus 6% gives an appropriate estimate of k_e for the regulatory control period. Given the deemed value of beta, Clause 6A.6.2(b) and the definition of k_e in that Clause equivalently require the AER to determine the *moving average period* so that the sum of the moving average of r_f over the *moving average period* plus 6% gives an appropriate estimate of k_m for the regulatory control period.

NER requirements and the determination of the return on debt

19. Clauses 6A.6.2(b) and 6A.6.2(e) of the NER together imply that the return on debt is to be calculated as a moving average over the *moving average period* of the observed annualized Australian benchmark corporate bond rate for corporate bonds which have a BBB+ credit rating from Standard and Poors and a maturity of 10 years.

20. In exercising its judgment as to how best to measure the observed annualized Australian benchmark corporate bond rate for corporate bonds which have a

BBB+ credit rating from Standard and Poors and a maturity of 10 years , the AER is bound by the Clause 6A.6.2(b) statement that:

The rate of return for a Transmission Network Service Provider for a regulatory control period is the cost of capital as measured by the return required by investors in a commercial enterprise with a similar nature and degree of non-diversifiable risk as that faced by the transmission business of the provider…

21. The return on debt is the return required by debt investors in a commercial enterprise with a similar nature and degree of non-diversifiable risk as that of the transmission network service provider. The similar nature of the enterprise and degree of non-diversifiable risk means that the return on debt is the return required by debt investors in benchmark corporate bonds which have a BBB+ credit rating from Standard and Poors and a maturity of 10 years. In summary, the determination of both (a) the moving average period and (b) the weight placed on the alternate available sources of data on 10-year BBB+ corporate bonds should be such that that determination leads to an estimate of kd which leads to a determination of the cost of capital that measures the return actually required by investors for the regulatory control period.

3. The Determination of the *Moving Average Period*

22. Subparagraph (2) of paragraph (c) of Clause 6.A.6.2 of the NER requires that the *moving average period* be a period of time which is either a period proposed by the relevant TNSP and agreed by the AER (such agreement is not to be unreasonably withheld) or a period specified by the AER. The AER can specify an alternate period only if it believes that adding 6% to the moving average risk free rate over the period proposed by the regulated entity produces an inappropriate estimate of k_e for the regulatory control period.

23. It is instructive to ask why the NER specifies the calculation of a moving average rate over a period to be determined, rather than a rate set on a predetermined period relative to the beginning of the regulatory control period. The answer is a simple one—observed rates are typically, but not always, reliable guides to investors' required returns. In fact, this is the reason for the use of a moving average rather than a rate determined on a single date. Reliance on a single date can lead to unintended outcomes.[1]

24. In a 2006 decision the Essential Services Commission of Victoria (ESCV) adopted a moving average period that preceded a time period for which the ESCV

[1] Some readers will recall Michael Milken's conviction on fraud charges. Milken and his employer, Drexel Burnham, had earlier been successfully sued for manipulating the price of the common shares of Home Shopping Network Corporation (HSN) on the specific date on which the HSN common share price was to determine the terms on which its preferred stock issue could be converted into common stock. When similar convertible securities are issued today, their conversion terms are always determined by a less easily-manipulated measure, namely the moving average price over an extended period.

believed CGS rates were biased down due to the maturity of a large proportion of the outstanding CGS.[2]

25. The *TransGrid Revised Revenue Proposal – January 2009* proposes a 20 business day averaging period finishing on Friday 5 September 2008. This period is the most proximate 20 business day period prior to the date of the Final Decision that avoids using data from the period following the Federal Housing Finance Agency placing Fannie Mae and Freddie Mac in conservatorship on Sunday September 7. This date is important since as seen in Figure 3 below it marks the beginning of a period of much increased investor uncertainty.

26. The global financial crisis (GFC) did not begin on 7 September 2008 and bank runs afflicted many financial institutions prior to September 2008. The April 2008 edition of the IMF publication *World Economic Outlook* dates the crisis to August 2007. Countrywide Financial suffered a run in August 2007. Northern Rock, Bear Stearns and IndyMac Bank experienced runs in September 2007, March 2008 and July 2008 respectively.

27. The GFC did though become markedly more severe after 7 September 2008. September 14, 2008 saw the bankruptcy of Lehman Brothers and sale of Merrill Lynch to Bank of America with US government guarantees attached. On 16 September 2008 the US Government took over AIG. On 25 September 2008 the Office of Thrift Supervision shut down Washington Mutual (WaMU) following a massive run. Prior to the run, WaMu had been the largest US savings and loan association. Come the end of September 2008 Wachovia experienced a run that was stemmed only when it too was acquired by Bank of America. In October 2008 a massive run lead the Icelandic government to close Landsbanki.

28. As investors' required returns have come to exceed what businesses can afford to pay, global credit markets have dried up and increasing numbers of countries have entered recessions. The Australian Bureau of Statistics website contains monthly data on the growth in credit provided to Australian businesses each month from March 2006 on. During fiscal year 2006-2007 credit grew at an average rate of 1.5% per month. That average declined to 1.3% in fiscal year 2007-2008. In the six months from July to December 2008, the average was only 0.6% per month and in December 2008 credit actually declined by 1.1%. This most recent month in the series is also the only negative growth month in the series.

29. The financial press is replete with stories of the current difficulty of issuing corporate bonds: e.g., the 28 July 2008 edition of the business journal titled *the sheet: better business journalism* leads with a piece titled "Corporate bond market dead in July", and the August 28 edition of the *Sydney Morning Herald* reports "Companies turn to bank loans as bonds dry up". At the time of writing this report

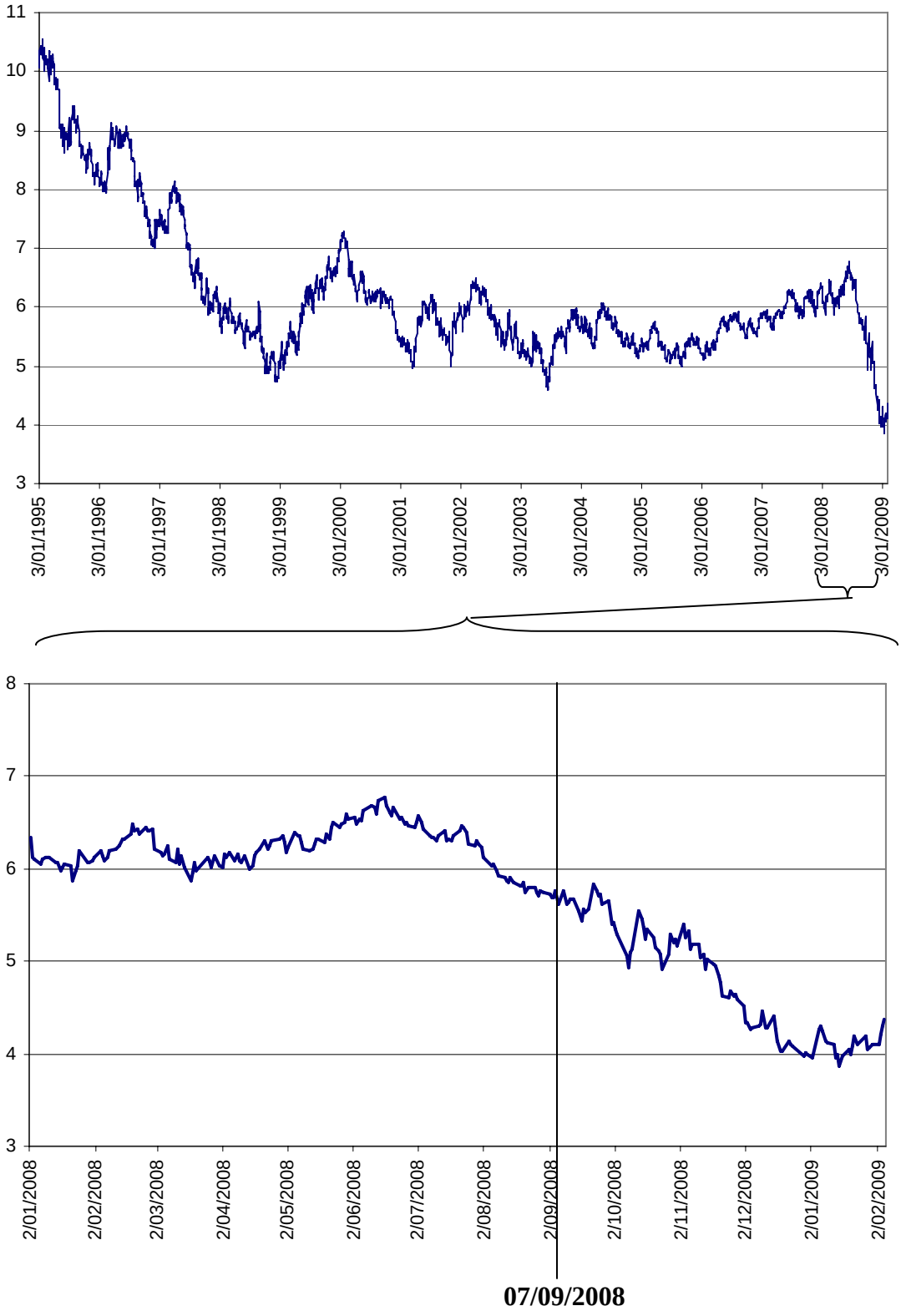
[2] Page 343 of ESCV, October 2006, Final Decision Electricity Distribution Price Review 2006-10 as amended in accordance with a decision of the Appeal Panel dated 17 February 2006, Volume 1 Statement of Purpose and Reasons.

senior US bankers are testifying before Congress about why the hundreds of billions of TARP monies provided to date have failed to free up US lending and the Australian parliament is debating our own massive stimulus package.

30. Figure 1 depicts the yields on 10 year CGS since January 1995. Suppose an estimate of the return on equity were obtained by adding 6% to the yield on 10 years CGS. The RBA website contains a history of 10 year CGS yields dating back to January 1976. The estimate of k_e would suggest that as the GFC has intensified, investors' required return on equity (and equivalently, given a beta of 1.0, investors' required return on the market) has reached a record low for the past quarter century.

31. There are two reasons to believe that adding 6% to a moving average of r_f determined post 7 September 2008 will understate the return on equity for the regulatory control period. The first reason is that yields on CGS post 7 September 2008 are biased down relative to the CAPM risk-free rate. The second reason is that 6% is an underestimate of the MRP post 7 September 2008.

Figure 1: Yields on 10-year CGS securities: 3/1/95—5/2/09.
Source: Reserve Bank of Australia



Yields on CGS post 7-9-08 are biased down relative to the CAPM risk-free rate

32. The CAPM is a relative pricing model that links differences in required returns to differences in assets' non-diversifiable beta risk and assumes that differences in required returns are due only to differences in beta risk. The CAPM can not be used to rationalize why more-liquid securities sell at higher prices than less-liquid securities of equivalent beta risk.

33. The yield on CGS is one measure of the required return on zero beta securities. When other zero beta securities have returns above this rate and the yield on CGS is substituted for r_f in the Sharpe CAPM, the resultant estimates of k_e can be biased. Hird, Grundy and Young (2008) document the voluminous empirical evidence that required returns on US equities are better described if the CAPM is implemented using a zero beta rate that is greater than the rate on government securities. Hird, Grundy and Young empirically demonstrate that this is equally true for Australian equities: The return on Australian equities is better estimated if a value above the yield on CGS is used as the measure of the risk-free rate.[3]

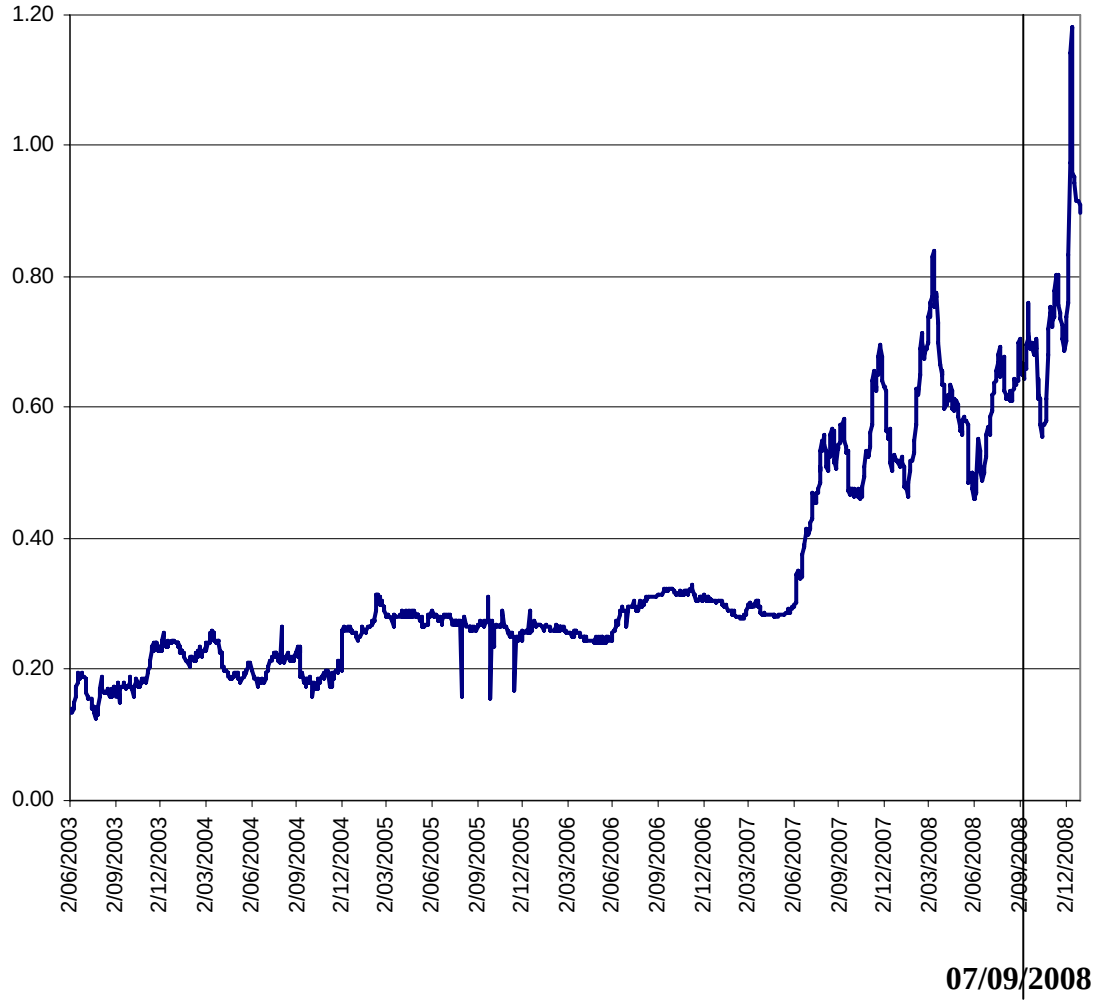
34. One rationale for why zero beta equity has a return above the rate on government securities is that the federal government's credibility gives its securities unique collateral and liquidity features relative to other assets and thereby induces a premium in the price of federal government securities; i.e., a lower yield on federal government securities than on other securities of equivalent beta risk. In a 2008 paper, currently under second round review at the *Journal of Political Economy*, Krishnamurthy and Vissing-Jorgensen estimate that in August 2008, US federal government securities traded at a yield 1% below the yield on equivalent-risk debt instruments and attribute the difference equally to the unique collateral features and the enhanced liquidity of US treasury securities.[4] This estimate (1%) of the downward bias in yields on government securities as estimators of the return on other zero beta debt predates the September 2008 increase in the severity of the GFC.

35. As the crisis has gathered momentum, the gap between CGS yields and yields on other zero beta debt securities has grown. This can be seen by comparing the yields on CGS securities with yields on equivalent maturity State government securities. Figure 2 depicts the excess of the yield on 10-year NSW Treasury Corporation securities over the yield on 10-year CGS. The data is taken from the RBA website which at the date of this report does not have 2009 data for NSW Treasury Corporation securities.

[3] Hird, Tom, Bruce D. Grundy and Daniel Young, 2008, "Estimation of, and correction for, biases inherent in the Sharpe CAPM formula: A report for Energy Networks Association, Grid Australia and APIA."

[4] Krishnamurthy, Arvind and Annette Vissing-Jorgensen, 2008, "The aggregate demand for treasury debt" August 2008 Northwestern University Working Paper.

Figure 2: Yields on 10-year NSW Treasury Corporation securities in excess of yields on 10-year CGS: 2/6/03—31/12/08
Source: Reserve Bank of Australia



36. To explain a 1% higher yield on NSW debt than on CGS that were paying 4.5% by a possibility of default by the State of NSW would require an annual probability of default by NSW of at least 0.948%.[5] It is at least 0.948% because if there were to be even a partial recovery of principal on defaulting NSW debt, the likelihood of default would have to be higher still. This means that over the next 10 years the likelihood of default by the State of NSW would have to be at least 9.08%.[6]

37. The possible default explanation of the recent higher yields on NSW Treasury Corporation securities is fanciful. The real explanation lies in the fact that

[5] $\$100 = \frac{\$100(1-0.00948)^{10}}{1.045^{10}} + \sum_{j=1}^{10} \frac{\$100 \times (0.045+0.01)(1-0.00948)^{j}}{1.045^{j}}$.

[6] $9.08\% = \sum_{j=1}^{10} 0.00948(1-0.00948)^{j-1}$.

different default-free, zero beta debt securities offer different yields when they differ in their acceptance as collateral and in their liquidity. The attractiveness of these features of CGS securities relative to NSW securities means that the risk-free rate on zero beta CGS is less than the risk-free rate on alternate zero beta debt securities. Figure 2 shows that the attractiveness of these features has increased after September 7, 2008.

My opinion regarding the issue in point 3 of the brief

38. Point 3 of the brief seeks my opinion on whether

The global financial crisis has resulted in a historically high liquidity premium being paid for government bonds, pushing down the yield on nominal Commonwealth Government Securities (CGS)

> The impossibility of explaining the result in figure 2 as the result of a high probability of default by the NSW government as well as results for the US reported in Krishnamurthy and Vissing-Jorgensen (2008) lead me to conclude that there is currently an historically high downward bias in yields on nominal CGS.

39. The difference between the collateral and liquidity features of CGS and of equities is greater than the difference between the collateral and liquidity features of CGS and NSW securities. This is consistent with the results cited and reported in Hird, Grundy and Young (2008) that the spread between the zero beta rate on equities and the rate on CGS is markedly greater than 1%.

40. Even when, as now, the collateral and liquidity features of CGS depress their yields, the return on equity with a beta of one (equivalently, the return on the market) can still be decomposed into the risk-free rate on CGS and the MRP relative to CGS. A liquidity/collateral induced reduction in the risk-free rate on CGS will mechanistically translate into any offsetting increase in the MRP. But, when the return on the market is to be estimated by summing a CGS rate and a constant 6%, the resultant estimate will be biased down relative to investors' required return on equity for the regulatory control period if the r_f measured over the *moving average period* is itself biased down.

41. Figure 2 shows that the downward bias in r_f is greater if the *moving average period* is selected as a period following rather than preceding 7 September 2008.

42. There is a second reason why the selection of a *moving average period* that precedes 7 September 2008 will produce a more accurate estimate of the return required by equity investors in the transmission network service provider than a *moving average period* that follows 7 September 2008. The increase in uncertainty associated with the GFC is expected to lead to an increase in the

MRP. When in the regulatory determination of the return on equity the MRP is held constant at 6%, the regulatory MRP will be biased down relative to investors' true required return for bearing market risk whenever investors are facing more risk than they typically do. The 6% number is an historical average of the reward to bearing market risk. When this risk is higher than usual, so also investors' required return is higher than usual.

43. The bias in the estimate of the required return on equity that results from the use of a constant 6% even in current market conditions will be compounded if the *moving average period* that is selected is also a period when the heightened attractiveness of the collateral and liquidity features of CGS makes CGS yields an even more downward biased estimate of the risk-free rate on other securities than CGS yields typically are.

6% is a downward biased estimate of the MRP post 7-9-08

44. It seems intuitive that the MRP will grow when investors face greater uncertainty about future returns on the market. The MRP is the expected return on the market in excess of the risk-free rate. Observed realized returns on the market in excess of the risk-free rate are noisy measures of the MRP and given the sample sizes available to researchers this noise has in the past made it difficult to empirically document the expected relation between market risk and market reward. Two recent papers have identified accurate proxies for expected returns and have documented an economically and statistically significant relation between increases in the volatility of the equity market and increases in the MRP.

The positive link between the MRP and the volatility of future market returns

45. Chen, Guo and Zhang (2006)[7] observe that debt and equity are financial claims on the same underlying assets and hence must reflect the same beta risk that affects the underlying firm fundamentals. The spread between the corporate bond yield and the Treasury bond yield incorporates both the fair compensation for default risk and the ex ante risk premium on the bond. The spread adjusted by an estimate of this fair compensation retains largely the forward-looking property of the ex ante risk premium consistent with the beta of the bonds.

46. Chen, Guo and Zhang construct elaborate estimates of the future stock market variance using lagged variance and the options-implied S&P100 volatility and conclude that:

    …. in contrast to many early authors, we find a positive and significant risk-return tradeoff. Our results highlight the importance of using the ex ante equity premium instead of the realized equity premium in asset pricing tests.[8]

[7] Chen, Long, Hui Guo and Lu Zhang, 2006, "Equity market volatility and expected risk premium," Working Paper 2006-007A http://research.stlouisfed.org/wp/2006/2006-007.pdf

[8] Page 24 of Chen, Guo and Zhang (2006).

47. Figure 3 below (page 17) demonstrates how investors' estimates of the future market variance of returns on S&P/ASX 200 index has increased after 7 September 2008.

The positive link between the required return on beta one equity and the volatility of future market returns

48. Lubos, Sinha and Swaminathan (2008)[9] (henceforth LSR) take a quite different approach to demonstrating that the return on the market (equivalently, the return on beta one equity) is increasing in the variance of the future return on the market. LSR calculate the implied cost of capital at various dates for large sets of listed companies in each of the G7 countries. The implied cost of capital is the discount rate that makes the present value of analysts' earnings forecasts equal to the sum of the market value of the firm's equity plus its debt.

49. LSR demonstrate plausible conditions under which a weighted average of the individual firm implied cost of capital values is theoretically perfectly correlated with the conditional expected return on the stock market and construct the time series of the implied cost of capital for the G7 countries.

50. LSR calculate conditional estimates of the volatility of future returns on the market using both predictions based on the past realized values of the market variance and, for the US, the implied volatility calculated from observations on the equity index options market. Equity index options are options to buy or sell an index of stocks at a fixed price.

51. Index option prices are determined by their contractual terms, the contemporaneous level of the underlying stock index and investors' forward-looking assessment of the standard deviation (also termed the volatility) of the return on the index over the option's life. The fact that the contractual terms are important is natural—for example; the option to buy an asset for $50 is more valuable than the option to buy it for $60. The fact that the value of the underlying equity is important is also natural—all else equal; the option to pay $50 to acquire a set of stock trading for $200 is more valuable than an option to buy a set of stocks that are similar but worth only $100. The effect of volatility on the value of an option is more subtle.

52. Suppose that a set of stocks is currently worth $50 and you have an option to acquire them in three months time by paying a fixed $50 amount if you do decide to acquire them. Suppose also that these are low volatility stocks in the sense that after three months they have an equal chance of being worth either $65 or $45. If they do go up in value, you will then find it optimal to exercise your option and pay $50 to acquire stocks worth $65. You will net $15. If they do go down in

[9] Lubos, Pastor, Meenakshi Sinha and Bhasaskaran Swaminathan, 2008, "Estimating the intertemporal risk–return tradeoff using the implied cost of capital," Journal of Finance 63, pp. 2859-2897.

value, you will not exercise your option to pay \$50 to acquire stocks worth only \$45 and in this case you will net \$0. On average, your payoff is \$7.50 = ½ × \$15 + ½ × \$0.

53. If instead they are high volatility stocks, their potential values in three months time are more extreme. For the sake of the example assume that high volatility stocks have an equal chance of being worth either \$75 or \$35 in three months time.[10] If the stocks go up, you exercise your option and net \$25. If the stocks go down, you don't exercise and you net \$0. On average you net \$12.50; i.e., a payoff that is more than the \$7.50 average from low volatility stocks.

54. Thus we have shown that an option on a set of high volatility stocks has a higher average payoff than an option on an otherwise equivalent set of low volatility stocks. This difference in future payoffs will translate into a difference in the current prices of the two options. The Black-Scholes option pricing model links the current price of an option to its contractual terms, the current value of the underlying asset and the volatility of that asset. Since the value of the option is increasing with the volatility of the underlying asset, one can use the option's price and the Black-Scholes model to determine how volatile investors think the underlying stocks are.

55. Inverting the Black-Scholes model given contemporaneous observations on the level of the stock index and the prices of options on that index allows one to determine investors' best estimate of the volatility of the future return on the stock index. This forward-looking measure of the risk of the equity market is termed the option implied volatility.

56. LSR report a positive relation between the conditional expected return on the stock market and the conditional estimate of the volatility of stock returns, at both the country level and the world market level.

    The results based on implied volatility are even stronger than those based on realized volatility. The mean–variance relation is significantly positive with the t-statistics on the order of ten in a 17-year-long sample.

57. It is important to note what LSR have demonstrated: Just when an increase in risk induces a flight to quality and lower yields on government securities, not only does the MRP increase but it increases *more* than the amount by which yields on government securities decline; i.e., k_m increases.

[10] Note that on average both high and low volatility stocks are worth \$55 in three months time.

\$55 = ½ × \$75 + ½ × \$35 = ½ × \$65 + ½ × \$45.

The implied volatility of the Australian equity market

58. Citigroup publish the option implied volatility of the S&P/ASX 200 index. The implied volatility is calculated from the prices of 3-month options on the index and the contemporaneous level of the index. Investors' assessments of the future annual standard deviation of the return on the S&P/ASX 200 are depicted in Figure 3 for the period 1/1/97 through 3/2/09.

59. The average implied volatility over the years 1997 through 2007 is 18.28% per annum. The average implied volatility during 2008 prior to 7 September 2008 is 28.15%. The average implied volatility after that date is 44.59%.

60. Figure 3 shows that investors' assessment of the risk of the Australian equity market has increased dramatically after 7 September 2008. The results in Lubos, Sinha and Swaminathan (2008) imply that investors' required return on the Australian equity market has increased post 7 September 2008 relative to their required return in the period preceding that date.

My opinion regarding the issue in point 4 of the brief

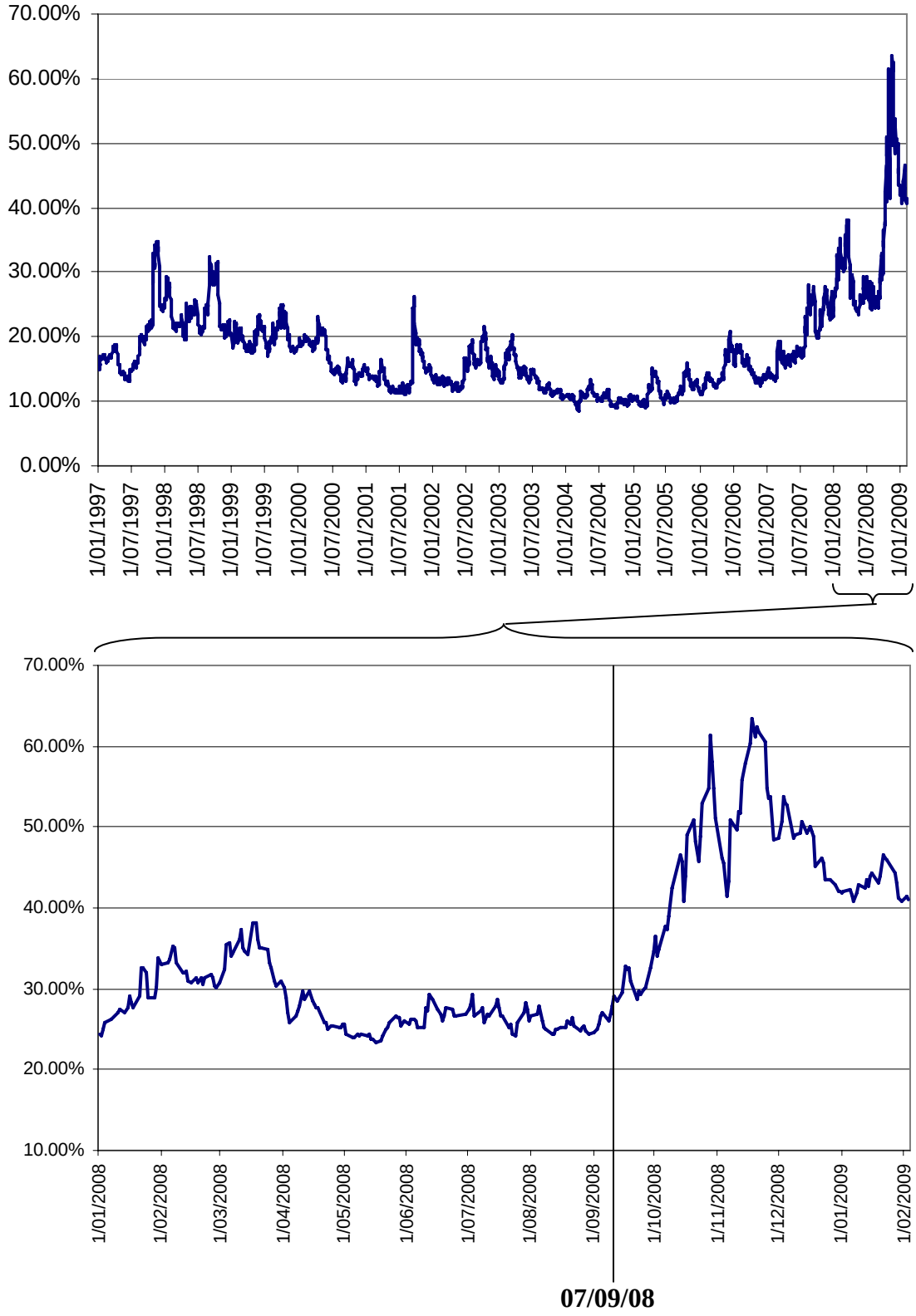
61. Point 4 of the brief seeks my opinion on whether

The mechanistic application of the Rules requirement using data since September 2008, and that likely to prevail through February and March 2009, would indicate a low cost of equity, whereas other evidence points to a high cost of equity currently

(1) The results in both Chen, Guo and Zhang (2006) and in Lubos, Sinha and Swaminathan (2008) combined with (2) the prediction of greater volatility in the Australian equity market implicit in index option prices and depicted in Figure 3 and (3) my conclusion that the GFC has lead to an historically high downward bias in yields on nominal CGS leads me to conclude that the mechanistic application of the Rules requirement using data since September 2008 and data that is likely to prevail through February and March 2009 will indicate a low cost of equity, whereas (1), (2) and the evidence underlying (3) all point to a high cost of equity currently.

Figure 3. Implied annual standard deviation of returns on the S&P/ASX 200 Index: 7/1/973/2/09

Source: Citigroup



My opinion regarding the issue in point 5 of the brief

62. Point 5 of the brief seeks my opinion on whether it is the case

That sampling nominal CGS yields in the current economic climate will not provide a reliable and unbiased estimate of the cost of equity and that a period prior to 7th September 2008 would provide a more reliable and unbiased estimate

> Because of the evidence in Figure 2 that the downward bias in nominal CGS has intensified post 7 September 2008 and the evidence in Figure 3 of an increase in the market's forecast of equity volatility post 7 September 2008 and the evidence in Lubos, Sinha and Swaminathan (2008) that the required return on equity increases when the equity market becomes more volatile, I conclude that sampling nominal CGS yields in a period prior to 7th September 2008 will provide a more reliable and unbiased estimate of the cost of equity for the regulatory control period than sampling nominal CGS in the current economic climate.

My opinion regarding the issue in point 1 of the brief

63. Point 1 of the brief seeks my opinion on whether

An averaging period close to the date of the final decision (i.e. in February/March 2009) would provide an unbiased rate of return given the current global financial crisis

64. The selection of a *moving average period* after 7 September 2008 combined with the NER's requirement to calculate the return on equity for the regulatory control period as the sum of 6% and r_f over the *moving average period* will produce the apparent result that return on equity has declined as the GFC has intensified.

65. Such a result is inconsistent with both basic economic theory of a risk return tradeoff and the requirement of Clause 6A.6.2(b) of the NER that [t]*he rate of return for a Transmission Network Service Provider for a regulatory control period is ... the return required by investors in a commercial enterprise with a similar nature and degree of non-diversifiable risk as that faced by the transmission business of the provider.*

> Because of the evidence contained in this report that the GFC has led to an increase in the required return on equity and because the NER requires that the WACC provide a commercial return to investors, it is my opinion that the use of an averaging period close to the date of the final decision (i.e. in February/March 2009) will not provide an unbiased estimate of the required commercial return to investors.

My opinion regarding the issue in point 2 of the brief

66. Point 2 of the brief seeks my opinion on whether

The mechanistic application of the capital asset pricing model (CAPM), in the form set out in the National Electricity Rules, supports selection of an averaging period close to the date of final decision for revenue setting purposes in accordance with the AER's obligations set out in the NEL and the Rules

> On the basis of the analysis in section 3 of this report it is my opinion that the selection of a *moving average period* equal to the 20 business days finishing on Friday 5 September 2008 will provide a more accurate estimate of the return on equity for the regulatory control period than the selection of a period between 7 September 2008 and the date of this Report.
>
> It also my opinion that unless the effects of the GFC on capital markets dissipate between the date of this Report and the date of the AER Final Decision, then the moving average period proposed in the *TransGrid Revised Revenue Proposal* will provide a more accurate estimate of the risk free rate and the cost of equity for the regulatory control period than the selection of a period after 7 September 2008.

4. The Measurement of the Return on Debt

67. Even when corporate bond markets are considered liquid every security is not traded all the time. However, when a security with a given set of features is not traded, other securities that do trade can include securities that differ from the non-traded security in ways that can be valued. Pricing services use what is termed a "matrix pricing approach"—observed prices for bonds that are traded and models of bond prices that reflect the bond's characteristics are used to estimate the prices for the bonds that haven't traded recently. Matrix pricing works provided sufficient bonds trade. But in the absence of trading of similar bonds, it becomes difficult to determine the fair value any given bond.

68. Deloitte[11] has advised that

The market for non-financial institution corporate bonds, similar to the assumed BBB+ grade used in the WACC model, effectively vanished from capital markets in the first half of 2008 … .Expectations are for the domestic corporate bond market to remain illiquid, possibly into 2010 and beyond.

[11] Deloitte, Refinancing, Debt markets and Liquidity, 12 November 2008, a report to the AER, page 5.

69. Consistent with the market for traditional corporate bonds drying up, the Commonwealth Bank reports that the issuance of unsecured bonds in Australia in January 2009 has all taken the form of AAA-rated Government guaranteed issues by banks.[12]

70. In an analysis of the effect of the GFC on the trading and pricing of asset backed securities, Jacklin and Wilcox (2008)[13] observe that

    The pricing services can also be hampered when they do not get data for enough of the trades that actually do take place. … . The reduction of pricing precision then subjects both potential buyers and sellers to being picked off. As a result, they sit on the sidelines, waiting for others to trade and thereby produce pricing precision. But there may not immediately be others who are ready to step into the void. … [W]ithout transactions matrix pricing schemes would have to rely on stale data, which may lead to a slower adjustment in the prices provided by pricing services and used to "mark the portfolio to market."

71. In measuring the return on debt the AER Draft Decision notes that in the past CBASpectrum yields have been downward biased estimators of actual yields on 10-year BBB+ corporate bonds. This past bias was documented in a 2005 NERA report.[14] The AER's Draft Decision chooses to rely solely on Bloomberg estimates of yields on 8-year BBB bond yields adjusted for Bloomberg's estimate of the term spread between 8 and 10 A-rated bonds. Only three bonds underlie Bloomberg's estimate of 8-year BBB bond yields.

72. Since the NERA report CBASpectrum has altered its matrix pricing technique with the result that a recent ESCV comparison of Bloomberg and CBASpectrum data concludes that[15]

    There is no evidence that the methodology applied by CBASpectrum cannot adequately produce valid estimates due to issues associated with the current sub-prime market conditions. Significantly, the analysis conducted in the estimation of the debt premium (below) shows that CBASpectrum has performed better in predicting bond yields than Bloomberg under current market conditions. (Page 487)

73. Consistent with the ESCV conclusion the Economic Regulation Authority Western Australian Draft Determination of the 2008 Weighted Average Cost of Capital for the Freight (WestNet Rail) and Urban (Public Transport Authority) Railway Networks concluded that

[12] Commonwealth Research Month in Review: January 2009.

[13] Jacklin, Charles J. and James A. Wilcox, 2008, "Crisis in structured debt markets: Mark-to-market accounting, illiquidity & vicious spirals," Haas School of Business University of California, Berkeley Working Paper, August 2008.

[14] Hird, Tom and Bruce Grundy, 2005, "Critique of available estimates of the credit spread on corporate bonds: A report for the ENA prepared by NERA," May 2005.

[15] ESCV, Gas Access Arrangement Review, Final Decision, March 2008.

… contrary to findings early in 2007, there was no empirical justification in November and December 2007 for considering that CBASpectrum systematically under estimates yields …

In its Final Determination the Authority relied solely on CBASpectrum yields when measuring the return on 10-year BBB+ bonds.[16] CBASpectrum yields are determined from observations on 7 bonds.

74. As part of a January 2009 report for a set of distribution and transmission businesses, CEG has examined the difference in 2008 of the estimates of the return on 10-year BBB+ bonds obtained by relying on Bloomberg data and on CBASpectrum data.[17] The CEG report observes that in late 2008 estimates based on CBA Spectrum data were consistently above estimates based on Bloomberg data.

    The level of disagreement between these services has recently reached 1.55% (averaged over the last 15 days to the 1st of December 2008). (Page 23)

75. The AER's Draft Determination has chosen to rely exclusively on Bloomberg-based estimates of the return on 10-year BBB+ bonds because of the past bias in CBASpectrum-based estimates. If the AER believes that CBASpectrum-based estimates continue to retain their earlier downward bias, it is then difficult to rationalize why the AER would then rely exclusively on Bloomberg estimates that can be 1.55% lower still.

76. Suppose a regulator knew that in late 2008 CBASpectrum-based estimates of the return on 10-year BBB+ bonds were consistently above estimates obtained by applying the AER methodology to Bloomberg data on 8-year BBB and 8- and 10-year A bonds. For the regulator to then ignore the larger sample of data on which CBASpectrum estimates are based and to rely exclusively on Bloomberg-based estimates in forming an estimate of the cost of debt for the regulatory control period using data from a *moving average period* in late 2008, a regulator would have to base its decision on evidence that lead to two conclusions. First, that the 2008 Western Australian ERA and the ESCV decisions were both mistaken in their analysis of CBASpectrum rates. Second, that what was once a downward bias in CBASpectrum rates had become an upward bias in late 2008.

[16] Economic Regulation Authority Western Australia, 2008, "Final determination: Weighted average cost of capital for the freight (WestNet Rail) and urban (Public Transport Authority) railway networks," 23 June 2008.

[17] Hird, Tom, 2009, "Rate of return and the averaging period under the National Electricity Rules and Law," CEG Report January 2009.

My opinion regarding the issue in point 6 of the brief

77. Point 6 of the brief seeks my opinion on whether

The divergence in the bond yields provided by Bloomberg and CBASpectrum data services indicates that illiquidity in the market is affecting the reliability of these estimates and that averaging the two would provide a more reliable estimate;

(1) The imprecision in matrix-based pricing when there are but a few underlying reference bonds traded as discussed in Jacklin and Wilcox (2008), (2) the 2008 conclusions of the Western Australian ERA and the ESCV, and (3) the evidence in the 2008 CEG Report referred to in paragraph 74 above all lead me to conclude that the divergence in the current Bloomberg and CBASpectrum yields indicates that illiquidity in the corporate bond market is affecting the reliability of these estimates.

It is my opinion that a prudent estimate of the cost of debt for the regulatory control period would be obtained by calculating an equal weighted average of the cost of debt determined from Bloomberg data and the cost of debt determined from CBASpectrum data.

5. Real Rates, Inflation Forecasts and the *Moving Average Period*

78. At one time the AER used the difference in CGS nominal and indexed yields as a market-based forecast of expected inflation. The Draft Decision notes (on page 96) that

… since late 2006 a downward bias in the indexed CGS has become evident due to the limited supply of these securities. Consequently, using this method potentially results in an overestimate of expected inflation.

79. Rather than rely on this market-based forecast the Draft Decision proposes to forecast expected inflation per annum over the next 10 years as a simple average of the RBA's published inflation expectations for the first two years and the mid-point of the RBA's target band for the remaining eight years. At the time of the Draft Decision this method produced an inflation forecast of 2.55% per annum. The Draft Decision concludes (on page 96) that

In the absence of an objective market-based approach, the AER considers that its methodology will result in the best estimates of expected inflation for the purposes of determining an inflation forecast in its transmission determinations.

80. When a forecast is biased up, that biased forecast can still be useful in that it places an upper bound on the value of an unbiased forecast. The Draft Decision's stated reason for rejecting the market-based forecast of expected inflation implicit in the difference in CGS nominal and indexed yields implies that an objective forecast must lie below the difference in CGS nominal and indexed yields.

81. Given the late 2008 levels of nominal and indexed CGS yields, there is a logical inconsistency between believing that

    i. unbiased estimates of expected real rates can be obtained by subtracting estimates of inflation from nominal rates;

    ii. the market-based forecast of expected inflation over the next 10 years implicit in the difference in CGS nominal and indexed yields in late 2008 is biased up; and that

    iii. the late 2008 average of RBA forecasts and the mid-point of the RBA's target band produces an unbiased estimate of expected future inflation.

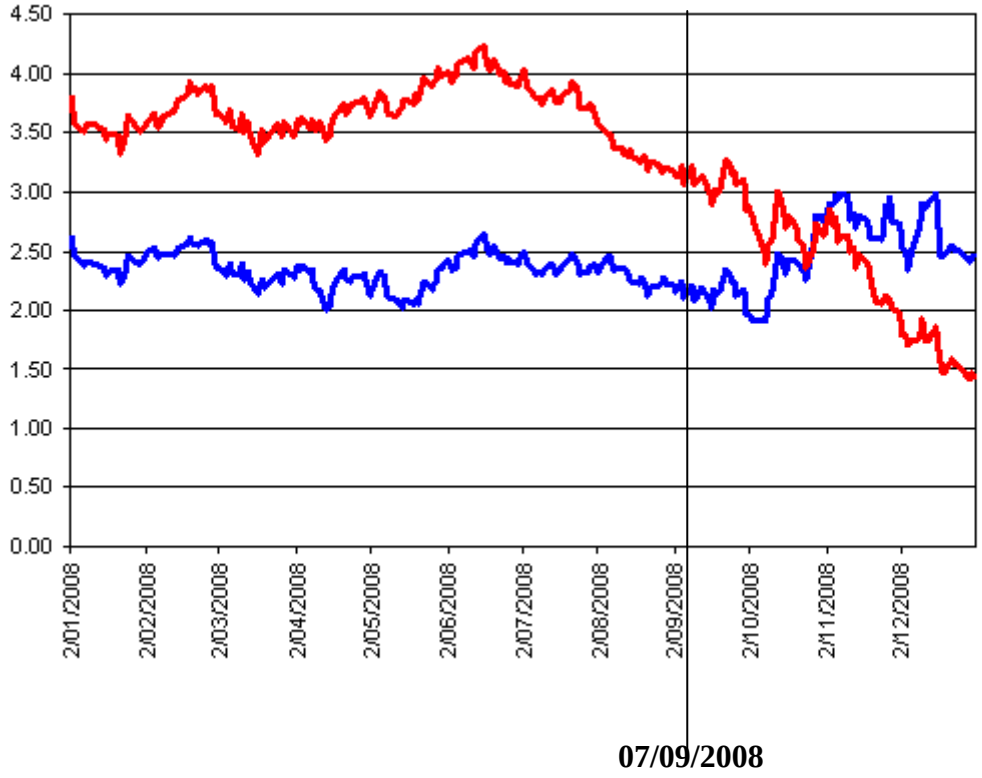
    The logical inconsistency is illustrated in Figure 4.

82. The red line in Figure 4 depicts the annual yield on 10-year CGS nominal bonds less the Draft Decision's 2.55% inflation forecast based on the RBA target band. If 2.55% is in fact an unbiased estimate of the expected future inflation rate, then part i of paragraph 81 states that the nominal CGS rate less 2.55% produces an unbiased estimate of the real return on default-free CGS securities. The blue line depicts the contemporaneous level of the yield on CGS indexed bonds. Thus according to the Draft Decision "the best estimates of expected inflation for the purposes of determining an inflation forecast in its transmission determinations" are such that at the end of 2008 the expected real return on a default-free security must be fully 1% below the return on CGS indexed bonds.

83. Note that the rate on CGS indexed bonds exceeds the rate on CGS nominal bonds less 2.55% only after the intensification of the GFC.

84. To simultaneously believe that (a) the best forecast of inflation is 2.55% (based on RBA near-term forecasts and the middle of the RBA target band) and (b) that the difference in CGS nominal and indexed yields in late 2008 produces an upward-biased forecast of inflation is illogical. Forecasts based on (a) are above forecasts based on (b) so it is impossible to simultaneously believe forecasts based on (a) are more accurate and forecasts based on (b) are overestimates.

Figure 4. 2008 yields on 10-year CGS nominal bonds less 2.55% (red line) and 2008 yields on indexed CGS bonds (blue line)
Source: RBA



85. It is possible to simultaneously believe that (a) the average involving the mid-point of the RBA band does provide the best estimates of expected inflation for the purposes of determining an inflation forecast in the AER's transmission determinations and (b) that differences in CGS nominal and indexed yields in late 2008 produce an inflation forecast that is downward biased. But, recalling the quote in paragraph 78 above, to simultaneously believe that

    i. since late 2006 the yields on indexed CGS have been biased downward and that

    ii. in late 2008 the difference in CGS nominal and indexed yields did not provide an objective market-based forecast of the expected future inflation rate

    requires that one must also believe that

    iii. in late 2008 nominal yields were biased down,

    iv. and the late 2008 downward bias in nominal yields exceeded the contemporaneous downward bias in real yields.

86. Although the expected inflation rate is not an explicit parameter within the WACC calculation it is used in the post tax revenue model to forecast real

allowed revenues (i.e., the real level of revenues that will be indexed to actual 'outturn' future inflation as that inflation occurs). Based on the reasoning in paragraph 85 it would appear that the AER has two choices open to it.

87. The first choice is to adopt as an inflation forecast a number that assumes that an inflation target rate is a credible forecast of inflation (that number being 2.55% in the Draft Decision) and to determine the *moving average period* as a period with the property that the moving average nominal rate less that inflation forecast exceeds the moving average indexed CGS bond rate (such as was the case in TransGrid's proposed *moving average period*).

88. If instead the AER were to choose a *moving average period* that does not have the particular property that the moving average nominal rate less the RBA-based inflation forecast exceeds the contemporaneous moving average indexed CGS bond rate, then it will be using a *moving average period* over which it must believe that there is a greater downward bias in nominal rates than in real rates. Note that a belief that nominal rates are currently downward biased is consistent with my own conclusion concerning point 3 of the brief (page 12, above) that *there is currently an historically high downward bias in yields on nominal CGS.*

89. Thus, given a belief that there is currently a greater downward bias in nominal CGS rates than in real CGS rates, the second choice open to the AER is to form its estimate of the nominal risk free rate by summing the moving average indexed CGS bond rate and the RBA-based inflation forecast. This second choice will though still produce an estimate of the nominal risk free rate that is biased down, and for this reason the first choice is to be preferred.

90. As long as the AER continues to believe that a forecast based on the mid-point of the RBA target band produces the best estimate of expected inflation for the regulatory period, then the AER should select a *moving average period* that predates the intensification of the GFC. The *TransGrid revised Revenue Proposal – January 2009* proposed a 20 business day period finishing on Friday 5 September 2008 as the *moving average period*.

91. The use of TransGrid's proposed averaging period does not lead to a logical inconsistency with the AER's preference for RBA inflation forecasts over market-based forecasts calculated as the difference between nominal and indexed CGS yields.

My opinion regarding the issue in point 7 of the brief

92. Point 7 of the brief seeks my opinion on whether:

The RBA inflation forecasts are the most appropriate forecast to apply to determine the real cost of capital, particularly where the averaging period coincides with the current period of abnormal market conditions

Given the analysis in paragraphs 78 through 91 above of the Draft Decision's proposed use of RBA inflation forecasts in determining the real cost of capital, I believe that it would be inappropriate when implementing the NER to use the RBA inflation forecast when the nominal r_f is determined as the moving average rate on nominal CGS over a *moving average period* that overlaps the period from 7 September 2008 to the date of this Report.

It is also my opinion that unless the effects of the GFC on capital markets dissipate between the date of this Report and the date of the AER Final Decision, then it will continue to be inappropriate when implementing the NER to use the RBA inflation forecast along with a value for the nominal r_f that is determined as the moving average rate on nominal CGS over a *moving average period* after 7 September 2008.

SCOPE OF WORK
AVERAGING PERIOD FOR SETTING COST OF CAPITAL

Background

The Australian Energy Regulator (AER) is responsible for the economic regulation of Transmission Network Service Providers (TNSPs) in the National Electricity Market. The process for setting a TNSP's revenue is set out in the National Electricity Rules (the Rules).

The Rules require a rate of return to be applied to the value of the regulatory asset base at the beginning of each regulatory year. The rate of return for each regulatory year of a regulatory control period is:

> *" … the cost of capital as measured by the return required by investors in a commercial enterprise with a similar nature and degree of non-diversifiable risk as that faced by the transmission business of the provider …"*[18]

The AER is required to consider whether the overall rate of return is consistent with the National Electricity Objective (NEO) and the Revenue and Pricing Principles in the NEL. In particular in making its decision on rate of return the AER must have regard to the broader objectives of:

- promoting efficient investment outcomes;[19]
- providing TransGrid with a reasonable opportunity to recover at least its efficient costs.[20]

As most parameters for the rate of return are prescribed in clause 6A.6.2 of the Rules, the AER's role in deciding on an appropriate nominal rate of return is limited to a decision about the nominal risk free rate under clause 6A.6.2(c) and a decision about the debt risk premium under clause 6A.6.2(e).

In addition, it is noted that the AER is also required, under clause 6A.5.3(b)(1) of the Rules, to include in the post-tax revenue model (PTRM) a method that is likely to result in the best estimates of expected inflation. The estimates of expected inflation in the PTRM determine the real return for the transmission business.

These are the only parameters in relation to the rate of return for TransGrid which are not "locked" in by the Rules and therefore the only values where the AER is required make a decision which ensures the rate of return is consistent with the requirements in the Rules and the NEL.

Under the Rules, the AER must determine the nominal risk free rate on a moving average basis from the annualised yield on Commonwealth Government bonds with a maturity of 10 years using the indicative mid rates published by the Reserve Bank of Australia (RBA).

The moving average is based on a period of time which is either:

- proposed by the TNSP and agreed by the AER; or
- in the absence of an agreed period, a period specified by the AER.

In considering the selection of the averaging period (whether that proposed by the service provider or that specified by the AER), the AER must have regard to the role of the averaging period in the context of the objects and purpose of the Rules and NEL, which relevantly include:

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[18] Clause 6A.6.2(b) of the Rules
[19] Sections 7 and 7A(3) of the NEL
[20] Section 7A(2) of the NEL

- the objective of the law is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of users with respect to price, quality, safety, reliability and security of supply (section 7 of the NEL);
- a regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs (section 7A of the NEL);
- the network service provider is entitled to a return on capital calculated in accordance with clause 6A.6.2 of the Rules;
- the return on capital is to be calculated by applying a rate of return to the value of the regulatory asset base for the relevant transmission system (clause 6A.6.2(a) of the Rules);
- the rate of return for a TNSP is the cost of capital measured by the return required by investors in a commercial enterprise with a similar nature and degree of non-diversifiable risk as that faced by the transmission business of the provider and must be calculated as a nominal post-tax weighted average cost of capital (WACC) in accordance with the formula prescribed in the rules (clause 6A.6.2(b) of the Rules); and
- the relevant WACC parameters have been fixed in the Rules, other than the risk free rate and the debt risk premium.

The Brief

A review of the AER Draft Decision for TransGrid (31 October 2008) and TransGrid's revised Revenue Proposal (submitted 14 January 2009) is required with regard to the cost of capital and an expert opinion is to be provided as to whether:

1. An averaging period close to the date of the final decision (i.e. in February/March 2009) would provide an unbiased rate of return given the current global financial crisis;
2. The mechanistic application of the capital asset pricing model (CAPM), in the form set out in the National Electricity Rules, supports selection of an averaging period close to the date of final decision for revenue setting purposes in accordance with the AER's obligations set out in the NEL and the Rules;
3. The global financial crisis has resulted in a historically high liquidity premium being paid for government bonds, pushing down the yield on nominal Commonwealth Government Securities (CGS);
4. The mechanistic application of the Rules requirement using data since September 2008, and that likely to prevail through February and March 2009, would indicate a low cost of equity, whereas other evidence points to a high cost of equity currently;
5. That sampling nominal CGS yields in the current economic climate will not provide a reliable and unbiased estimate of the cost of equity and that a period prior to 7th September 2008 would provide a more reliable and unbiased estimate;
6. The divergence in the bond yields provided by Bloomberg and CBA Spectrum data services indicates that illiquidity in the market is affecting the reliability of these estimates and that averaging the two would provide a more reliable estimate;
7. The RBA inflation forecasts are the most appropriate forecast to apply to determine the real cost of capital, particularly where the averaging period coincides with the current period of abnormal market conditions; and
8. There is any other information or analysis that would support TransGrid's position in the revised revenue proposal.

The report is to be used by TransGrid in a submission to the AER in support of its revised Revenue Proposal.