Critique of AER estimate of a 5-year RoE

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1 Executive summary

1. The AER's draft rate of return instrument (RoRI) proposes a profound change to the way in which equity investors will be compensated for funding monopoly energy assets. Specifically, the AER has determined that equity compensation will be linked to the level of the more volatile 5-year risk-free rate rather than the 10-year risk-free rate but that the MRP will remain fixed (albeit at a higher level). In doing so, the AER has also adopted an estimate that is radically different to the observed practice of investors and commercial valuers.

2. The rationale for making this change is based on the AER's interpretation that, because the AER resets the regulated return on equity (RoE) every 5-years, finance theory requires that investors must use a corresponding 5-year risk-free rate to inform their cost of equity estimate.

3. The AER does not consider in any detail whether a more volatile risk-free rate, combined with a fixed MRP[1], will actually make the return on equity more accurate. Nor does the AER explore the implications of such a profound change for other elements of the regulatory regime – including for its estimate of equity beta.

4. This report addresses three separate questions:

   - Does the AER's proposed approach follow from application of sound finance theory? What implicit assumptions are required in order for the AER's conclusions to be correct and are these assumptions borne out by evidence?

   - What consequences might such a profound change in the way regulatory returns are set have elsewhere in the regulatory regime and has the AER accounted for these? In particular, what consequences might the change have for the risk faced by NSPs as reflected in both equity beta and credit rating?

   - What other unintended/unexpected implications follow from adopting the AER's implicit and explicit assumptions. In particular:

     □ For the efficient internal planning and budgeting of NSPs. For example, in present value assessment of capital versus operating expenditure solutions to network congestion.

     □ The effective adoption of a 2-factor model of risk (with risk driven by both beta and the duration of the asset).

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[1] That is, the MRP is held invariant over time and, therefore, invariant in the various market circumstances that give rise to the greater volatility of the 5-year risk-free rate.

1.1 Is the AER's approach derived from sound finance theory?

5. The AER's proposed change to the regulatory regime does not follow directly from the application of finance theory. The AER's policy position relies on a strong set of assumptions that are not found anywhere in finance theory and that are, in fact, inconsistent with the available evidence. Specifically, the AER assumes investors have a term structure[2] for both the risk-free rate and the MRP such that:

- they apply a higher MRP to the short run and a lower MRP to the long run;

- this term structure in the MRP is fixed through time such that:

  - it does not vary at all with the term structure in risk-free rates; but rather

  - reflects the historical average difference in risk-free rates at the relevant tenors. For example, the AER assumes the 5-year MRP is above the 10-year MRP by the historical average difference in the 5 and 10-year risk-free rates.

6. This means that if the historical average difference between 5 and 10-year risk-free rates is 30bp but the prevailing difference is 100bp then the AER assumes that the 5 year market return on equity is 70bp lower than the 10 year market return on equity. Moreover, with a beta of 0.6 for network service providers (NSPs) the AER assumes that NSP return on equity is 82bp (100bp - 30bp*0.6) lower at the 5 year horizon than the 10-year horizon.

7. Similarly, the AER is implicitly assuming that low beta (beta<1.0) firms typically have lower return on equity over shorter horizons than longer horizons (and *vice versa*). It is this peculiar feature of the AER's assumptions that gives rise to adopting a 5-year risk-free rate lowering the expected return on equity allowance for NSPs. If NSPs beta was higher than 1.0 then, on the AER's assumptions, for the average term structure of risk-free rates, NSP's short-term cost of equity would be higher than their long-term cost of equity. The AER does not explore this incongruity in its decision.

8. The AER has assumed a term structure for risk premiums and this gives rise to a specific term structure for the cost of equity for a firm with a given beta and in a given risk-free rate environment. However:

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[2] See section 4c(i)-(iv) of the draft RoRI where the AER sets out a downward sloping term structure for the MRP. This term structure for MRP is a mirror image of the AER's estimated average term structure for risk free rates (see page 133 of the draft explanatory statement).

- The AER is wrong to claim that its approach necessarily follows from sound finance logic. [3] It does not. It is also not consistent with the expert panel advice on MRP, including Dr Lally, which considered that the AER's single method and "set and forget" approach was naïve.[4]

- For the AER's approach to be correct very strong assumptions, as set out above, need to be made about the term structure of the MRP that have no grounding in the theoretical or empirical finance literature and which, if true, would have very unusual implications more generally; and

- The available evidence is inconsistent with the AER's assumptions at paragraph 5 above. Namely, the evidence:

  □ that investors' actual practice is to use a long-term discount rate at all tenors (i.e., no term structure in the return on equity); and

  □ that term premiums on equity vary inversely with term premiums on government bonds (cancelling out, at the return on equity level, variations in bond term premiums).

9. The AER states that its proposed policy reform is focussed on a desire to achieve "NPV=0" results at the beginning of each regulatory period. However, this objective requires that the best estimate of the return on equity at the beginning of the regulatory period is adopted. Adopting a more volatile risk free-rate proxy makes it less, rather than more, likely that the AER's return on equity estimate will be accurate at the beginning of each regulatory period. This is especially so given that the AER is unwilling to attempt to also estimate the MRP at the same point in time as the risk-free rate; and the AER's MRP term structure assumptions are the opposite to those found in the literature on the variation in the term premiums on equity (which suggests that the volatility in the 5-year risk-free rate would not be reflected in the 5-year return on equity).

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[3] On page 123 of the explanatory statement the AER states: "Matching the equity term to the length of the regulatory control period is consistent with principles of the corporate finance theory and regulatory economics." and "As the approach is consistent with principles of the corporate finance theory and regulatory economics, it is likely sustainable."

[4] For example, Dr Lally states on page 32 -33 of the concurrent evidence session 2

> *I simply pointed out that using the AER's preferred methodology for estimating the MRP, this mathematical consequence would occur. I wasn't saying that's the best MRP method to use. And in fact,* **I think I have clearly said I think the AER should be using a wide range of MRP estimation methods.**

1.2   What impact would implementation of the AER proposal have?

10.   The AER's proposal would radically alter the way NSP's equity returns behave. The 5-year risk-free rates is both more volatile and more procyclical than the 10-year risk-free rate.   The AER's draft decision essentially transfers this procyclical volatility into the equity returns investors will actually receive.

11.   The first question that needs to be asked when considering such a profound change is what the "knock-on" implications are? In particular, what are the implications for the risk to equity investors (beta) and lenders (debt risk premium (DRP)) for funding NSPs?

12.   The AER draft decision does not address these questions in any meaningful way. Rather, it assumes that the proposed radical restructuring of equity returns will have no effect on NSP's risks. In our view, this is not a safe assumption. This is because the AER's proposal will make the return on equity allowance more volatile and more procyclical. This must, axiomatically, be expected to increase with a more volatile (and procyclical) allowance for the return on equity.

1.3   Unintended/unexpected implications

1.3.1   Linking RoE to the term of the regulatory period implies capex should inefficiently crowd-out opex

13.   The AER position would have real implications for capital budgeting. The AER is implementing a reform that will lower the WACC allowance on average – which it claims more accurately reflects the actual WACC of an NSP.   The AER's own analysis suggests a series of 5-year return on equity values has been 27bp lower than the 10-year return on equity since the global financial crisis (GFC) and has been as much as 80bp lower (up to 107 bp lower if the post 1988 period is used).

14.   If NSPs' actual cost of equity is made up of a series of 5-year returns then it must be the case that NSPs should use a lower cost of equity in capital budgeting decisions. This would imply an average 27bp lower cost of equity but potentially much lower (e.g., if the yield curve is strongly positive in the early years of discounting). This, in turn, would mean that the AER should encourage a more "capex heavy" approach to network solutions.

15.   While this result follows from the AER's assumptions, it also serves to illustrate why those assumptions are problematic.   The length of time between resets is an arbitrary regulatory decision – not grounded in any real economic fact or circumstance. It is a very peculiar outcome for this arbitrary regulatory setting to have any impact on how society should assess the trade-off between incurring expenditure now versus in the future.

16. It is also relevant to ask what if the AER determined to update the return on equity annually? Would this involve the adoption of a 1 year risk free rate and imply even greater reliance on capex heavy solutions to network problems? What if the AER adopted a 15-year regulatory period? Would this make opex heavy network solutions more efficient?

17. In our view, this should not be the case and the (arbitrary) length of time between return on equity resets should have no effect on how the present value of expenditure beyond the regulatory period is assessed. If the AER disagrees, then it would be appropriate for the AER to grapple fully with the implications of this.

1.3.2 The AER's 2-factor model

18. The AER is proposing to estimate the return on equity based on both beta and the effective duration for which prices/revenues are set. If this second factor is important for regulated businesses it must also be important (and generally even more important) for unregulated businesses. That is, the AER's position is that the frequency with which regulated business's prices/revenues are reset to match prevailing market conditions is an important consideration for the estimation of the return on equity for those businesses. If so, the frequency with which unregulated business's prices/revenues are reset to match prevailing market conditions would also be an equally important consideration.

19. For example, consider two firms with otherwise identical betas but where:

    ▪ one operates in a highly competitive market where prices can be reset more or less continuously to reflect the prevailing cost of operation; and

    ▪ the other supplies services under long-term contracts such that prices are only reset to reflect prevailing costs once every 10 years on average.

20. In this situation we would expect to see CFO's adopt the AER's model for estimating different return on equity for these firms even though they have the same beta. The CFO of the firm operating in a highly competitive market should adopt a higher MRP and a shorter tenor risk free rate than the CFO of the firm with long-term contracts. Similarly, finance academics should have built up a literature demonstrating that firms who can reset prices more frequently have different risk premiums that are not explained by different betas.

21. However, to the best of our knowledge there is no evidence in the empirical literature supporting such a 2-factor model and there is no evidence that investors/valuers or CFOs act "as if" this is 2-factor model were correct.

2 Introduction

22. This report has been commissioned by the Australian Pipelines and Gas Association. We have been asked to review the AER's draft decision to set the return on equity based on a 5-year risk-free rate along with an estimate of the "5-year" market risk premium (MRP).

23. The remainder of this report has the following structure:

   ▪ Section 3 examines whether the AER's decision flows from sound finance theory/evidence. We conclude:

      ▫ The AER's approach relies on very strong implicit assumptions about the term structure of the return on equity; including the equity risk premiums. These assumptions have not been tested against the empirical evidence and are inconsistent with that evidence;

      ▫ The AER's assumptions generate specific and peculiar implications;

      ▫ The AER's assumptions are inconsistent with observed practice by professional valuers and the AER's attempt to reconcile these differences is invalid; and

      ▫ The AER's professed focus on achieving "NPV=0" outcomes at the beginning of each regulatory period is critically undermined by its naïve approach to estimating the MRP (including any term premiums in the MRP).

   ▪ Section 4 examines the impact of the AER decision on beta and debt risk premium. We conclude that both must rise as a result of the AER decision.

   ▪ Section 5 considers unintended/unexpected implications of the AER decision. Namely, that:

      ▫ The AER has put forward a 2-factor model. Firms (including unregulated firms) with the same equity beta should have different costs of equity depending on the duration of their price/revenue resetting. In particular, firms operating in highly competitive markets with the flexibility to reset prices regulatory should have a materially different return on equity to firms with the same equity beta but with revenues governed by long term contracts. and

      ▫ The AER's decision implies that NSPs should invest more in expensive capital projects today as a substitute for future opex/capex.

3 Is the AER's approach derived from sound finance theory?

3.1 The AER's approach applies strong implicit assumptions about the term structure of risk premiums

24. The AER's proposed change to the regulatory regime does not follow directly from the application of finance theory. The AER's decision relies on a much stronger set of assumptions that are not found anywhere in finance theory and that are, in fact, inconsistent with the available evidence. Specifically, the AER assumes investors have a term structure for the MRP such that:

   ▪ investors apply a higher MRP to the short run and a lower MRP to the long run;

   ▪ this term structure in the MRP is fixed through time; and

   ▪ this fixed term structure reflects the historical average difference in risk-free rates at the relevant tenors. For example, the AER assumes the 5-year MRP is above the 10-year MRP by the historical average difference in the 5 and 10-year risk-free rates.

25. These assumptions are themselves arbitrary and give rise to a number of peculiar implications. The AER does not rely on any finance literature (theoretical or empirical) justify these assumptions and, as discussed below, they are, in fact, inconsistent with that literature.

26. This is, in my view, a critical problem with the AER's proposed policy change. The AER's focus of justification for that change has been on the adoption of a 5-year risk-free rate proxy. But the AER has combined its adoption of the 5-year risk-free rate with an arbitrary set of assumptions about the term structure of the MRP. The AER has not stopped to ask whether these combined assumptions make the final estimate of the return on equity more or less accurate.

3.2 The AER's assumptions have specific and peculiar implications

27. In order that the AER's reform to make the return on equity estimate more accurate all of the AER's assumptions must be true. However, none of these assumptions are grounded in finance theory or in empirical evidence. They are, in fact, highly novel assumptions and would have extraordinary implications if they were true. For example, these assumptions imply that under typical conditions (i.e., when at the average term structure of risk-free rates):

- High beta firms will have a downward sloping term structure of return on equity; and

- Low beta firms will have an upward sloping term structure of return on equity.

28. This is because, when beta is above 1.0, as the term increases the AER's assumed lower MRP reduces the return on equity by more than the (typical) increase in risk-free rates (and *vice-versa* for low beta firms). If this were true then you would tend to see high risk firms tending to prefer long-term projects (which give them a lower discount rate) and low risk firms tending to focus on short term projects (which would have the lowest discount rates for them). This is a peculiar, and not at all intuitive, prediction of the AER's assumptions.

29. Another implication of the AER's assumptions is that if the yield curve were inverted, such that the 10 year risk-free rate was 2.0% below the 5-year risk-free rate, then a firm with a beta of 1.0 would have a 26bp lower 10-year return on equity than the 5-year return on equity for a firm with a beta of 0.7.[5] High beta firms having a lower discount rate than low beta firms is a peculiar result.

30. The fact that the AER approach implies a firm with a beta of 0.7 can have a higher return on equity than a firm with a beta of 1.0 is inconsistent with the application of the standard CAPM. This highlights the fact that the AER is no longer operating within the standard CAPM. The AER is, in fact, introducing a new 2-factor model of risk. In this model beta is only one determinant of risk with the other being the timing of cash-flows (the AER assumes near term cash-flows are higher risk than long term cash-flows.

31. I consider the support, or lack thereof, for the AER's 2-factor model in:

- Section 3.3 where I explain that if this was really how investors perceived risk, we would see very different structure of valuation reports;

- Section 3.4 where I explain that the economic literature finds the opposite conclusion to the AER. Namely, that, other things (including beta) constant, near-term cashflows are discounted at a higher equity discount rate (risk free rate plus risk premium) than long term cash-flows;

- Section 5.1 where I explain in more detail the implications of the AER's 2-factor model.

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[5] Specifically, the AER's 10-year MRP is 650bp which is 30bp below the 5-year MRP of 680bp. This implies that the firm with a beta of 1.0 has an equity risk premium (beta times MRP) that is 174bp higher than a firm with an equity beta of 0.7 (174=(1.0*650-0.7*680). But if the 10-year risk-free rate is 200bp lower than the 5-year risk-free rate then the higher risk firm will have a 24bp lower required return on equity.

3.3 The AER's attempt to reconcile its proposal with valuation practice is unsound

32. The AER's decision to alter its risk-free rate proxy and combine it with its assumptions about a term structure for MRP is both:

   ▪ not based on any empirical evidence about investor behaviour or market outcomes; but also

   ▪ is in direct contravention of the available evidence.

33. The available evidence is that investors in NSPs do not apply any term structure for the cost of equity. That evidence suggest that investors apply a long horizon equity discount rate to all cash-flows (typically based on the 10-year risk-free rate plus a long horizon MRP).

34. The AER's rationale for rejecting this evidence is entirely invalid. The AER's response is to argue that:

   ▪ when investors/valuers use a 10-year risk-free rate and MRP they are only doing so because it is a "simplification" to using the technically correct approach of using different discount rates for every year; and

   ▪ in any event, the AER's task is different to that of valuers.

35. In relation to the second point the AER attempts to distinguish its task from that of a valuer by arguing as follows:[6]

   However, we do not estimate the allowed rate of return to be used as a discount rate for a business valuation over a long investment horizon. In our building block model, by construction, the market value of a regulated business is equal to its book value, RAB, as long as we ensure NPV=0. We estimate the allowed rate of return to be able to evaluate the return on capital building block and then the maximum allowed revenue of a regulated business. Further, at any regulatory determination we only estimate a 'snapshot' of cashflows – revenue allowances for a single regulatory control period (typically, 5 years) – rather than cashflows for an entire asset life.

36. A key internal inconsistency in the above passage is that the AER seeks to distinguish the AER's task from that of valuers on the basis that valuers must look

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[6]   p. 107

out over the long run while the AER only looks out over the next regulatory period.[7] This is not a distinction reasonably open to the AER to take.

37. The AER's entire rationale to solely focus over one regulatory period is that this is what investors do/should do. The AER cannot attempt to distinguish itself from valuers on the basis that the latter look out further than the current regulatory period when it is fundamental to the AER's rationale that valuers should not do so.

38. Specifically, the basis for adopting a "5-year return on equity" estimate is premised on the assumption that the resetting of allowed rates of return every 5 years removes "risk-free rate risk" from investors beyond the end of the regulatory period.[8] On this basis, the AER concludes that it can safely assume that investors treat the RAB at the end of the regulatory period as a safe "terminal value". This is the argument upon which the AER solely relies to arrive at the conclusion that it needs a "5-year discount rate".

39. Consequently, it is not just the use of a 10-year risk-free rate in actual valuations that contradicts the AER's approach. Even more critically, it is that these valuations do not simply adopt a terminal value at the end of the next regulatory period. If the AER were correct about how investors treat regulated assets, we would expect to see valuation reports that both:

   ▪ adopt a different discount rate depending on when in the regulatory cycle a business is valued (e.g., if the valuation occurs at the beginning of yar 5 of a regulatory period the discount rate adopted should be based on a 1-year risk free rate); and

   ▪ adopt a terminal value for the business based on (but not necessarily equal to)[9] the projected RAB at the end of the regulatory period.

40. There might be other aspects of the valuation (e.g., for unregulated activities) but the above structure would be the core of the valuation for the regulated entity. The fact that real world valuation reports have no semblance of this structure is a fundamental weakness in the AER's rationale for reform. Valuers are clearly taking a very different approach to what the AER assumes (and critically relies on) as the approach that investors would take. This is a weakness in the AER logic that cannot reasonably by ignored on the grounds that there are different objectives for the AER versus valuers. Neither can it be claimed that valuers are just "approximating" the

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[7] This is not the only inconsistency in this passage. The AER's assumption of a RAB terminal value (NPV=0) is itself only possible if investors use the AER discount rate. That is, the logic is circular.

[8] P. 67, 97, 100, 101.

[9] For example, if it is believed that there will be future opex or capex outperformance this will be separately valued.

AER's correct method. The fact that valuers look beyond the end of the next regulatory period is glaring evidence that contradicts the AER's assumptions about how investors view regulated assets.

3.4 Taking account of the evidence on term structure of risk premiums

41. The available evidence in the finance literature on time variation in risk premiums and risk-free rates can be summarised as:

   ▪ Risk premiums are higher in recessions and lower in expansions;[10]

   ▪ Risk-free rates are lower during recessions.

42. These predictions of the empirical finance literature suggest that the return on equity will be relatively more stable than the risk-free rate. Lower risk-free rates in a recession will be offset, at least in part, by higher risk premiums.

43. The AER states that it is concerned about both:

   ▪ price stability; and

   ▪ achieving NPV=0 outcomes from investors perspective at the beginning of the regulatory period.

44. However, the AER's adoption of a 5-year term from the risk free rate along with a fixed 5-year MRP will further neither of these professed objectives. Prices will be more volatile due to volatility in return on equity allowances. Moreover, the return on equity allowance will be less accurate because the more volatile risk-free rate will not be offset by a MRP moving in the opposite direction to the risk-free rate (as the finance literature suggests it does). This empirical phenomenon is the basis of what the AER describes as the "Wright model".

45. However, a similar phenomenon exists in relation to the term structure of the return on equity.

   ▪ The term structure of risk-free rates is most strongly upward sloping in recessions and flatter/negative at the peak of expansions;[11] and

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[10] Hui Guo, Are Investors More Risk-Averse During Recessions? Federal Reserve of St Louis, 2006. Martin Lettau and Sydney C. Ludvigson, Measuring and Modeling Variation in the Risk-Return Trade-off Chapter 11 in Handbook of Financial Econometrics: Tools and Techniques, 2010.

[11] In a recession, short term policy rates are lowered to stimulate economic expansion – but if investors expect this to be successful, they also expect short term rates to rise once the expansion occurs. In which case, the long-term rates in a recession reflect the expected rise in short term rates – giving rise to an upward sloping yield curve. By contrast, at the peak of an expansion short term policy rates are raised above long run expectations in order to rein in inflation. This leads to a flatter or negatively sloped yield

- The term structure of risk premiums is downward sloping in recessions and upward sloping in expansions.[12]

46. This means that:

- In a recession, a strongly positive term structure of risk-free rates is offset by a downward sloping term structure of risk premiums.

- In an economic expansion, as the term structure of risk-free rates flattens/inverts so does the term structure of risk premiums.

47. The fact that the term structure of risk-free rates moves in the opposite direction to the term structure of risk premiums means that the difference between the 5 and 10-year return on equity is more stable than the difference between the 5 and 10-year risk-free rates. For example, as shown in Figure 3-1, if the term structure for risk premiums is the mirror image of the term structure for the risk-free rate, then a perfectly flat term structure for the return on equity exists no matter what the term structure of risk free rates.

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curve. RBA, Bonds and the Yield Curve.
https://www.rba.gov.au/education/resources/explainers/bonds-and-the-yield-curve.html. "In an expansion there is a greater likelihood that future interest rates will be higher than current interest rates, because investors will expect the central bank to raise its policy interest rate in response to higher inflation ... An 'inverted' shape for the yield curve is where short-term yields are higher than long-term yields, so the yield curve slopes downward. An inverted yield curve might be observed when investors think it is more likely that the future policy interest rate will be lower than the current policy interest rate."

[12]   Ravi Bansal , Shane Miller, Dongho Song, Amir Yaron, The Term Structure of Equity Risk Premia, Journal of Financial Economics (2021), doi:https://doi.org/10.1016/j.jfineco.2021.05.043. The authors state: "*Regardless of specification, we find that risk premia slope upwards in expansions and downwards in recessions. The results for the unconditional moments are similar*".

Figure 3-1: Illustration of flat RoE term structure irrespective of RFR term structure (RFR term structure is from November 2008)
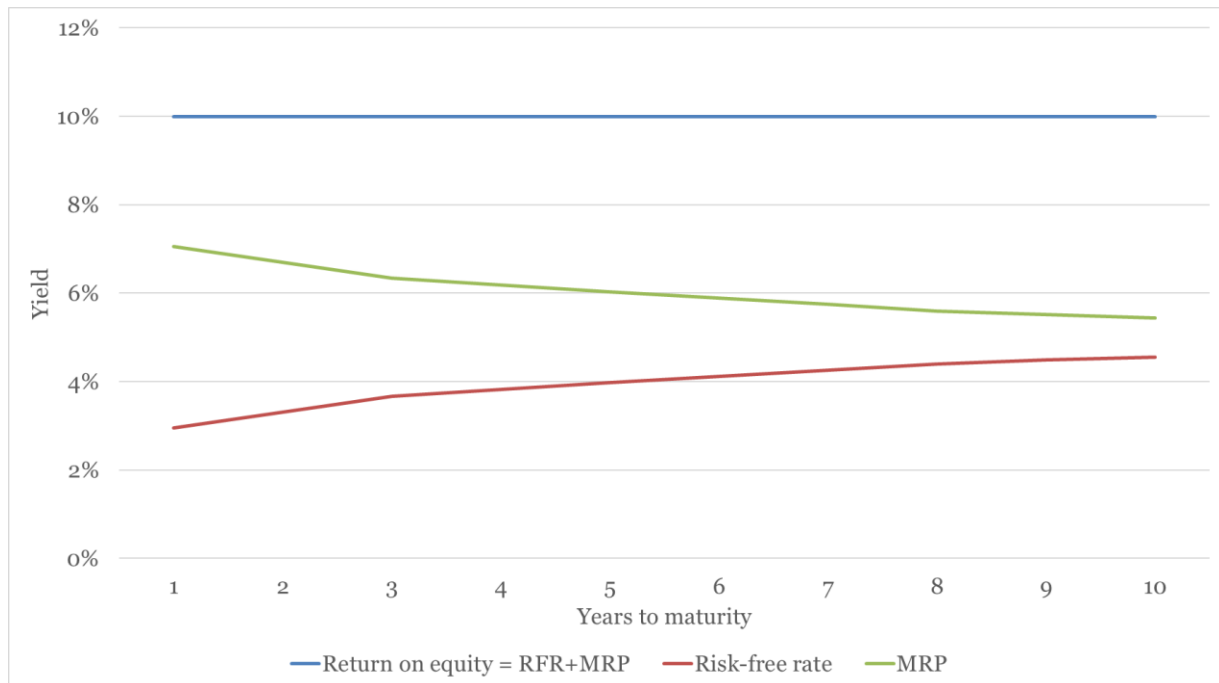
48. Moreover, the literature finds that the average term structure for the return on equity is downward sloping – implying that higher risk premiums at shorter horizons more than offset lower risk-free rates at shorter horizons. Weber (2018) summarises the literature and his contribution as follows:[13]

> *The term structure of equity returns is downward-sloping. van Binsbergen et al. (2012) show that a synthetically created short-term asset that only pays dividends in the near-term future has higher returns than the market index, which is a claim to the stream of all future dividends.*
>
> *...*
>
> *My findings complement and extend evidence in van Binsbergen, Brandt, Koijen, 2012, van Binsbergen, Hueskes, Koijen, Vrugt, 2013, who use dividend futures and strips with maturities of up to 10 and a sample period of 12 years. Similar to their work, I find high average returns and volatilities at the short end of the term structure, lower CAPM betas for short duration assets, and the value factor explains only part of the return*

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[13]   Weber M., *Cash flow duration and the term structure of equity returns*, Journal of Financial Economics Volume 128, Issue 3, June 2018, Pages 486-503.

*difference between low- and high-duration stocks. I complement their
work because my cross-sectional data allow me to study longer duration
assets and a longer sample period. The average duration at the stock level
is 19 years in my sample from 1963 to 2014, and ranges between 6 and 24
years at the portfolio level.*

49.   This literature is briefly summarised in Appendix B. A downward sloping return on
equity implies that the term structure for risk premiums more than offsets the term
structure for the risk free rate – as illustrated in the next figure.

**Figure 3-2: Illustration of downward RoE term structure with upward
sloping RFR term structure (from November 2008)**
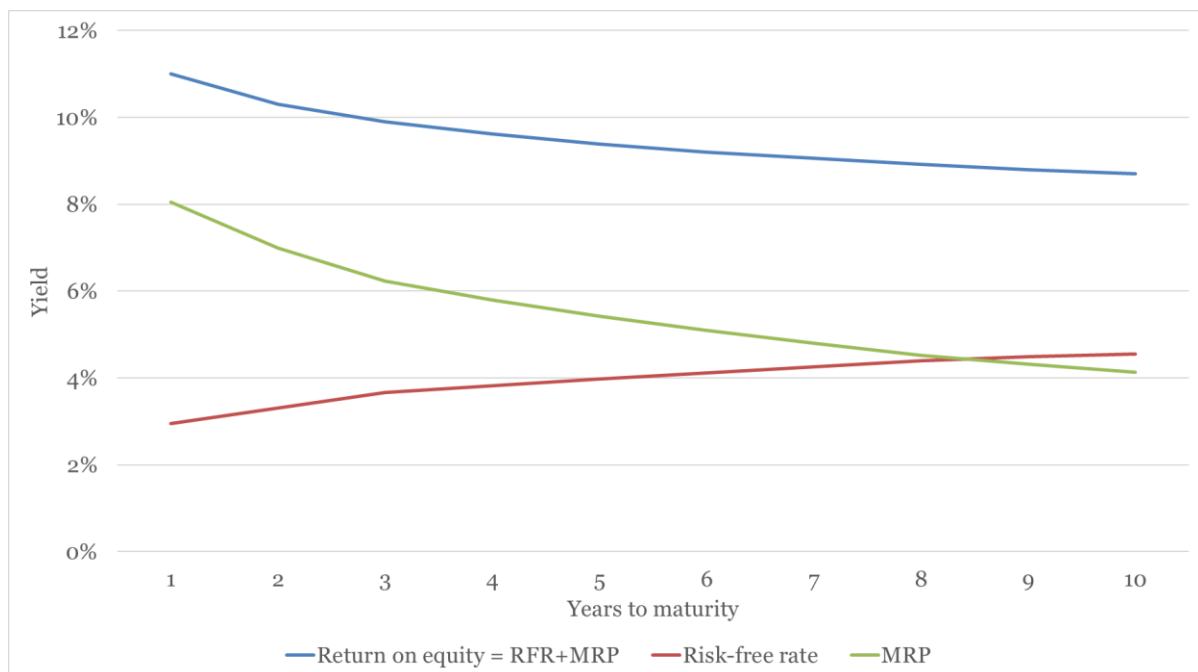
50.   The AER's entire rationale for using a 5-year risk free rate is that, in essence, the
regulatory regime turns NSPs into short duration assets (such that investors would
solely focus on earnings over 5-years and would apply a "safe" terminal value at 5-
years). In addition, the way that the AER has set the term structure for the MRP
has the effect, for typical risk-free rate term structures, of estimating a lower return
on equity for NSPs at 5-years than at 10-years. By the AER's own estimation, its
approach would have reduced the allowed return on equity by 10/27 bppa since
1988/2010.

51.   However, the empirical finance literature suggests that investors discount near-
term equity earnings at a higher rate than they do longer-term equity earnings.
Moreover, as explained in the quote from paragraph 48, this is despite lower betas

for short duration assets.[14] This is the opposite of the AER's proposal which is to reduce the average compensation to NSPs on the assumption (arrived at without any recourse to the empirical literature) that the term structure for risk premiums is upward sloping and is fixed through time.

52. In reality, and as noted above, the historical average term structure for equity is downward sloping which implies that the historical average term structure for the MRP is downward sloping by more than the term structure on risk-free rates is downward sloping. Moreover, that term structure on the MRP is not fixed but, rather, moves in the opposite direction to the term structure on risk-free rates. This makes the return on equity at short durations less volatile than the risk free rate at short durations.

53. Valuation experts' practice of using a stable return on equity (based on a long term risk-free rate that looks out across the economic cycle) is consistent with this literature. That is, adopting return on equity that does not have a term structure is consistent with the literature that finds any equity risk term structure tends to move counter to movements in the risk-free rate term structure.[15]

54. By contrast, the AER's proposal will tend to result in less accurate estimates of the cost of equity. This is because the AER is proposing to hold the term structure of the MRP constant and adopt a much more volatile and procyclical risk-free rate proxy (see section 4). This will mean the relative to the 10-year estimates, the AER's 5-year estimates will underestimate the true return on equity by even more in recessions and overestimate the return on equity by even more during strong expansions.

55. By way of illustration, applied retrospectively the AER's method would have:

   ▪ in November 2007, during the mining boom, estimated the 5-year RoE for an NSP was **52bp higher** than the 10-year RoE;[16] and

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[14] It should be noted that both the AER and the literature are treating "term" as an additional factor to beta. The AER estimates different returns for different terms and the same beta. In the literature, excess returns are estimated after accounting for beta risk.

[15] If valuation experts were to use a range of different risk-free rates (as the AER believes that they should) they would need to pair these with a carefully calibrated set of equity risk premiums – one for every tenor risk-free rate used. Moreover, the level and term structure of the risk premiums would need to vary through time and would need to be the inverse shape to the term structure of the risk-free rates. There is no reason to believe that this would be materially different to simply estimating a single equity discount rate.

[16] The 5-year risk-free rate was as high as 34bp above the 10-year risk-free rate in November 2007. The AER's proposed method would, applied retrospectively, have compounded this by assuming the 5-year MRP was 30bp higher than the 10 year-MRP. The effect of this would have been an estimated market return on equity that as 64bp higher at 5 years than at 10-years (and a 48bp higher return on equity for an NSP with an equity beta of 0.6)

- in November 2008, during the GFC, estimated the 5-year RoE for an NSP was **48bp lower** than the 10-year RoE. [17]

56. These time periods illustrate how much more unstable the return on equity allowance using a 5 year risk-free rate can be than when using a 10 year risk free rate.

Figure 3-3: November 2007 to November 2008 swings in AER RoE term structure
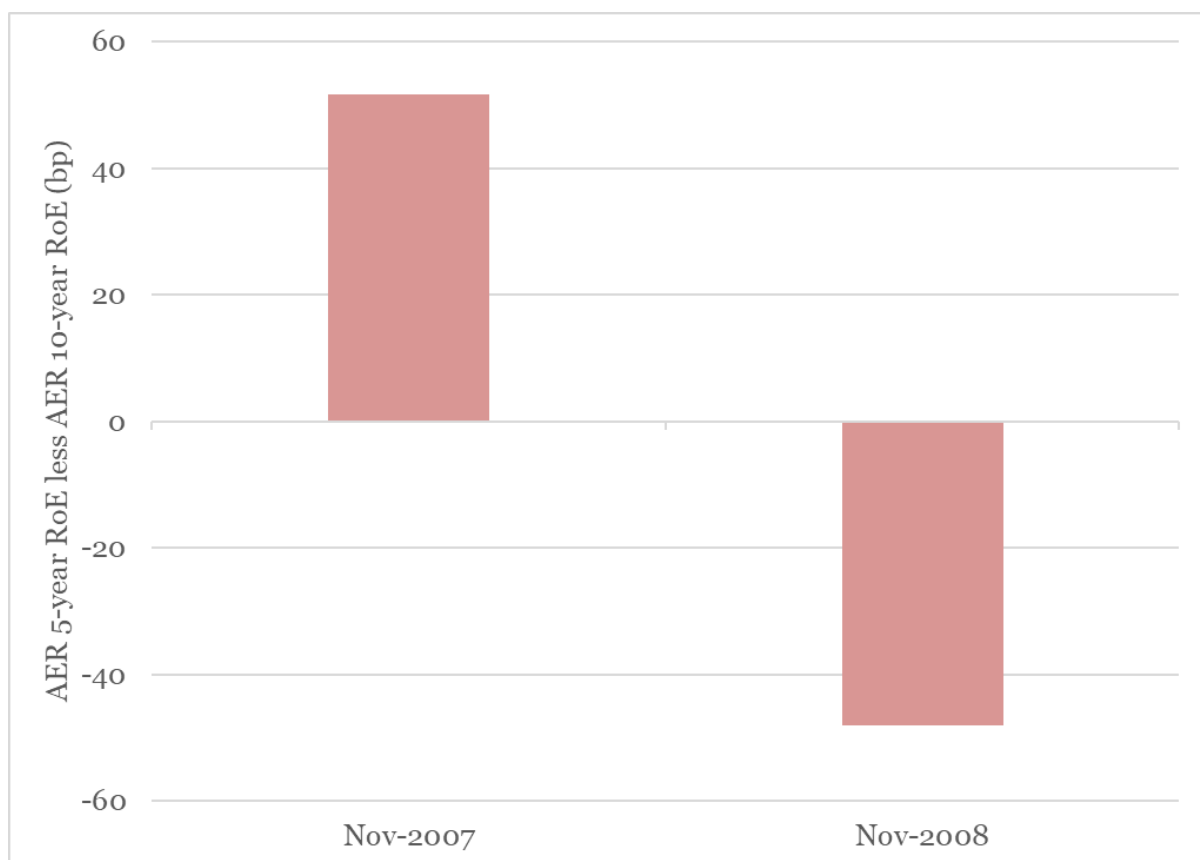
Source: CEG analysis

57. This is a more than 100bp change in the AER's estimate for the 5-year return on equity relative to the 10-year return on equity in just 12 months. Moreover, over this 12 month period the AER's 10-year return on equity fell by over 100bp itself. In other words, the AER's 5-year return on equity would have fallen by more than 200bp over this period and this would have been double the fall in the 10-year return on equity.

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[17]   The 5-year risk-free rate was as high as 66bp above the 10-year risk-free rate in November 2008.

Figure 3-4: November 2007 to November 2008 swings in AER RoE

Source: CEG analysis

58. This is not a one-off illustration. As can be seen in Figure 4-3 and Figure 4-4 in section 4 below there are many other instances of wild swings in the difference between the AER's 5 and 10-year return on equity estimates (for example, a roughly 70b change from 2020 to 2021).

59. We consider that, before introducing such radical volatility into the AER's return on equity allowance the AER should consider whether it is consistent with the economic literature. The evidence that we have reviewed suggest that this volatility in the estimate of the 5-year return on equity would materially overstate the volatility in the true return on equity. This is because the term structure in equity premiums likely moves to offset changes in the term structure for risk-free rates. This literature is consistent with the observed standard practice of valuers using a more stable 10-year risk-free rate to estimate a return on equity that is, to a first approximation, free of any term structure.

3.5 NPV=0 requires an accurate estimate of the RoE (which includes the MRP) not the RFR

60. The AER's rationale for altering the term of the risk-free rate from 10-year to 5-years will better ensure an "NPV=0" outcome (where an NPV=0 outcome requires that the AER set the return on equity allowance consistent with the discount rate that investors use to value equity flows). However, the AER's concern for achieving

an "NPV=0" outcome does not extend to any genuine analysis of how to pair this more volatile risk-free rate proxy (see section 4.1) with an MRP that will more accurately estimate the return on equity.

61. Instead, the AER has simply assumed that it can make a naïve adjustment to the 10-year MRP. Specifically, the AER simply assumes that it can estimate a 5-year MRP by adding the historical difference between 5 and 10-year risk-free rates (in its estimation, 30bp) to the 10-year MRP. For all the ink spilled by the AER on why "NPV=0" requires it to adopt the volatile value for the 5-year risk-free rate at the beginning of each regulatory period, the AER:

   ▪ outright rejects any attempt to estimate the MRP at the same time, and in the same market conditions, as the volatile 5-year risk-free rate is estimated; and

   ▪ does not consider or investigate the literature that suggests that any term-structure in risk premiums varies such as to at least partially "cancel out" the volatility in the term structure of risk-free rates.

62. Indeed, prioritising "NPV=0" at the beginning of each regulatory period would imply a focus on the context specific MRP before any change from the 10 to the 5-year risk-free rate was considered. However, if the AER was determined to adopt the more volatile 5-year risk-free rate, this would make it even more critically important to pair this with a context specific MRP estimate.

63. In our view, the credibility of the AER's professed desire to achieve "NPV=0" outcomes by adopting a 5-year risk-free rate is seriously undermined by both: its unwillingness to attempt to estimate the MRP at the same point in time; and its failure to even consider the potential that the volatility in the 5-year risk-free rate would not be reflected in the 5-year return on equity.

3.6 Conclusion

64. In summary, we conclude:

   ▪ The AER is wrong to claim that its approach necessarily follows from sound finance logic. It does not.

   ▪ For the AER's approach to be correct very strong assumptions need to be made about the term structure of the MRP that have no grounding in the theoretical or empirical finance literature and which, if true, would have very unusual implications more generally; and

   ▪ The available evidence on investors' actual practice and in the empirical literature is inconsistent with the AER's assumptions.

4 Impact on beta and debt risk premium

65. The AER's proposal would radically alter the way NSP's equity returns behave. When considering such a profound change, the first question that needs to be asked is what are the knock-on implications? In particular, what are the implications for the risk to equity investors (beta) and lenders (DRP) of funding NSPs?

66. The AER draft decision does not address these questions. Rather, it assumes that the proposed radical restructuring of equity returns will have no effect on NSP's risks. In our view, this is not a safe assumption and, in fact, beta and credit risk must be expected to increase.

4.1 Impact on beta risk

67. This follows axiomatically from the fact that the 5-year risk-free rate is more volatile than the 10-year risk-free rate and it is more procyclical than the 10-year risk-free rate. By linking NSP equity returns to the 5-year risk-free rate the AER will, therefore, make the allowed return on equity both more volatile and more procyclical. This must be expected to increase the beta risk attached to earning those returns.

68. The higher volatility and higher procyclicality of shorter versus longer term risk-free rates is obviously true. Short term risk-free rates reflect short term market conditions at any given point in the economic cycle. Longer term risk-free rates reflect average expected conditions over the economic cycle. This means that short term risk-free rates are both:

  ▪ more volatile; and

  ▪ that volatility is strongly procyclical (e.g., short term risk-free rates will fall more strongly in a recession and rise more sharply in a boom).

69. From the perspective of an equity investor, the AER's proposed reform makes it certain that when their equity allowance is reset during:

  ▪ a recession then that allowance will be strongly lower than average; and

  ▪ a boom then that allowance will be strongly higher than average.

70. By making equity allowances more strongly procyclical the AER's proposed reform must be expected to increase equity beta. Brealey, Myers and Allen, *Principles of*

Corporate Finance, is a leading finance textbook. When explaining the determinants of asset betas, the authors first describe cyclicality in demand:[18]

> ### *What Determines Asset Betas?*
>
> ***Cyclicality*** *Many people's intuition associates risk with the variability of earnings or cash flow. But much of this variability reflects diversifiable risk. Lone prospectors searching for gold look forward to extremely uncertain future income, but whether they strike it rich is unlikely to depend on the performance of the market portfolio. Even if they do find gold, they do not bear much market risk. Therefore, an investment in gold prospecting has a high standard deviation but a relatively low beta.*
>
> *What really counts is the strength of the relationship between the firm's earnings and the aggregate earnings on all real assets. We can measure this either by the earnings beta or by the cash-flow beta. These are just like a real beta except that changes in earnings or cash flow are used in place of rates of return on securities. We would predict that firms with high earnings or cash-flow betas should also have high asset betas.*
>
> ***This means that cyclical firms—firms whose revenues and earnings are strongly dependent on the state of the business cycle—tend to be high-beta firms***. *Thus you should demand a higher rate of return from investments whose performance is strongly tied to the performance of the economy. Examples of cyclical businesses include airlines, luxury resorts and restaurants, construction, and steel. (Much of the demand for steel depends on construction and capital investment.) Examples of less-cyclical businesses include food and tobacco products and established consumer brands such as J&J's baby products.* (Emphasis added.)

71. The coefficient of variation (the standard deviation divided by the mean) for 5-year and 10-year risk-free rates can be used to illustrate the higher volatility of 5-year versus 10-year risk-free rates.

Equation 1: Coefficient of variation (CV)

$$CV = \frac{\sigma}{\mu}$$

Where: σ = standard deviation of the series, μ = mean of the series.

72. Table 4-1 below compares the CV of the 5-year CGS and 10-year CGS.

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[18]   Brealey, Myers and Allen, Principles of Corporate Finance, 10th Edition, McGraw-Hill Irwin. 2011, p. 222.

Table 4-1: CV of 5-year CGS yield vs 10-year CGS yield

	5-year CGS	10-year CGS	Percentage difference [(5-year less 10-year)/10-year]
CV since 1972	56%	52%	7%
CV since 1988	60%	54%	11%
CV since 2000	49%	41%	18%
CV since 2010	55%	45%	22%

Source: RBA, CEG analysis

73. We have sourced the monthly 5-year and 10-year CGS yield from the RBA.[19] The CVs (thus both standard deviation and mean) are calculated since January of the relevant year to June 2022.

74. It can be seen in Table 4-1 above that the CV for the 5-year CGS is consistently higher than the 10-year CGS across different periods. Moreover, the relative difference between the two is increasing over time. With the 5-year CV being 11% higher for the data since 1988 and 22% higher since 2010.

75. This demonstrates the materially higher volatility of the 5-year risk-free rate than the 10-year risk-free rate.

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[19]   Capital Market Yields – Government Bonds – Monthly – F2.1 , https://www.rba.gov.au/statistics/tables/

Figure 4-1: 5-year rolling coefficient of variation for 5-year and 10-year CGS
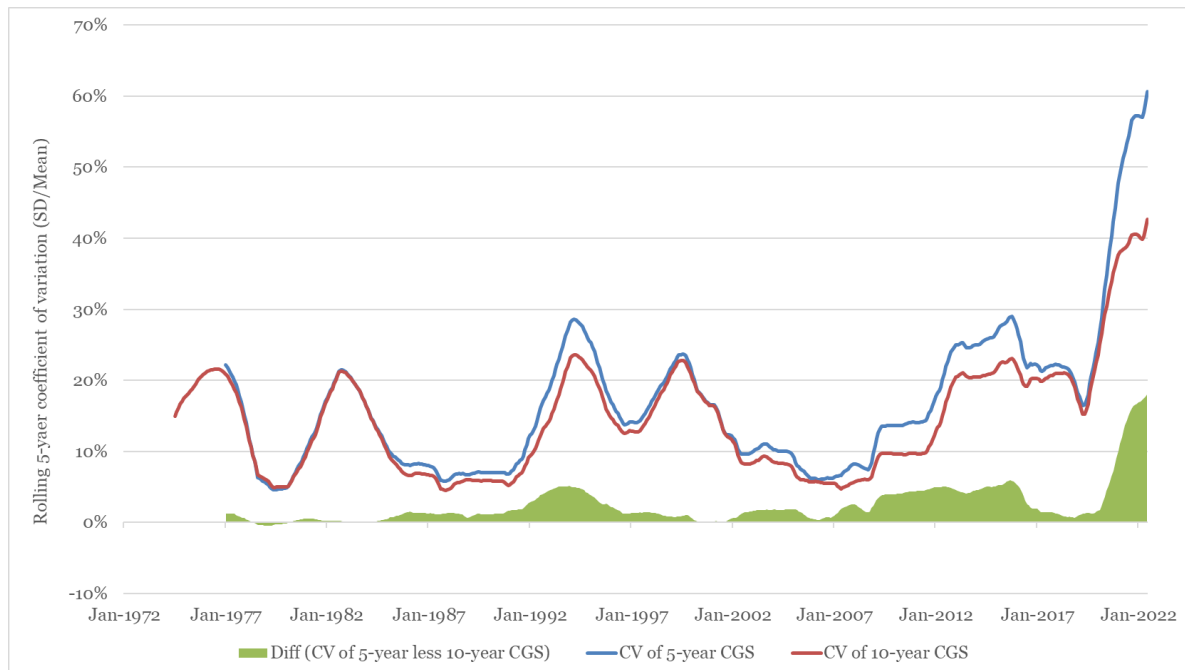
Source: RBA, CEG analysis

76. The greater procyclicality of the 5-year rate can be illustrated by estimating the relationship between the RBA cash-rate and the 5-year and 10-year rates.

77. Since 1990, the RBA has set a target for the cash rate as part of its monetary policy.[20] The change in cash-rate target is a response to the change in economic conditions (a higher cash-rate implies improving economic conditions and vice-versa). Changes in the cash-rate is a month-to-month measure of changes in the RBA's assessment of the underlying strength of the economy.

78. Table 4-2 and Figure 4-2 below show the relationship between the percentage change in the cash rate target[21] (excluding months where the cash rate target was unchanged) and the percentage change in 5-year and 10-year CGS (not to be confused with the change in percentage points). The time periods shows are since August 1990 (earliest available) and since 2000.[22] We have also included sensitivity analysis by calculating percentage changes with periods of various length.

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[20] https://www.rba.gov.au/monetary-policy/about.html

[21] Monthly average cash rate target is sourced from the RBA table F1.1, https://www.rba.gov.au/statistics/tables/

[22] Monthly average cash rate target is sourced from the RBA table F1.1, https://www.rba.gov.au/statistics/tables/

Table 4-2: Regression analysis between percentage change in 5-year and 10-year CGS vs RBA's cash rate target (monthly data of percentage changes with various length)

Period	N-monthly/ yearly % change	Regression coefficient for the 5-year CGS	Regression coefficient for the 10-year CGS	Ratio between 5- and 10-year CGS
Aug 1990 (earliest) to Dec 2021	1-monthly	0.293	0.086	3.39
	6-monthly	0.319	0.125	2.55
	1-yearly	0.348	0.196	1.78
Jan 2000 to Dec 2021	1-monthly	0.298	0.077	3.85
	6-monthly	0.292	0.074	3.95
	1-yearly	0.279	0.101	2.76

Source: RBA, CEG analysis

79.   Entirely as expected, the results in this table suggest the 5-year risk-free rate is around three times as sensitive to changes in the RBA's policy rate as the 10-year risk-free rate. The above regression results, for 1-monthly data, are visualised in Figure 4-2 below.

Figure 4-2: Percentage change in 5-year and 10-year CGS vs RBA's cash rate target


Monthly % change from August 1990 (earliest) to December 2021
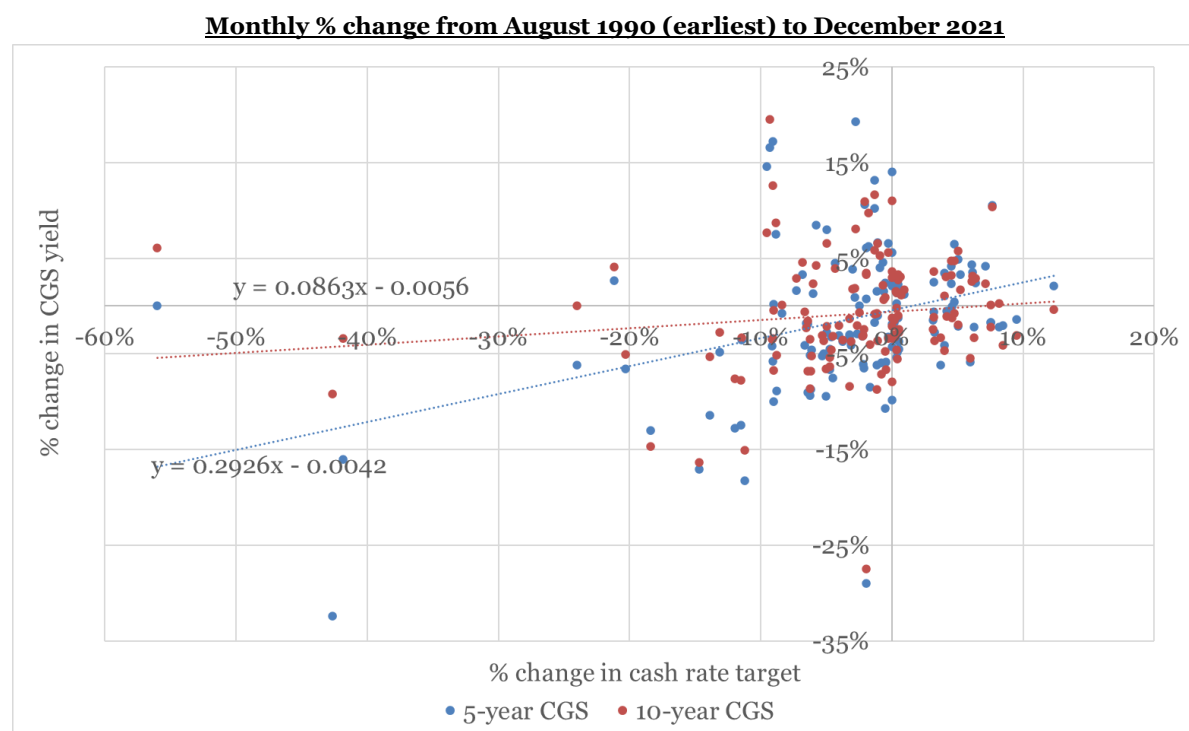
Source: RBA, CEG analysis

80. It can be seen that the 5-year rate is materially more sensitive to the policy rate than the 10-year rate. When the policy rate falls/rises the 5-year rate falls/rises by around 3-times the change in the 10-year rate.

81. The same sort of analysis shows similar results when comparing the relationship between 5 and 10-year rates and stock market returns. Changes in the 10-year rate have only a small positive relationship with stock market returns. However, changes in 5-year rates have a much stronger relationship. See Appendix A.

82. Procyclicality can also be demonstrated in other ways. Below is a marked-up version of the AER's Figure 6.3.

Figure 4-3: Reproduction of Figure 6.3 in the AER draft rate of return instrument

Figure 6.3 Difference between return on equity based on 5-year and 10-year CGS yields, 1988 to 2022
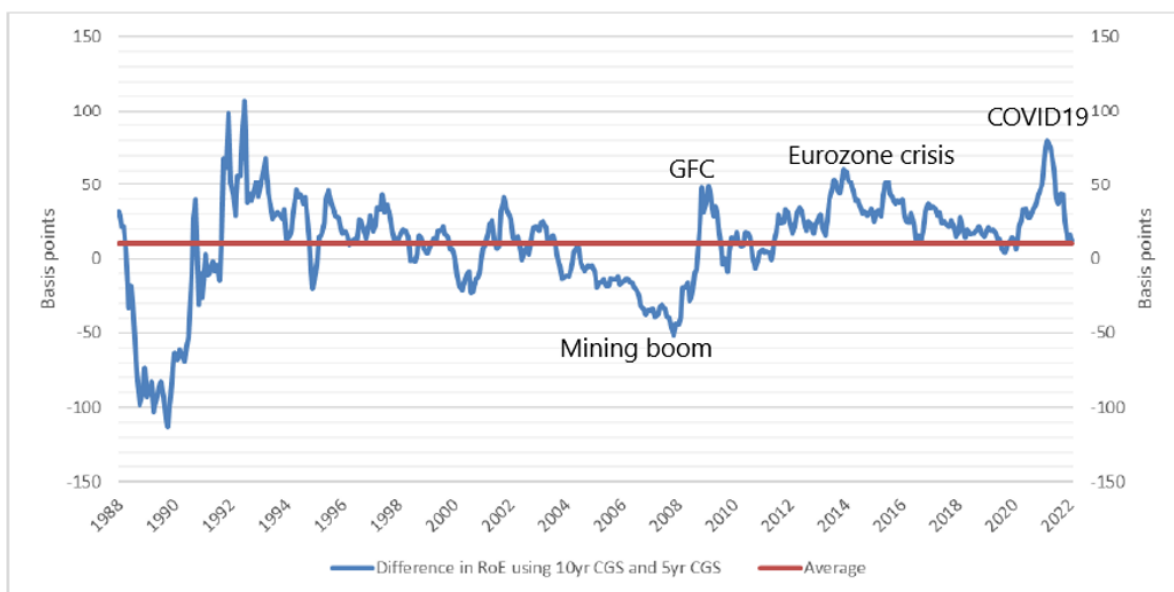
Source: RBA; ASX; Brailsford, T., Handley, J. C., & Maheswaran, K. (2012). The historical equity risk premium in Australia: Post-GFC and 128 years of data. *Accounting and Finance*, 52(1), 237-247; AER calculations.

Source: AER

83. The blue line measures the compensation when using the AER's current approach less its proposed approach. That is, a negative value implies the AER's proposed approach would increase compensation and a positive value implies it would reduce compensation. This chart nicely illustrates the procyclical nature of the AER's proposed approach:

- During the mining boom the AER's proposed approach would have increased compensation;

- But the AER's proposed approach would have decreased compensation the most, during:
  - The global financial crisis (GFC);
  - The Eurozone crisis;
  - The 2020/2021 period of the COVID-19 pandemic.

84. For completeness, Figure 4-4 superimpose rolling 2.5 year GDP growth (demeaned) on the AER's estimate of the difference in compensation. It can be seen that the AER's proposed estimation of the rate of return on equity would have materially reduced compensation in periods where GDP growth had been the most below average and vice versa. There are two panels in Figure 4-4 the first is for data from 1988 to 2022 (being the same period the AER shows). The second is for all data from 1972 (the longest time period the RBA publishes for its 5 and 10 year series).

85. These figures show that compensation is reduced the most (when the dark blue line is the most positive) at times that tend to be when GDP growth (light blue line) has been at the lowest. Similarly, the periods when the AER's method would have raised compensation (the late 1980s boom and the 2004-2008 mining boom) is precisely when GDP growth is at its highest. In both figures the correlation coefficient between the series is around -0.5.

Figure 4-4: AER Figure 6.3 vs rolling GDP growth
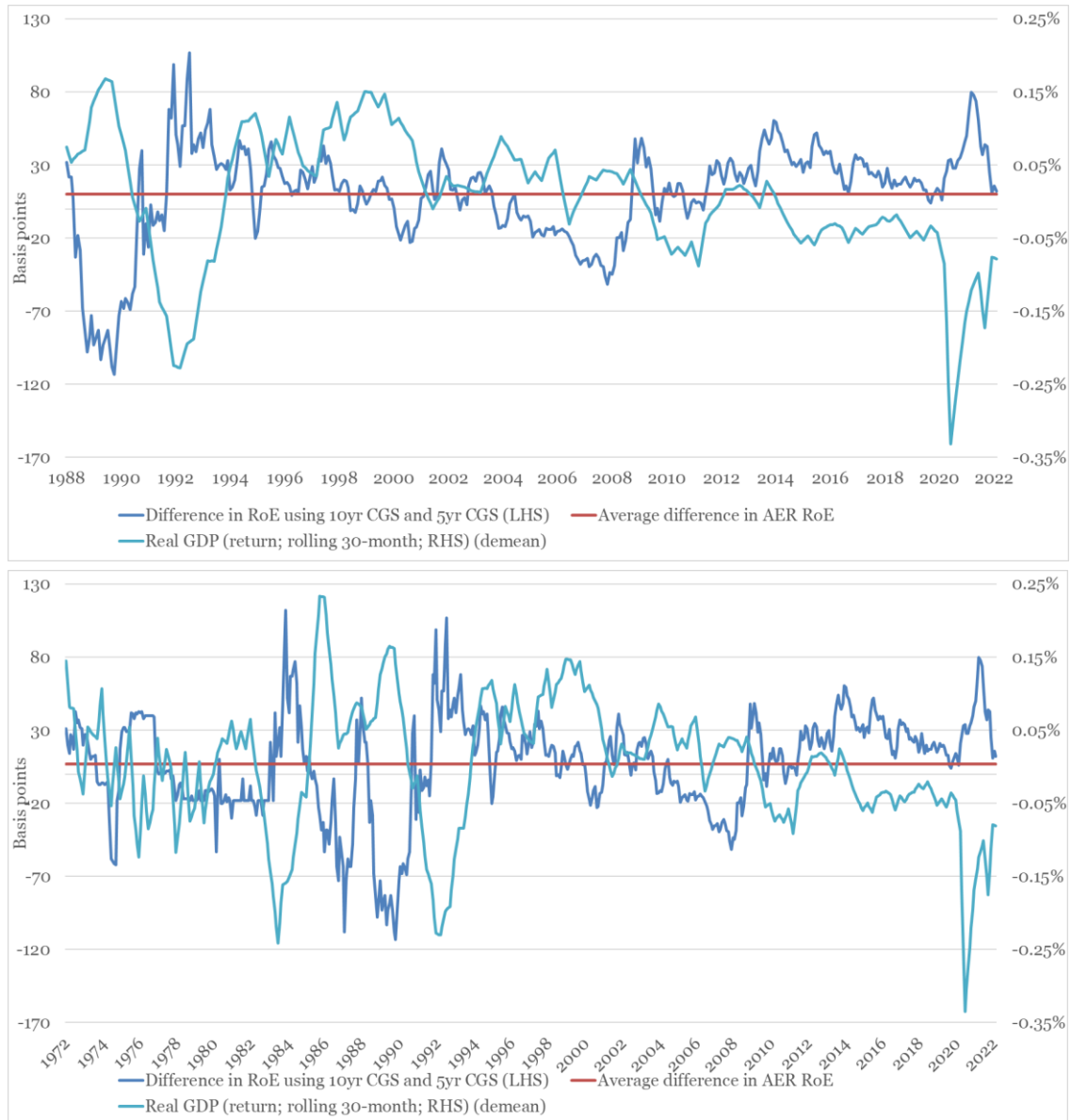
4.1.1 AER incorrectly describes expert views

86. The AER incorrectly states (emphasis added):

> *In terms of the CAPM parameters, we need to ensure that the MRP is estimated consistently with our assumptions about the benchmark term of return on equity. We do not consider that a change to the estimation method of equity beta is required.* **This view is consistent with the views of our experts** *and the CRG's submission.[213]*

213 AER, *Concurrent evidence session 2 – Proofed transcript, February 2022, pp. 9–10; CRG, Rate of Return Instrument information paper – Submission, 11 March 2022, pp. 60-–61.*

87. This is not an accurate description of the expert panel discussion. In particular, on pages 15 to 17 of the transcript I explained:

   ▪ When the risk-free term structure was consistent with its historical average, that the AER's proposed approach would have:

      ▫ no effect on the estimated return on equity for a firm with a beta of 1.0

         ▫ the effect of lowering the estimated return on equity for a firm with a beta of less than 1.0;

   ▪ That this would likely lead to an increased bias relative of the true cost of equity for firms with beta less than 1.0.

88. Mr Kumareswaran then expressed agreement with my views (transcript page 18).

89. On page 33 of the transcript, I reiterated this point.

   I think that is important context. If the AER does maintain its current approach to setting the market risk premium … we have to think about what the AER might be doing in adopting a five-year term in the context of everything else that it does and ask whether that makes things better or worse.

90. My view, as clearly expressed earlier, was that if the AER did not raise beta for NSPs it would be making things worse.

91. Dr Lally, who is the primary expert proponent of the use of a 5-year risk free rate had this to say about beta (transcript page 30).

   And I further said that the five-year risk free rate, that is easy to observe. The five-year MRP, well, you can estimate a five-year MRP as opposed to a 10-year MRP. So that is kind of doable. But with the betas, it's pretty hard getting a reasonable answer. How that answer differs over five and 10 years, I don't know.

92. Dr Lally is not expressing a view that the beta associated with a 5-year risk free rate will be higher than that associated with a 10-year risk free rate. However, he is categorically not expressing the view the AER attributes to the experts that no change to the estimation method of equity beta is required.

4.2   Impact on borrowing costs and credit rating risk

93. The proposed change must also be expected to raise borrowing costs.

94. The AER's proposed approach can be expected to reduce the return on equity allowance. The AER estimates this impact as 27bppa based on average data since the global financial crisis.[23] The return on equity allowance is the equity buffer that lenders to an NSP rely on to absorb shocks to the NSP cash-flow without causing default. The smaller this buffer the higher the risk to lenders and, therefore, the higher the debt risk premium they will demand.

95. A 27bppa reduction in the equity buffer is a non-trivial impact and can be expected raise perceived credit risk for lenders. Although the exact quantum of this impact is difficult to estimate it is reasonable to assume that a reduction in the equity buffer of this magnitude would raise the debt risk premium by a noticeable amount (e.g., by more than one or two basis points).

96. Certainly, a reduction in the equity buffer by 27bppa will negatively affect NSP credit metrics as used by the ratings agencies. In this regard, it is important to note that the backloading of compensation for inflation within the regulatory regime means that the actual "cash" equity buffer available to an NSP is already materially lower than the nominal return on equity allowance (and has, in the past, been negative).

97. Moreover, 27bppa is an average and the impact for any given regulatory period is likely to be materially different to the average. As already described, the AER's proposed approach will make equity allowances more volatile and harder for debt lenders to predict. Holding 10-year debt issued by an NSP will typically expose the lender to two regulatory resets. That is, a NSP will undergo 2 resets over the typical loan period for a 10-year bond.

98. Finally, we note that, while a lender is mainly focussed on the risk of default, they are also concerned about when a default might occur. That is, a default in a recession is worse for a lender than a default in an economic boom because this adds beta risk to the overall default risk. The AER's proposal would have the effect of reducing the equity buffer by the most during recessions (when the 5-year risk-free rate is most depressed relative to the 10-year risk-free rate). This means that not only would the AER's proposal increase default risk but it would do so in a way that increases the debt beta associated with lending to NSPs; further increasing the debt risk premium lenders would require.

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[23]   AER Explanatory Statement for Draft Rate of Return Instrument 97, p.98.

5 Unrealistic further implications of AER assumptions

5.1 AER is proposing a 2-factor model with no support in the literature

99. The AER's is proposing a new 2-factor model to explain equity returns and investor discount rates. Under the simple 1-fctor CAPM the return on equity is the same for all firms that have the same beta. By contrast under the AER's 2-factor model equity returns are explained by both:

   ▪ Beta; and

   ▪ The duration over which prices/revenues are set.

100. Of course, the AER has limited its application of this 2-factor model to regulated NSPs. However, if this second factor is important for regulated businesses it must also be important (and generally even more important) for unregulated businesses. That is, if the AER's views are correct for NSPs then the frequency with which unregulated business's prices/revenues are reset to match prevailing market conditions would also be an equally important consideration.

101. For example, consider two firms with otherwise identical betas but where:

   ▪ one operates in a highly competitive market with free entry and exit and where prices are reset more or less continuously to reflect the prevailing cost of operation; and

   ▪ the other firm operates in a market with high barriers to entry and supplies services under long-term contracts such that prices are only reset to reflect prevailing costs once every 10 years on average.

102. Under the AER's 2-factor model, investors would treat these firms very differently as summarised in Table 5-1 below. Under the AER's 2-factor model has a number of implications. For example, imagine that:

   ▪ the term structure of risk-free rates is positive such that the 10-year rate is **2.0% higher** than the short term rate (Panel B of Table 5-1). In that case a beta=0.5 firm with frequent price reset powers would have cost of equity that is **1.55% lower** than a beta=0.5 firm with long-term contracts; or

   ▪ the term structure of risk-free rates is negative such that the 10-year rate is **2.0% lower** than the short term rate (Panel C of Table 5-1). In that case a beta=0.5 firm with frequent price reset powers would have cost of equity that is **2.45% higher** than a beta=0.5 firm with long-term contracts.

103. That is, the AER 2-factor model implies that two firms with identical 0.5 betas will have a relative change in the return on equity of 400bp when the term structure of interest rates changes from positive 20bppa slope to negative 20bppa slope. This is one of many unusual implications of the AER 2-factor model. Some others are set out in Table 5-1 below.

Table 5-1: Implications of AER's 2-factor model

Pricing duration	Short time scale	Long time scale	Difference
MRP	7.4%*	6.5%	
Panel A: Scenario with historical average risk free rate term structure			
RFR	3.0%	3.9%	
RoE (Beta = 1.5)	14.1%	13.7%	-0.45%
RoE (Beta = 1.0)	10.4%	10.4%	0.00%
RoE (Beta = 0.5)	6.7%	7.2%	0.45%
Panel B: Scenario higher than historical average risk free rate term structure			
RFR	3.0%	5.0%	
RoE (Beta = 1.5)	13.1%	14.8%	0.65%
RoE (Beta = 1.0)	9.4%	11.5%	1.10%
RoE (Beta = 0.5)	5.7%	8.3%	1.55%
Panel C: Scenario lower than historical average risk free rate term structure			
RFR	5.0%	3.0%	
RoE (Beta = 1.5)	16.1%	12.8%	-3.35%
RoE (Beta = 1.0)	12.4%	9.5%	-2.90%
RoE (Beta = 0.5)	8.7%	6.3%	-2.45%

* The AER does not explicitly estimate an MRP at a price reset frequency of 3 months or shorter. However, based on the AER logic for estimating the 30bp difference between a 10 and 5 year MRP (being the historical average difference in 5 and 10 year risk-free rates) the 3 month MRP would be around 90bp higher than the 10-year MRP.

104. The results in Panel A can be shown graphically. In this panel, the 10-year risk-free rate is 90bp higher than short horizon risk free rate. The AER 2-factor model predicts that for firms with beta=0 the firm with a short horizon will have a 90bp lower return on equity. However, as the assumed beta rises the firm with the short horizon's return on equity rises relative to the firm with the longer horizon. When

beta is above 1.0 then the relativities flip – with the short horizon firm having a higher return on equity than the long horizon firm.

Figure 5-1: Graphical illustration of Panel A
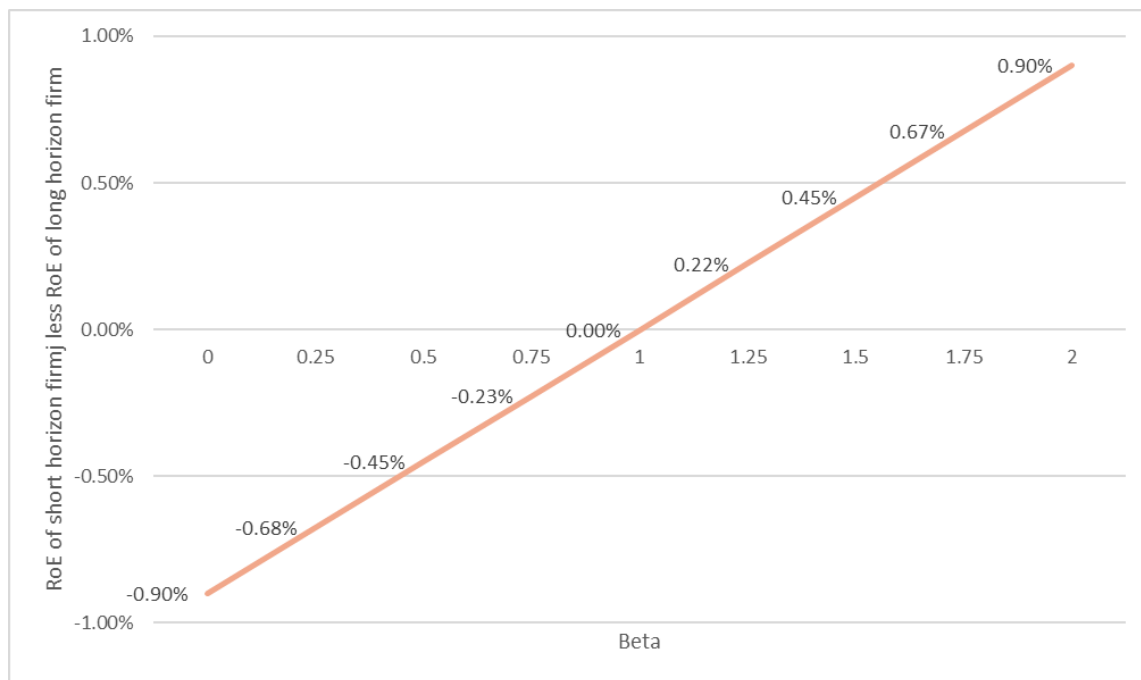
Panel A assumes 10 year risk free rate is 90bp above short term risk free rate which is the same as the difference in MRP (based on historical average difference in risk-free rates).

105. If the AER 2-factor model correctly described how investors set their return on equity then we would expect to see strong evidence that reflected the dramatic implications of the model.

106. We would expect to see CFO's adopt the AER's model for estimating different return on equity for firms even though they have the same beta. The CFO of the firm operating in a highly competitive market should adopt a much shorter risk free rate and a higher MRP than the CFO of the firm with long-term contracts.

107. Similarly, finance academics should have built up a literature demonstrating that firms with more frequent pricing resets have different risk premiums and have returns that are more sensitive to short-term risk-free rates than firms with revenues governed by long-term contracts

108. However, to the best of our knowledge there is no evidence in the empirical literature supporting such a 2-factor model and there is no evidence that investors/valuers or CFOs act "as if" this is 2-factor model were correct.

5.2 Capital budgeting/planning over 40 years should use a series of 5-year RoEs

109. A further critical implication of the AER's position is that investors in regulated businesses either:

- have no long-term RoE (i.e., beyond the current regulatory period);

- do have a long-term RoE but this is the same as the regulatory WACC; or

- have a different long-term WACC to the regulatory RoE.

110. This is an important consideration because NSPs do need to make long-term decision that have implications beyond the current regulatory period.

111. For example, imagine an NSP considering investing $1bn now in new equipment with a life of 40 years in order to avoid future opex/capex of $60m pa over those 40 years. This involves a roughly 5.6% internal rate of return in terms of future expenditure avoided. Now imagine that the AER's '5-year' WACC (based on a 5-year RoE) is 5.4% while a longer term WACC (derived using the 10-year RoE) is 5.8%. This will result in the following estimated net present values

Table 5-2: NPV of upfront capex project

Discount rate	NPV of 1bn capex solution*
5.4% (AER 5-year RoE)	+$28 m
5.6% (tipping point)	$0 m
5.8% (10-year RoE)	-$20m

* Calculated as the difference in present value of $1bn upfront versus $60m pa for 40 years.

112. What action would be in the best interests of society in this context? If the AER's discount rate is applied this will result in the billion dollars of capex having a positive net present value. However, the this involves discounting 40 years of expenditure savings at a 5-year discount rate. If a longer term discount rate, consistent with the horizon of the cost savings, is applied then the billion dollar investment has negative net present value. That is, if the discount rate better reflects the period of the actual cost savings, then the NPV will be negative. But if the AER's discount rate is used, which only looks out 5 years, the project will be NPV positive.

113. In our view the answer to this is simple. The NSP should not undertake the investment because the return it generates is below the best estimate of the WACC (which we believe is derived using the 10-year risk-free rate in all circumstances).

That is, the NPV=0 condition does not hold with the AER's 5-year return on equity estimate.

114. However, exactly what the AER's position would be is unclear. If the AER were correct in all of its (implicit and explicit) assumptions underpinning its rational for reform, then we think that the AER's internally consistent position would be to require the NSP to:

- Use the regulatory WACC for the current regulatory period to discount the benefits from the investment over the current regulatory period; and

- Use a forecast of the regulatory WACC in each of the next 7 periods. That is, forecast the 5-year risk-free at the beginning of each future regulatory period.

115. That is, the AER's position is that the cost to investors (and therefore to society) of committing equity capital is associated with the 5-year risk-free rate reset every 5-years. Therefore, the AER's position should be that any trade-offs between capex and opex (committing resources now versus in the future) should be assessed using a series of 5-year risk-free rates.

116. In our view this would give rise to a misleadingly low WACC that would artificially tip the regulatory balance in favour of inefficiently large capital expenditure.[24] If the AER agrees or disagrees that this is a direct implication of its logic then it will ideally identify and explain its position.

117. Our understanding of the AER position is that it would have real implications for capital budgeting. The AER's own analysis suggests the 5-year return on equity has been 27bp lower than the 10-year return on equity since the GFC and has been as much as 80bp lower (up to 107 bp lower if the post 1988 period is used). Using the AER's WACC has the potential to materially tip the balanced of present value assessments in favour of more capital intensive network solutions.

118. While this result follows from the AER's assumptions, it also serves to illustrate why those assumptions are problematic. The length of time between when the AER resets the cost of equity allowance should have no relationship to whether a particular capital expenditure is efficient. The length of time between resets is an arbitrary regulatory decision – not grounded in any real economic fact or circumstance. It is a very peculiar outcome for this arbitrary regulatory decision to have any impact on how society should assess the trade-off between incurring expenditure now versus in the future.

119. Naturally, it is our view that this should not be the case and the (arbitrary) length of time return on equity resets should have no effect on how the present value of

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[24] Of course, whether investors would be willing to provide this capex is a separate question.

expenditure is assessed. But, if it is the AER's view that it should, then it would be appropriate for the AER to grapple fully with the implications of this.

Appendix A 5/10-year rates and stock market returns

120. In this appendix we show the relationships, express as regression coefficients, between the percentage change in the market index (ASX Accumulation Index) and the percentage change in 5-year vs 10-year CGS yield, since January 1980 (earliest available) and since 2000. We have also included sensitivity analysis by calculating percentage changes with periods of various length.

Table 5-3: Regression analysis between percentage change in 5-year and 10-year CGS vs market return (monthly data of percentage changes with various length)

Period	N-monthly/ yearly % change	Regression coefficient for the 5-year CGS	Regression coefficient for the 10-year CGS	Ratio between 5- and 10-year CGS
Jan 1980 (earliest) to Dec 2021	1-monthly	0.093	0.002	39.18
	6-monthly	0.276	0.154	1.80
	1-yearly	0.309	0.188	1.64
Jan 2000 to Dec 2021	1-monthly	0.587	0.321	1.83
	6-monthly	0.959	0.644	1.49
	1-yearly	1.090	0.741	1.47

Source: RBA, Bloomberg, CEG analysis

Appendix B   Summary of literature on downward sloping RoE term structure

121.   The following table summarises literature on the term premiums for the return on equity.

Table 5-4: Literature on the term structure for the return on equity

Year	Reference	Key point
2012	van Binsbergen, J., M. Brandt, and R. Koijen (2012). On the timing and pricing of dividends. American Economic Review 102 (4), 1596–1618.	The term structure of equity returns is downward sloping.
2015	Belo, F., P. Collin-Dufresne, and R. S. Goldstein (2015). Dividend dynamics and the term structure of dividend strips. The Journal of Finance 70 (3), 1115–1160.	The term structure of equity returns is downward sloping.
2015	Ait-Sahalia, Yacine and Karaman, Mustafa and Mancini, Loriano, The Term Structure of Variance Swaps and Risk Premiums (April 23, 2018). Swiss Finance Institute Research Paper No. 18-37.	The term structure of risk premiums is downward-sloping during recessions but flat or upward-sloping during normal times.
2015	Ravi Bansal , Shane Miller, Dongho Song, Amir Yaron, The Term Structure of Equity Risk Premiums, Journal of Financial Economics (2021).	The term structure of risk premiums is downward sloping on average and especially during recessions
2018	Weber M., Cash flow duration and the term structure of equity returns, Journal of Financial Economics Volume 128, Issue 3, June 2018, Pages 486-503.	The term structure of equity returns is downward sloping and especially in recessions.
2018	Hengjie Ai, Mariano Max Croce, Anthony M. Diercks and Kai Li, News Shocks and the Production-Based Term Structure of Equity Returns. The Review of Financial StudiesVol. 31, No. 7 (July 2018), pp. 2423-2467 (45 pages).	The term structure of risk premiums is downward sloping on average and especially during recessions