The term of the allowed return

Report for DBP NGP Pty Ltd

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Contents

1. Background and conclusions

Overview and instructions

1. SFG Consulting (**SFG**) has been retained by DBP NGP Pty Ltd (**DBP**) to provide our views on issues relating to the term of the allowed rate of return for use in the regulatory setting. In particular, we have been asked to respond to the ATCO Gas Draft Decision of the Economic Regulation Authority of Western Australia (**ERA**) insofar as it relates to the term of the allowed rate of return. The ERA proposes to adopt a five-year term for its allowed return by using a five-year risk-free rate (for the return on equity and the return on debt) and by using a five-year term for its estimate of the market risk premium.

Preparation of this report

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

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

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

5. A copy of my instructions is attached as an appendix to this report.

Summary of conclusions

6. Our main conclusions are as follows:

    a) The ERA sets allowed returns on the basis of a five-year term;

    b) The ERA states that it uses a term equal to the length of the regulatory period to be consistent with its "present value principle";

    c) The present value principle only suggests that the term of the allowed return should be matched to the length of the regulatory period in the case where the market value of the regulated asset at the end of the regulatory period is known for sure from the outset. This is because the asset can be valued as the present value of cash flows over the regulatory period only (one of which is the known end-of-period market value of the asset);

    d) If the end-of-period market value of the asset is *not* known for sure from the outset, the present value principle does *not* imply that the term of the allowed return should match the length of the regulatory period. This is because the asset cannot be valued as the present value of the cash flows over the regulatory period;

    e) Where the end-of-period market value of the asset is *not* known for sure from the outset, the asset would be valued as the present value of the cash flows to be generated over the life of

the asset. In this case a long-term discount rate would be used and therefore the allowed return should be set on the basis of a long-term rate;

f) The dominant commercial practice is to use a long-term discount rate, even when valuing regulated infrastructure assets where the regulator sets allowed returns based on a shorter-term rate;

g) The vast majority of regulated infrastructure assets in Australia have their allowed return set on the basis of a long-term (10-year) rate;

h) The ERA argues that its (currently low) 5-year allowed return is consistent with the (currently higher) 10-year required return used by investors. The ERA argues that investors actually require a low return over the next five years (the same as what the ERA currently allows) and a much higher return on cash flows thereafter. However, there is no mechanism whereby the high future returns that the ERA says investors require can ever be delivered by the ERA's rate-setting process. The more likely outcome is that, at every determination, the ERA simply uses this term structure argument to explain why its current regulatory allowance is below the return that investors require; and

i) If the ERA does adopt a 5-year risk-free rate, consistency requires that the same rate must be used in the two places it appears in the CAPM formula.

2. The term of the regulated return and the "present value principle"

The ERA's "present value principle"

7. In its Rate of Return Guideline, the ERA stated that it would estimate the risk-free rate as the yield on "5-year Commonwealth Government Securities" and that it would interpret that yield as a "point estimate."[1]

8. In its ATCO Gas Draft Decision, the ERA follows its Guideline, concluding that when estimating the risk free rate component of the regulated rate of return:

> The Authority considers that a 5-year term for the risk free rate is consistent with the 'present value principle', and with investors' horizons with regard to the regulated assets, given the 5-year regulatory period. [2]

9. The basis for the position of the ERA is that the term of the risk-free rate should be aligned with the term of the regulatory period because that is consistent with the time horizon of investors and the present value principle, also referred to as the "NPV=0 principle." The idea behind this reasoning is that investors will only consider cash flows over the term of the regulatory period because the end-of-period market value of the asset is known with certainty from the beginning of the regulatory period. Thus, there is no need to consider cash flows beyond the end of the regulatory period when valuing the asset – because the end-of-period asset value is known for sure. In this case, investors will have an investment horizon equal to the length of the regulatory period. The argument that follows is that, since investors have an investment horizon of five years, they will discount cash flows using a five-year rate of return when valuing the regulated asset. Consequently, if the regulator sets allowed cash flows on the basis of the (usually higher) 10-year risk-free rate, investors would be over-compensated relative to their required (usually lower) 5-year risk-free rate. In this case, investors would receive an abnormal return as opposed to a normal or "NPV=0" return.

What does NPV=0 mean?

10. We agree that it is appropriate to set regulated prices so that investors receive their required return on their investment rather than excess or super-normal returns. However, we agree with the Incenta (2013) submission to the AER on this issue in that:

> In this context, the NPV=0 principle says nothing more than that the discount rate should be the correct one for the cash flows being considered.[3]

11. That is, the NPV=0 principle does not say that the term of the return must be equal to the length of the regulatory period. Rather, the NPV=0 principle says that the term of the return should be appropriate for the cash flows that are being considered by investors.

12. The ERA appears to agree with the notion that the return on equity should correspond with the term of the cash flows that would be considered when valuing the asset:

> The rate of return on equity for any investment should correspond to the period over which the cash flows are expected in relation to the invested assets. It follows that the

[1] ERA Rate of Return Guideline, p. 4.
[2] ERA ATCO Gas Draft Decision, p. 161, Paragraph 699.
[3] Incenta (2013), p. 6.

> same period should be used to inform the term of the risk free rate and the equity risk premium.[4]

13. The ERA then says that investors need only consider the cash flows through to the end of the regulatory period because the end-of-period market value of the regulated asset is known with 100% certainty from the outset – thus, there is no need to consider any subsequent cash flows. In this regard, the ERA states that:

> the Authority notes that the value of the regulatory asset base, the risk free component of the return on equity, and the equity risk premium are set at the start of each regulatory period. This provides relative certainty with regard to the related earnings cash flow over the regulatory period, all other things equal. [5]

14. If it were true that the market value of the regulated asset *was* known with certainty from the outset, it does follow that investors could value the asset with reference to the cash flows over the regulatory period. There would be no need to consider cash flows beyond the regulatory period if the end-of-period market value of the asset was already known with certainty. However, we consider that the end of period market value of the assets is *not* certain, and that investors will consider *all* cash flows that the asset might generate over its life (as is the case with all other assets).

Key assumptions and their implications

15. In its ATCO Gas Draft Decision, the ERA sets out its view that the only way in which the NPV=0 principle is satisfied is if the term to maturity of the risk-free rate proxy (and the term of the allowed return in general) is set equal to the term of the regulatory period. In our previous submission to the ERA, we documented that the ERA approach is based on the important assumption that there is no uncertainty about the market value of the regulated asset at the end of the regulatory period.[6]

16. The difference between the view of the ERA and our view can be summarised as follows. We consider that there *is* uncertainty over the market value of the asset at the end of the first regulatory period. In our view, the market value of the asset at the end of the first period will be the present value of the expected cash flows to be received after the first regulatory period. That is, at the end of the regulatory period, investors will estimate the future cash flows they expect the asset to produce and they will discount those expected cash flows back to a present value using a discount rate that reflects the prevailing conditions in the market at that time. This is how the market value of the asset at the end of the regulatory period will be determined.

17. That is, if at the end of the regulatory period, investors were forecasting higher cash flows and if market conditions were such that a lower discount rate was appropriate, the market value of the asset would be higher. Conversely, if investors were forecasting lower cash flows and if market conditions were such that a higher discount rate was appropriate, the market value of the asset would be lower. Since we don't know which of these will happen, or whether something different again might happen, there is uncertainty over what the market value of the assets will be at the end of the regulatory period.

18. Now consider an investor seeking to value the regulated asset at the beginning of the regulatory period:

[4] ERA ATCO Gas Draft Decision, p. 146, Paragraph 630.
[5] ERA ATCO Gas Draft Decision, p. 146, Paragraph 631.
[6] SFG (2014 ERA), Paragraphs 346-358.

a) If the investor considered that they knew with certainty what the market value of the regulated asset would be at the end of the regulatory period, they would value the asset as the present value of the cash flows during the regulatory period plus the present value of the certain end-of-period asset value; however

b) If the investor considered that the end-of-period market value of the regulated asset was uncertain, they would value the asset as the present value of the cash flows during the regulatory period plus the present value of their estimate of the end-of-period asset value. As set out above, the end-of-period market value of the asset would be estimated as the present value of all subsequent cash flows. In other words, the asset would be valued as the sum of the present values of all of the future cash flows that the asset is expected to generate. This is the standard approach that is used for valuing infrastructure assets, including regulated infrastructure assets.

19. The ERA considers that there is no uncertainty over the market value of the asset at the end of the first regulatory period, in which case the former of the two approaches set out above could be used when valuing the asset. This point is made clear in the Guideline Explanatory Statement where the ERA responds to the Incenta submission that:

> ...since the market applies a 10 year risk free rate and a risk premium and prices assets in this way, it drives valuation, and regulators should not be out-of-step with the market, or they will risk under-investment. [7]

by stating that the above submission is flawed because it assumes that the end-of-period market value of the regulated asset is risky when, in fact, it is not:

> the Authority notes in this context that Incenta states that market practitioners view the residual value of asset as being risky. However, the Authority considers that the fact that the regulatory asset base is not re-valued periodically undermines this view, implying a very low risk for the full return of the value of the regulatory asset base. This provides strong support for the present value principle as it is interpreted by the Authority.[8]

20. The ERA confirms this view in its ATCO Gas Draft Decision as follows:

> the Authority notes that the value of the regulatory asset base, the risk free component of the return on equity, and the equity risk premium are set at the start of each regulatory period. This provides relative certainty with regard to the related earnings cash flow over the regulatory period.[9]

21. In summary, the ERA appears to be saying that the key assumption that the end-of-period market value of the regulated asset is certain from the outset is innocuous – because the RAB *is* effectively certain. However, this misses the point entirely. Indeed the whole point of the Lally derivations (on which the ERA's present value principle is based) is to demonstrate the application of the present value principle to the case where the *market value* of the regulated asset is known with certainty. In all of his derivations it is taken as given that the RAB is certain – but the present value principle only becomes relevant in the case where the market value of the asset is known with certainty in advance. We explain this point in more detail in relation to the Lally derivations below.

[7] ERA Rate of Return Guideline Explanatory Statement, p. 89, Paragraph 462.
[8] ERA Rate of Return Guideline Explanatory Statement, p. 89, Paragraph 464.
[9] ERA ATCO Gas Draft Decision, p. 146, Paragraph 631.

22. Moreover, the end-of-period RAB is not certain. To the extent that regulators have the power to declare assets redundant and to re-examine forecast capital expenditure and so on, the closing RAB is not entirely certain.

The Lally certainty assumption

23. The ERA's approach to the term of the risk-free rate (and the overall return) and to the NPV=0 principle is based on the work of Lally.[10] In his most recent contribution on this issue, Lally (2012 QCA) is very clear about the assumption that serves as the foundation for all of his derivations. He assumes that the regulatory process is such that the market value of the regulated assets at the end of each regulatory period is not subject to any risk:

> the output price will be reset to ensure that the value at that time of the subsequent payoffs on the regulatory assets equals the regulatory asset book value prevailing at that time[11]

such that the:

> payoffs at time 4 [the end of the regulatory period in his example] are certain.[12]

24. Lally (2013 QCA) is even more explicit about the fact that the present value principle only requires the term of the return to be set to the length of the regulatory period if the end-of period market value of the asset is known with certainty from the outset. Lally sets out a two-period example in which the regulated asset has a two year life, the initial RAB is $100, depreciation is $50 in each period, and the allowed return in the first period is 5%. Consequently, investors will receive cash flows of:

    a) In period 1: $50 depreciation plus a return on capital of $100×5%; and

    b) In period 2: $50 depreciation plus a return on capital of $50×$R_{12}$, where R_{12} is the allowed return for the second period, set by the regulator at the end of the first period.

25. Lally then assumes that the market value of the asset at the end of the first period is known for sure right from the beginning of the first period. At the beginning of the first period no one knows what market conditions will prevail at the end of the first period. Consequently no one knows what return investors will require over the second period or what the regulator might allow over the second period. But Lally assumes that the regulator will set the allowed return precisely equal to whatever it is that investors require. This ensures that the market value of the regulated asset at the end of the first period is known for sure right from the outset. Lally (2013 QCA, Eq 1) states that:

$$V_1 = \frac{50 + 50\tilde{R}_{12}}{1 + \tilde{R}_{12}} = 50$$

where the R_{12} in the numerator is the regulator's allowed return and the R_{12} in the denominator is the investor's required return.

[10] ERA Rate of Return Guideline Explanatory Statement, Appendix 2.
[11] Lally (2012 QCA), p. 14.
[12] Lally (2012 QCA), p. 10.

26. Given that the market value of the asset at the end of the first regulatory period is guaranteed from the outset, the current market value of the asset can be found by discounting the first period regulatory cash flows, plus the known end-of-period market value back over the first regulatory period. Lally (2013 QCA) explains that:

> At the end of the first year, the regulated business will therefore receive V_1 = \$50m plus revenues to cover regulatory depreciation of \$50m and the cost of capital for the first year of \$100m(.05). **Since this sum is known at the beginning of the first year** it can be valued using the prevailing risk-free rate, which is 5%. So the value now of V_1, plus the revenues received at the end of the first year, is \$100m as follows:[13]

$$V_0 = \frac{(50 + 100 \times 0.05) + 50}{1.05} = 100$$

where the term in brackets is the regulatory allowed cash flow for the first period and the end-of-period market value is known for sure, $V_1 = 50$.

27. In summary, the assumption that the value of the asset at the end of the regulatory period is already known with 100% certainty at the beginning of the regulatory period is the basis for the derivation of the conclusion that the NPV=0 principle requires the term of the risk-free rate (and the overall return) to be set to the length of the regulatory period. If the market value of the asset at the end of the regulatory period is *not* known with certainty, setting the term of the risk-free rate equal to the length of the regulatory period is no longer consistent with the NPV=0 principle.

28. Thus, the key point has been crystallised:

    a) If the value of the asset at the end of the regulatory period *is* known with certainty right from the start of the regulatory period, setting the term of the return equal to the term of the regulatory period will be consistent with the NPV=0 principle – because the asset can be valued with reference to cash flows over the regulatory period only; and

    b) If the value of the asset at the end of the regulatory period is *not* known with certainty right from the start of the regulatory period, setting the term of the return equal to the term of the regulatory period will *not* be consistent with the NPV=0 principle – because the asset would be valued with reference to cash flows extending beyond the end of the regulatory period. If the cash flows that would be considered when valuing the asset extend beyond the five-year period, they would be discounted back to present value using a rate that is longer than the five-year rate. Thus, the present value of the cash flows will not be consistent with the use of a five-year discount rate.

29. Finally, we note that in all of the derivations above, the whole point is to show that the end-of-period market value of the regulated asset was certain from the outset. The RAB was, by definition, certain to be \$50 at time 1 – no other value was even possible. What Lally shows is that if the time 1 *market value* of the firm is known for sure, then there is no need to consider subsequent cash flows when estimating the market value of the firm.

30. Indeed, the RAB is not a *value* at all. It is one of a number of inputs that the regulator inserts into a formula to determine what prices the firm is allowed to charge. It is the present value of the future cash flows that will determine the value of the firm.

[13] Lally (2013 QCA), p. 47, emphasis added.

What if the end-of-period market value is not certain?

31. If the market value of the regulated asset at the end of the first period (V_1) is *not* known with certainty from the outset, the opening market value of the firm would be computed in the standard manner by discounting the expected cash flows over the life of the asset using a discount rate that is appropriate for those cash flows (in terms of risk and duration. The standard valuation calculation in this case is:

$$V_0 = \frac{CF_1}{(1+R_{02})^1} + \frac{CF_2}{(1+R_{02})^2}$$

where R_{02} is the investor's required return for a two-period horizon beginning at time 0.[14]

32. That is, if the market value of the regulated asset at the end of the first period (V_1) is *not* known with certainty from the outset, investors would value the asset by discounting the expected cash flows over the two-period life of the asset using the two-period discount rate. In this case, the "present value principle" would require the regulator to set allowed returns based on the two-period rate, not the (usually lower) one-period rate.

The end-of-period market value is either certain or it is not

33. There appears to be general agreement about the fact that the Lally/ERA derivation of the NPV=0 principle requiring a 5-year return, relies on the end-of-period market value of the asset being certain from the outset. The reasons why the end-of-period asset value might not be known with certainty are irrelevant – if it is *not* known with certainty right from the start of the regulatory period, the derivation does not hold and setting the term of the return equal to the term of the regulatory period will *not* be consistent with the NPV=0 principle.

34. The only point that is relevant to the current issue is whether the ERA's regulatory process can guarantee the market value of the asset at the end of the regulatory period. If it cannot, then setting the term of the return equal to the term of the regulatory period will *not* be consistent with the NPV=0 principle.

35. In this context, the only thing that potentially differentiates a regulated company from an unregulated one is the possibility that the regulated firm might have a known market value at the end of the regulatory period whereas a commercial firm does not. If the end-of-period market value of the regulated firm *is* known with certainty from the outset, there is an argument for aligning the term of the return to the length of the regulatory period. If the end-of-period market value is *not* guaranteed, the regulated firm is not materially different from the unregulated firm and would be valued in the same way – as the present value of all future expected cash flows. In this case, the regulated firm should use the same long-term risk-free rate that is used by the comparable commercial firms. Indeed, in commercial practice this is precisely how regulated firms are valued – as the present value of all future cash flows, using a discount rate based on the 10-year risk-free rate.

36. In summary, the end-of-period market value of the asset is either known with 100% certainty or it is not. If not, there is no basis for setting the term of the return to the term of the regulatory period.

[14] Note that it is also theoretically appropriate to discount the first cash flow at the one-period zero-coupon discount rate and the second cash flow at the two-period zero-coupon discount rate. But this is equivalent (by construction) to discounting both cash flows at the two-period coupon rate R_{02} as above. Using a single rate for all cash flows over the life of the asset is also consistent with the uniform market practice.

37. Our point is that it is not appropriate to assume that the asset base has a certain value at the end of the regulatory period. Because there is risk associated with the market value at the end of the regulatory period, the cost of capital reflects expectations for all future cash flows. And once the asset is valued using all future cash flows a long-term risk-free rate must be used.

Potential regulatory responses

38. The foregoing discussion can be summarised as follows:

    a) If the value of the asset at the end of the regulatory period *is* known with certainty right from the start of the regulatory period, setting the term of the risk-free rate equal to the term of the regulatory period will be consistent with the NPV=0 principle; and

    b) If the value of the asset at the end of the regulatory period is *not* known with certainty right from the start of the regulatory period, *for whatever reason*, setting the term of the risk-free rate equal to the term of the regulatory period will *not* be consistent with the NPV=0 principle.

39. If a regulator argues that the derivation of the NPV=0 principle does not require that the end-of-period asset value must be known with 100% certainty right from the beginning of the period, they would be demonstrably wrong. The mathematical proof from Lally establishes this point.

40. Consequently, we assume that the regulator accepts that the NPV=0 principle requires that the end-of-period asset value must be known with 100% certainty, as the AER and IPART have done. In this case, the NPV=0 principle would only be relevant if the regulator considered that the end-of-period asset market value *was* known with 100% certainty. This would be the case, for example, if the regulator considered that its regulatory process was such that it could guarantee that at every regulatory determination it would set allowed revenues such as to *exactly* compensate investors for every one of the building block components. This appears to be the view of the ERA, as set out above.

41. If a regulator really did believe that its regulatory process guaranteed the end-of-period market value of the asset with 100% certainty, that certain value should be set out in the regulatory determination for the benefit of all stakeholders.

Conclusion

42. For the reasons set out above, our view is that:

    a) The market value of the regulated asset at the end of the regulatory period is not certain right from the beginning of the regulatory period;

    b) Consequently, setting the term of the risk-free rate equal to the term of the regulatory period will *not* be consistent with the NPV=0 principle; and

    c) A long-term risk-free rate should be used, which is consistent with:

        i) The long-term (uncertain) cash flows that determine the value of the asset; and

        ii) Commercial practice, as discussed in the subsequent section.

3. Commercial practice and the role of the regulator

Overview

43. In this section of the report we establish that the dominant approach in commercial practice is to use a 10-year term when estimating the risk-free rate, to use a single long-term required return on equity, and to use a single long-term required return on debt – especially when valuing long-lived infrastructure assets.

Commercial practice is to set the term of the risk-free rate to ten years

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

> The 10-year bond rate is a widely used and accepted benchmark for the risk free rate in Australia.[15]

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

> The ten year bond rate is a widely used and accepted benchmark for the risk free rate. Where the forecast period exceeds ten years, an issue arises as to the appropriate bond to use. While longer term bond rates are available, the ten year bond market is the deepest long term bond market in Australia and is a widely used and recognised benchmark. There is a limited market for bonds of more than ten years. In the United States, there are deeper markets for longer term bonds. The 30 year bond rate is a widely used benchmark. However, long term rates accentuate the distortions of the yield curve on cash flows in early years. In any event, a single long term bond rate matching the term of the cash flows is no more theoretically correct than using a ten year rate. More importantly, the ten year rate is the standard benchmark used in practice.[16]

46. In summary, the independent expert evidence supports the use of a 10-year term to maturity when estimating the risk-free rate:

    a) 94% of the relevant reports adopted a 10-year term assumption; and

    b) The few reports that did not use a 10-year term assumption explained that the reason for not doing so was that they were adopting a term assumption that matched the lives of the assets being valued.

47. Incenta (2013) also conclude that the dominant commercial practice is to use a 10-year term for the risk-free rate:

[15] Deloitte (2012), ING Real Estate Community Living Group – Independent expert's report and Financial Services Guide, 24 April 2012, p.93.
[16] Grant Samuel (2012), Hastings Diversified Utilities Fund – Independent Expert's report, 3 August 2012, p.4.

> In conclusion, we recommend using a 10 year risk free rate for estimating the cost of equity, and for this rate to be applied consistently to estimate the market risk premium…our view is based on achieving consistency with the practice of valuation professionals for whom the use of a 10 year term for the risk free rate is widespread, and consistency with our observations of how investors actually value regulated infrastructure assets. [17]

48. In its ATCO Gas Draft Decision, the ERA accepts that the evidence establishes that the overwhelming commercial practice is to set the term of the risk-free rate to 10 years. The ERA notes that:

> The long term approach is consistent with that adopted by equity analysts, who use the longest term bonds available when evaluating the performance of equities vis-àvis government bonds. IPART, for example, highlighted survey evidence by Brotherson et al (2013) that financial advisors unanimously responded that they use bond maturities of 10 years or longer in cost of capital estimations. [18]

49. The ERA also notes that the market practice is to use a 10-year discount rate when valuing regulated firms even if the regulator uses a 5-year risk-free rate to determine the allowed cash flows:

> Incenta stated that interviewed valuation professionals were unanimous that regulators' application of a 5 year risk free rate would not change their use of the 10 year rate in valuations. [19]

Commercial practice is to use a long-term discount rate when estimating the required return on equity

50. In its ATCO Gas Draft Decision, the ERA notes that the commercial practice is also to use a long-horizon market risk premium. Thus, long-horizon estimates of the risk-free rate and MRP produce a long-horizon estimate of the required return on equity:

> Independent analysts tend to adopt a 10 year horizon for the WACC discount rate because they are valuing assets on the basis of the cash flows to perpetuity. In Australian financial markets, 10 year government bonds are among the most common 'long maturity' bonds, and thus traditionally have been used as a proxy for the long term to perpetuity. Similarly, analysts estimate the equity premia component over a longer term horizon, involving 10 years or more.

51. The ATCO Gas Draft Decision also considers, in some detail, the recent Grant Samuel independent expert valuation report for Envestra. In that report, the independent expert computes a single discount rate, which is applied to forecasted cash flows over a long horizon.

52. Moreover, the approach of applying a single discount rate to all of the cash flows being valued is uniformly adopted in independent expert valuation reports.

[17] Incenta (2013), p. 13.
[18] ERA ATCO Gas Draft Decision, p. 148, Paragraph 640.
[19] ERA ATCO Gas Draft Decision, p. 149, Paragraph 641.

Commercial practice is to use a long-term discount rate when estimating the required return on debt

53. As noted above, the ATCO Gas Draft Decision considers, in some detail, the recent Grant Samuel independent expert valuation report for Envestra. In that report, the independent expert computes the required return on debt as the sum of the 10-year government bond yield and a 10-year debt risk premium. Grant Samuel state that:

> This figure represents the cost of borrowings with a ten year tenor.[20]

54. Moreover, the approach of estimating the required return on debt with a ten-year tenor is standard practice among independent experts and it is consistent with standard corporate practice.

55. In the ATCO Gas Draft Decision, the ERA also recognises that the standard practice of comparator firms is to issue debt with a maturity of approximately 10 years. Since the debt risk premium cannot be hedged, the ERA proposes to adopt an estimate of the DRP based on a 10-year tenor:

> absent credit default swaps, the Authority should estimate the debt risk premium based on the average term at issuance. The Authority notes that analysis in the Rate of Return Guidelines would support a term at issuance for the benchmark efficient entity of around 10 years. Therefore, the Authority accepts that it is appropriate to adopt the 10 year term for its estimate of the debt risk premium.[21]

Summary of commercial practice

56. There appears to be broad agreement about the fact that the dominant commercial practice is to estimate required returns based on a 10-year horizon and to apply a single discount rate to all future cash flows that are expected to be produced by the asset. Specifically, the commercial practice is to:

    a) Estimate the required return of equity for a 10-year (or longer) horizon on the basis of a 10-year risk-free rate and 10-year MRP; and

    b) Estimate the required return on debt for a 10-year horizon, commensurate with the fact that the comparator businesses tend to issue 10-year debt.

57. In summary, there is broad agreement that the commercial practice is to estimate required returns using inputs (base risk-free rate and risk premiums) that have a 10-year tenor. The only point of disagreement is about whether the regulator should estimate required returns in the same way they are estimated in commercial practice and by independent expert valuation professionals, or whether regulators should estimate required returns in a different way that is inconsistent with commercial practice. We explore that point of disagreement in the following subsection.

The role of the regulator

Should the regulator seek to produce commercial outcomes?

58. In its Guideline Explanatory Statement, the ERA notes that the commercial practice is to set the term of the risk-free rate to 10 years, but suggests that the regulatory task is different. In particular, the ERA states that it does not consider the regulatory role to be one of replicating the returns that

[20] Grant Samuel (2014), p. 7.
[21] ERA ATCO Gas Draft Decision, p. 189, Paragraphs 831-832.

commercial investors would require from assets such as the one being regulated. Specifically, the ERA states that its role is *not* to estimate the return that investors would use when estimating the value of the regulated asset:

> the Authority considers that equity analysts are generally trying to estimate the value of the company…In that case it would be reasonable to utilise the longest possible term risk free rate to contribute to the discount rate to be applied to those cash flows. However, that is not the regulatory task, which involves determining rate of return for a five year period. [22]

59. The ERA makes a similar point in relation to the overall required return on equity. In particular, the ERA recognises that the market practice is to use 10-year inputs when estimating the required return on equity whereas its view is that regulators should set allowed returns on the basis of 5-year inputs (i.e., a 5-year risk-free rate and a 5-year MRP). The ERA considers that the "present value principle" requires it estimate required returns in a way that is inconsistent with market practice:

> As noted above, the Authority is of the view that the term over which return expectations should be assessed is 5 years, so as to match the regulatory period. This is consistent with the Authority's intention to account for the 'present value' principle...This 5 year forward looking horizon contrasts with that of independent analysts. Independent analysts tend to adopt a 10 year horizon for the WACC discount rate because they are valuing assets on the basis of the cash flows to perpetuity. In Australian financial markets, 10 year government bonds are among the most common 'long maturity' bonds, and thus traditionally have been used as a proxy for the long term to perpetuity. Similarly, analysts estimate the equity premia component over a longer term horizon, involving 10 years or more. [23]

60. This reasoning leads the ERA to conclude that the evidence that commercial investment proceeds on the basis of a 10-year risk-free rate is not relevant to its regulatory task.[24] In particular, the ERA's view is that commercial investors determine a single long-run required rate of return, whereas the regulatory task is to set a return for only five years at a time. (We show below that the long-run commercial required return is still relevant evidence in that the 10-year required return is simply a combination of two five-year returns.)

61. The ERA goes on to conclude that it should not be seeking to replicate the commercial return that would be required by investors when investing in an asset with a similar degree of risk to the asset that is being regulated. The ERA concludes that its role is *not* even to estimate the return that investors would use when valuing the regulated asset itself. In this regard, the ERA notes that its approach (based on a 5-year term) differs from the approach that Grant Samuel adopted when valuing Envestra.[25] It is also inconsistent with the approach used to value Hastings Diversified Utility Fund and DUET.

62. The ERA reaches the conclusion that it should use an approach that is inconsistent with the approach that would be used in market practice notwithstanding the Allowed Rate of Return Objective, which states that:

[22] ERA Rate of Return Guideline Explanatory Statement, p. 89, Paragraph 465.
[23] ERA Rate of Return Guideline Explanatory Statement, pp. 174-175, Paragraphs 770, 772.
[24] ERA ATCO Gas Draft Decision, p. 149, Paragraph 643.
[25] ERA Rate of Return Guideline Explanatory Statement, pp. 178-180, Paragraphs 785-788.

> [t]he rate of return for a [Service Provider] is to be commensurate the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the [Service Provider] in respect of the provision of [services].[26]

63. Moreover, the standard economic interpretation of the requirement to have regard to:

> the prevailing conditions in the market for equity funds.[27]

would include some consideration of the return that investors would use when valuing the regulated asset.

64. However, the ERA reaches a different view, based primarily on its NPV=0 principle. This has led the ERA to align the allowed return with the length of the regulatory period. As set out in more detail above, it is important to note that the NPV=0 principle only implies that the term of the discount rate should match the length of the regulatory period *if* the end-of-period asset value is known with 100% certainty from the beginning of the period. Otherwise, the NPV=0 principle implies that a long-term discount rate should be adopted, consistent with the standard commercial practice.

65. That is, the NPV=0 principle does not require that the term of the risk-free rate must be aligned to the term of the regulatory period in *all* cases – only in the special case where the end-of-period asset value is known with 100% certainty from the beginning of the period. We explain this point in detail in the next section of this report.

66. In summary, we note that the ERA recognises that the market practice is inconsistent with its own approach, but argues that this evidence is not relevant to the regulatory task.[28]

Implications for allocative efficiency

67. We now consider the case where a regulator aligns the term of the allowed return with the term of the regulatory period on the basis of the regulator's belief that the end-of-period market value of the asset *is* known with 100% certainty – but where investors do not believe that the market value of the asset is guaranteed, but is uncertain. In this case, investors will assess their required return using a long-term required return (consistent with their standard commercial practice) whereas the regulator will set the allowed return on the basis of the (generally lower) shorter-term risk-free rate and risk premiums.

68. In our view, setting the allowed return on regulated assets below the return that investors expect to receive on comparable assets in a commercial setting has clear implications for allocative efficiency. Setting the allowed return below the investor's required return will act as a disincentive for investment and result in allocative inefficiency. This aspect of allocative efficiency concerns the allowed return relative to the return that investors require. Another consideration is the relative returns available on comparable investments. For example, setting allowed returns for WA energy distributions that are materially below the returns that are allowed to other highly-comparable Australian energy distribution businesses that are regulated under the same rules has obvious consequences for investment incentives.

[26] For example, see NGR 87(2)(3).
[27] For example, see NGR 87(7).
[28] ERA ATCO Gas Draft Decision, p. 149, Paragraphs 642-643.

69. Consequently, one consideration that is relevant to the question of economic efficiency is whether investors do consider the end-of-period market value of the asset to be guaranteed, such that a short-term return would be appropriate. However, we note that there is no evidence to support the notion that investors consider the end-of-period asset value to be guaranteed. Rather, for example, the practice of independent experts and equity research analysts is to use a long-term return when valuing regulated assets – the same approach that they apply to unregulated assets.

70. Also, consider the investors that are now preparing to bid on the regulated assets to be offered for sale by the Queensland and NSW governments. The suggestion that those bidders would use materially lower discount rates if the term of the regulatory period were shortened is fanciful. One of their main concerns is regulatory due diligence, and it is certainly not the case that they consider more frequent involvement of regulators as something that would *decrease* risk and their required return.

71. In our view, setting the allowed return on regulated assets below the return that investors expect to receive on comparable assets in a commercial setting has clear implications for allocative efficiency. Suppose a regulator believes that their regulatory process de-risks an investment such that the required return should be commensurately low. If investors do not share the regulator's views about the extent to which the regulatory process de-risks the asset, the lower allowed return will act as a disincentive for investment and allocative inefficiency.

72. In this setting, it is hard to imagine that the lower regulatory return could be considered to be "commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk" [29] or that it would "promote efficient investment in…natural gas services…for the long term interests of consumers."[30]

Implications for price volatility

73. In its ATCO Gas Draft Decision, the ERA states that it expects that its returns based on 5-year inputs will approximate returns based on 10-year inputs – on average over time. That is, the ERA's view is that, in the long run, the average return to investors and the average prices for consumers will be approximately the same whether returns are calculated on the basis of 5-year or 10-year inputs. The ERA also recognises that returns based on 10-year inputs will be less volatile:

> A 10 year view tends to 'smooth' out the large, but infrequent spikes in expected risk premia that are more evident in shorter investment horizons. The implication is that risk premia under a 5 year approach are generally lower than the 10 year average, for much of the time. However, the 5 year estimates are more volatile than the 10 year estimates, as they are more sensitive to fluctuations in prevailing market conditions. Over time, the average of the many 5 year observations should converge toward the average risk premium observed under a 10 year approach. [31]

74. We agree with the ERA's assessment that its approach will result in more volatility in regulated prices, without any material change in average prices.

75. Again, it is hard to imagine that more volatility in regulated prices would "promote efficient investment in…natural gas services" [32] or that it would be in "the long term interests of

[29] For example, see NGR 87(2)(3).
[30] National Gas Law, s. 23.
[31] ERA Rate of Return Guideline Explanatory Statement, p. 175, Paragraph 773.
[32] National Gas Law, s. 23.

consumers."[33] In this regard, we note that Wesfarmers and Alinta have submitted to the ERA that, other things being equal, high volatility in prices is not in the long-term interest of consumers.

Regulatory practice

Most regulated assets have returns based on a 10-year term

76. The majority of Australian regulated infrastructure assets have an allowed return based on a ten-year term. For example, in its recent Draft Rate of Return Guideline, the AER concluded that:

> On balance, we are more persuaded by the arguments for a 10 year term, than the arguments for a five year term.[34]

77. The AER also notes that the Australian Competition Tribunal advocates the use of a 10-year term, as set out above.

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

> We agree with stakeholder views that increasing the TTM [term to maturity] from 5 years to 10 years for all industries is more consistent with our objective for setting a WACC that reflects the efficient financing costs of a benchmark entity operating in a competitive market.[35]

79. The Queensland Competition Authority sets the term of the risk-free rate strictly to the length of the regulatory period. This practice results in them using a four-year rate for Aurizon Network as it is regulated on a four-year cycle and using a one-year rate for their price monitoring of water distribution businesses. All other WACC parameters are estimated in a way that is independent of the length of the regulatory period. This approach results in the QCA estimating that investors require lower returns the more frequent the QCA's involvement in setting allowed prices. If the QCA is right about this, the logical conclusion is that they should set allowed prices on a daily basis, in which case the return that investors would require (on assets with a life of 50 years or more) would be benchmarked to the overnight cash rate. The fact that such a conclusion would be nonsensical has led the AER and IPART to adopt a 10-year risk-free rate (consistent with the long life of the assets and with commercial practice) rather than a risk-free rate linked to the term of the regulatory period.

Regulatory practice is to adopt a 10-year term because the end-of-period market value of the asset is not guaranteed.

80. As set out above, the AER has rejected the ERA approach of setting the term of the risk-free rate equal to the term of the regulatory period. The AER recognises that aligning the term of the risk-free rate to the term of the regulatory period is only justified in the case where the end-of-period market value of the asset is known with certainty from the outset:

> In Lally (2012), the argument for a five year term relies on the 'present value principle'—the principle that the net present value (NPV) of cash flows should equal the purchase price of the investment.

[33] National Gas Law, s. 23.
[34] AER Draft Rate of Return Guideline Explanatory Statement, p. 181.
[35] See IPART (2013), Review of WACC Methodology, December, p. 12.

> Lally stated that the present value principle is approximately satisfied only if the term of equity matches the regulatory control period. Lally illustrated this point using a numerical example in which there is no risk, so the return on equity equals the risk free rate. The example sets allowed revenues at the beginning of the regulatory control period using the yield to maturity on a five year risk free bond. Lally showed that in this example, the 'present value principle' is approximately satisfied: the NPV of the cash flows is approximately equal to the book value of the assets.
>
> The reason why the principle is satisfied is that the structure of the bond payments and the structure of the regulatory payments are similar…The core intuition behind the argument for a five year term is that the cash flows from the building block model have a similar structure to the cash flows from a five year bond. Put simply, the argument is that an equity investment in a regulated business is—at least in respect of its term—like an investment in a five year bond.
>
> The central issue in the debate about the term of equity, therefore, is the extent to which the cash flows from an equity investment in a regulated business are like the cash flows from a five year bond.[36]

81. However, the AER goes on to note that the cash flows from an equity investment in a regulated business are *not* like the cash flows from a five year bond in a very important respect – whereas a bondholder receives a known payment at maturity, the infrastructure equity owner does not. Rather, infrastructure equity (like all equity) is risky and the value of shares five years into the future cannot possibly be known with certainty. Using the same Lally derivation on which the ERA now relies, the AER notes that this necessary precondition does not hold in practice, but only under certain theoretical assumptions:

> In Lally's calculation above, the cash flow in each year is the allowed revenue net of opex and capex, except in the final year, where the closing value of the regulatory asset base (RAB) is included in the cash flow. That is, the assumption is that the investor receives a cash payment equal to the RAB in the final year of the regulatory control period. While under certain assumptions, the market value of equity is equal to the residual value of the RAB, these assumptions may not hold in reality.[37]

82. The AER then cites a report by Incenta (2013) which explains that:

    a) The argument that the term of the risk-free rate should be set equal to the length of the regulatory period relies on the end-of-period market value of the asset being known with certainty from the outset; and

    b) Since this necessary precondition does not hold, the term of the risk-free rate should *not* be set to the length of the regulatory period:

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

[36] AER Draft Rate of Return Guideline Explanatory Statement, p. 183.
[37] AER Draft Guideline, Explanatory Statement, p. 183.

> changes in the market (both technological changes and changes to customer preferences).[38]

83. The AER also notes that the same point has been made by Officer and Bishop (2008):

> Officer and Bishop said that the argument for a five year term would be correct only if after five years, in the event that 'they [the owners of the regulated business] choose to walk away from the asset, they would be fully compensated'. Officer and Bishop propose, however, that the owners are not, in reality, guaranteed of such compensation—the problem is that there is no guarantee that the secondary market will deliver a price equal to the value of the equity component of the RAB. [39]

84. The AER concludes that the term of the risk-free rate should be set to 10 years and not to the length of the regulatory period.

[38] AER Draft Rate of Return Guideline Explanatory Statement, p. 183.
[39] AER Draft Rate of Return Guideline Explanatory Statement, p. 183.

4. Specific issues in the ATCO Gas Draft Decision

A term structure of required returns

85. In its ATCO Gas Draft Decision, the ERA draws a distinction between the return that investors might require over the next five years and the return that they might require over longer horizons:

> an investor's outlook on market conditions over any forthcoming 5 year period is unlikely to be the same as their outlook over a perpetual horizon, particularly when the corresponding perpetual outlook relates to the period starting in 5 years time.[40]

86. The idea is that investors might require a low return on cash flows to be received over the next five years and a materially higher return on cash flows from year 6 and beyond. These differential returns would then "average" out into a single long-run return. Thus, the long-run required return would be higher than the 5-year required return.

87. The ERA seeks to illustrate this point in Figure 29 of its ATCO Gas Draft Decision.[41] That figure applies the ERA's current approach to estimating the required market return to historical data. It shows what the ERA's estimate of the forward-looking 5-year required market return would have been at different points in time. The figure illustrates variation in estimates over time, where the primary source of variation is changes in the 5-year risk-free rate. Indeed Figure 29 shows that the required market return is essentially parallel to the risk-free rate over time.

88. The ERA notes that the average estimate of the required market return from Figure 29 is 10.9%. That figure would seem to be inflated by data from the early 1990s when the risk-free rate exceeded 10% and the estimated market return was in the order of 16%. It is not clear that this period of high interest rates that preceded the Reserve Bank's inflation targeting regime is as relevant as more recent data. Consequently, it seems unlikely that the ERA's current approach would produce average estimates of the required market return as high as 10.9% into the future.

89. Moreover, in its Guideline the ERA argued that current interest rates are not at historical lows, but rather that interest rates above the current level were abnormally high:

> the Authority is of the view that it is unclear that the current level of the risk free rate is at an historical low. The Authority remains unpersuaded that the current level of the risk-free rate is at a historical low.[42]

90. Also, in its ATCO Gas Draft Decision, the ERA indicates that it believes that it does not expect any change in the current record low government bond yields before the next regulatory determination:

> The Authority notes that at 2.95 per cent, the indicative estimate is lower than the average of 5-year rates over recent decades, reflecting a concerted downward trend. However, the Authority has no view as to the prospect for significantly higher rates over the next five years. The Authority considers that the prevailing 5 year CGS estimate is the best predictor for the next five years.[43]

[40] ERA ATCO Gas Draft Decision, p. 147, Paragraph 633.
[41] ERA ATCO Gas Draft Decision, p. 175.
[42] ERA Rate of Return Guideline Explanatory Statement, p. 145, Paragraph 686.
[43] ERA ATCO Gas Draft Decision, p. 173, Paragraph 764.

91. Thus, it seems that the best current estimate of the market return that the ERA is likely to allow at its next determination is the same 8.45% that it proposes in the current ATCO Gas determination.

92. The ERA then states that, at any point in time, it would be wrong to compare its estimate (which has a 5-year horizon) with a market practice estimate (which has a 10-year horizon):

> This 5 year forward looking horizon contrasts with that of independent analysts. Independent analysts tend to adopt a 10 year horizon for the WACC discount rate.[44]

93. This leads the ERA to compare the average of its estimates since 1993 (10.9%) with the contemporaneous market practice estimate. In our view, there is no basis for this comparison at all. Suppose the current market estimate is an estimate of the required return over the next 10 years, as the ERA suggests. Then the appropriate comparison would be with:

    a) The ERA's current estimate, which covers the first 5 years of that 10-year period; and

    b) The current expectation of what the ERA's estimate will be at the next determination, which covers the last 5 years of the 10-year period.

94. The ERA's current estimate of the required market return is 8.45%.[45]

95. The current expectation of what the ERA's estimate will be at the next determination can be computed as follows:

    a) The 5-year forward risk-free rate is approximately 4.2%.[46] It is well known that forward rates are, on average, higher than expected spot rates, so this can be treated as a conservatively high estimate of the expected 5-year government bond yield at the time of the next determination; and

    b) At the next determination, the ERA's approach is likely to produce an MRP estimate at or below its current estimate of 5.5%. This is because the upper bound of the ERA's MRP range is directly related to the risk-free rate – any increase in the risk-free rate would cause a corresponding decrease in the upper bound of the ERA's range for MRP. Consequently the ERA's current estimate of 5.5% can be interpreted as a conservatively high estimate of what the ERA approach is likely to produce at the next determination. We note that this estimate is not materially different to the ERA's own modal estimate of 5.6% which is "reflective of typical market conditions which tend to be observed much of the time."[47]

96. The sum of an expected risk-free rate of 4.2% and an expected MRP allowance of 5.5% is 9.7%.

97. That is, the current market required return for a forward-looking 10-year horizon, which the ERA states is between 10.7% and 15.2%, should be compared with :

    a) The ERA's allowance of 8.45% for the first 5-year period; and

[44] ERA ATCO Gas Draft Decision, p. 175, Paragraph 772.
[45] ERA ATCO Gas Draft Decision, p. 173, Paragraph 759.
[4646] This is the forward rate implied by a 5-year government bond yield of 2.95% and a 10-year government bond yield of 3.58%.
[47] ERA ATCO Gas Draft Decision, p. 168, Paragraph 731.

b) The ERA's (upwardly conservative) expected allowance of 9.7% for the second 5-year period.

98. In our view, it is an error to instead compare the current market required return with the average outcome of the ERA's approach over an historical period that included double-digit inflation and a deep financial crisis.

Application of the term structure argument

99. The ERA considers, in some detail, the Grant Samuel independent expert report in relation to Envestra. This is a highly relevant report, given that it is timely and that it relates to a business that is engaged in regulated gas distribution. The ERA concludes that:

> Grant Samuel ultimately assess an overall equity market return to be in the range of 10.7 to 15.2 per cent [48]

100. The ERA's own estimate of the overall equity market return is 8.45%.[49] Thus, the mid-point of the Grant Samuel range is 53% higher than the ERA's estimate.

101. The ERA considers the Grant Samuel estimate as a cross check of its own estimate and concludes that:

> On this basis, the Authority is satisfied that its current estimate…is reasonable. [50]

102. The ERA suggests that although its current estimate of the required return on the market is only 8.45%, it anticipates that over the long-run future its estimate will increase to 10.9%. The ERA then notes that its:

> long run average of its estimates of the 5 year return on equity of 10.9 per cent is within the Grant Samuel range of 10.7 to 15.2 per cent.[51]

103. The ERA's point is that its 8.45% return applies only to cash flows over a five-year period, whereas the 11% return used in practice applies to long-term cash flows. (We have adopted 11% as a round number from near the bottom of the Grant Samuel range as a convenient reference point in the following discussion) The idea is that these two required returns can be consistent if investors require a return of 8.45% from cash flows over the first five years and a higher return on cash flows from year 6 onwards. This term structure of required returns could then produce an "average" required return of 11%.

104. In particular, the ERA states that its 5-year return should not be compared directly with the longer-term returns that are used in corporate and investment practice when valuing regulated gas distribution firms:

> This 5 year forward looking horizon contrasts with that of independent analysts. Independent analysts tend to adopt a 10 year horizon for the WACC discount rate

[48] ERA ATCO Gas Draft Decision, p. 179, Paragraph 786.
[49] The sum of the risk-free rate and market risk premium.
[50] ERA ATCO Gas Draft Decision, p. 179, Paragraph 788.
[51] ERA ATCO Gas Draft Decision, p. 179, Paragraph 786.

> because they are valuing assets on the basis of the cash flows to perpetuity…For this reason, the 5 year and 10 year estimates are not directly comparable. Rather, the Authority considers it appropriate that all 10 year/perpetual investment horizon type estimates of the return on equity can only be compared to the longer term average of the Authority's 5 year forward looking return on equity estimates using its proposed methodology.[52]

105. To illustrate the ERA's term structure argument, consider the simple case of a firm has $100 of equity in its regulated asset base and which has CAPEX equal to depreciation every year such that the equity RAB remains at $100. An allowed return of $11 per year would be sufficient to provide the real-world equity investors with their required return since:

$$\sum_{t=1}^{\infty} \frac{11}{1.11^t} = 100.$$

106. The equity investors would also receive their 11% required return over the long-run life of the asset if the allowed return was $8.45 per year for the first five years and $12.75 thereafter, since:

$$\sum_{t=1}^{5} \frac{8.45}{1.11^t} + \sum_{t=6}^{\infty} \frac{12.75}{1.11^t} = 100.$$

107. That is, if the regulator set the allowed market return to 8.45% for the next regulatory period and then to 12.75% for all subsequent regulatory periods, investors would (over the long-run) receive the 11% return that they currently require.

108. However, there are at least three problems with this application of the term structure argument:

a) There is no evidence that market practitioners or independent experts adopt a term structure approach. That is, there is no evidence that long-term assets are valued by applying one discount rate to near-term cash flows and a materially different discount rate to subsequent cash flows. This means that there is no evidence at all relating to what the market might view as being an appropriate discount rate to apply to cash flows beyond the present regulatory period. Consequently, there is no basis at all by which the reasonableness of the implied 12.75% market return can be assessed (and, as set out below, no reasonable prospect of it ever being delivered);

b) It would be possible to justify *any* arbitrarily low 5-year return on the basis that subsequent required returns are higher. For example, a regulator could argue that an initial 5-year return of 5% is consistent with the long-run market required return of 11% on the basis that the market is requiring a return of 5% on cash flows over the first five years and 15.11% on cash flows from year 6 and beyond:

$$\sum_{t=1}^{5} \frac{5}{1.11^t} + \sum_{t=6}^{\infty} \frac{15.11}{1.11^t} = 100.$$

That is, for *any* 5-year return, there is a corresponding assumed return for years 6 and beyond that equates to an average long-run return of 11%. For example, an initial 5-year return of

[52] ERA ATCO Gas Draft Decision, p. 175, Paragraphs 772, 774.

zero could be said to be consistent with the market's long-run required return of 11% by simply setting the assumed return for years 6 and beyond to a high enough level.[53]

With nothing to constrain the assumed market return for years 6 and beyond, *any* estimate of the required return for the first five years can be said to be consistent with the market's long-run required return of 11%. This means that it is impossible to test the regulator's allowed return for the next regulatory period against market evidence – because *every* possible regulatory estimate of the 5-year return could be said to be consistent with the market's long-run required return; and

c) The ERA has stated that investors should expect them to allow a return on the market of 10.9% on average over their determinations. As set out above, the only way that the ERA's current allowed market return of 8.45% could be consistent with a long-run requirement of 11% is if all subsequent determinations averaged an allowed market return of 12.75%. But such high subsequent returns would seem to be impossible given that the ERA has indicated that investors should expect to receive allowed returns of 10.9% on average subsequent to the current regulatory period, leaving them with a shortfall relative to the 12.75% return that would be required to compensate them for setting the allowed return for the current regulatory period below their long-run average. Moreover, as set out above, the best expectation of the outcome of the ERA approach at the next determination is an allowance materially below the historical average of 10.9%.

The operation of the ERA's term structure approach in different scenarios

109. To further explore the ERA's approach, we consider how it would operate in a range of scenarios set out below.

Scenario 1: Market conditions remain as they are

110. If market conditions remain as they are for subsequent determinations, the allowed return in the above example will be $8.45 in every year. In this scenario, equity investors would always require a return of $11 per year and they would always receive $8.45 per year. That is, at every determination investors would receive an allowed return that is below their long-run required return – on the basis that allowed returns in the future will be sufficiently above the long-run required return. However, the promised higher allowed returns in the future will never eventuate.

Scenario 2: Market conditions remain as they are for one more determination

111. If market conditions are expected to remain as they are for one more determination, the allowed return on all subsequent determinations would have to be $15.69 for investors to obtain their current required long-run return since:

$$\sum_{t=1}^{10} \frac{8.45}{1.11^t} + \sum_{t=11}^{\infty} \frac{15.69}{1.11^t} = 100.$$

112. In its ATCO Gas Draft Decision, the ERA indicates that even at the peak of the GFC, its current approach would have estimated the required market return to be 10-12%.[54] Assuming that there is no probability of the ERA ever setting the allowed return on the market as high as 15.69%, it would

[53] Of course, the lower the five year return, the higher the assumed return for years 6 and beyond must be. The higher the subsequent return is assumed to be, the less likely it is that it will ever be realised.
[54] ERA ATCO Gas Draft Decision, p. 175, Figure 29.

be impossible for investors to ever receive their long-run required return of 11% if the ERA repeated its current determination at just one more determination.

Scenario 3: Market conditions change, but the regulatory term structure is always upward sloping

113. In this scenario we assume that market conditions vary from one determination to another, but at every determination the regulator assumes that there is an upward-sloping term structure of required returns such that:

    a) The required market return over the next five years is lower than the long-run required market return; and

    b) The required market return over subsequent years is higher than the long-run required market return.

114. In this case, at every determination the regulator would always set the allowed return below the long-run required return. Investors would never have any prospect of receiving their long-run required return.

Scenario 4: Market conditions change, but the regulatory term structure is upward sloping on average

115. This scenario is the same as the previous one except that the allowed market return is lower than the long-run required market return on average, rather than at every determination. The outcome is the same – over the long-run, investors do not receive their allowed long-run return.

The ERA's ARORO test

116. The previous sections of this report make the point that it is easy to claim that the long-run commercial required return is consistent with the average of:

    a) A materially lower allowed return over the next five years; plus

    b) A materially higher allowed return over subsequent years.

117. We also make the point that the higher subsequent returns are unlikely to ever eventuate in practice.

118. In this regard, the ERA's Guideline sets out a test by which its allowed return on equity over time can be assessed against the allowed rate of return objective:

> The Authority considers that if the average of its estimates of the return on equity over a number of determinations varied significantly from the long term mean of 11.8 per cent (Table 48), then it would have cause to question whether its approach to developing the return on equity was achieving the allowed rate of return objective. [55]

119. The 11.8% benchmark is for the return on equity for the market. It is based on the ERA's observation that the long-run historical average return on the market is 11.8% and on the ERA's assessment that the market return is a stationary series:

[55] ERA Rate of Return Guideline, Appendix 29, p. 195, Paragraph 24.

> This historical return on equity series was analysed by the Authority and found to be stationary (see Appendix 16), meaning that its averages and variance can produce meaningful information for informing ranges and unconditional averages for the future. [56]

120. In summary, the ERA indicates that one test of whether its WACC estimation process is consistent with the allowed rate of return objective is whether the ERA's estimates of the required return on the market average 11.8% over time. That is, the ERA's ARORO test would be satisfied if the very low allowed market return of 8.45% in the ATCO Gas Draft Decision is offset by higher allowed returns in future determinations such that the allowed market return averaged 11.8%.

121. However, in its ATCO Gas Draft Decision, the ERA states that it will adopt a process that will result in its estimate of the required return on the market averaging 10.9% over time. The ERA now refers to its:

> estimate for the return on the market to perpetuity is the long run average of its return on equity estimates, of 10.9 per cent. [57]

and to:

> The Authority's comparable long run average of its estimates of the 5 year return on equity of 10.9 per cent.[58]

122. The ERA also states that its approach, when applied over the 1993-2014 period, would have averaged 10.9%.[59]

123. In summary, the way the ERA proposes to utilise its indicator variables will cause its future estimates of the required return on the market to be consistently and materially lower than what has been observed in the past. This is because, for the vast majority of determinations, the contemporaneous indicator variables will be below half of the extreme peak level that was observed for a very short period during the height of the GFC.

124. The result is that, according to the ERA's own figures, its WACC estimation process is bound to fail its own test of the allowed rate of return objective. The ERA expects its own market return estimate to average 10.9% which is materially less than the 11.8% historical average that forms the basis of the ERA's own test of its compliance with the allowed rate of return objective.

[56] ERA Rate of Return Guideline, Appendix 29, p. 194, Paragraph 22.
[57] ERA ATCO Gas Draft Decision, p. 180, Paragraph 786.
[58] ERA ATCO Gas Draft Decision, p. 180, Paragraph 786.
[59] ERA ATCO Gas Draft Decision, p. 178, Paragraph 784.

5. Consistency between the risk-free rate and the market risk premium

The current practice of the ERA

125. In the CAPM, the market risk premium represents the extent to which the expected return on the market portfolio exceeds the risk-free rate:

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

126. In its ATCO Gas Draft Decision, the ERA has adopted an estimate of the market risk premium of 5.5%. This estimate is selected from within a range that is formed on the basis of historical market returns and dividend discount models, all estimated by consultants and other regulators.[60]

127. Both sources of data estimate the MRP relative to the yield on 10-year government bonds. This is because the estimates were performed for other regulators who set the term of the risk-free rate to 10 years and because a long-term history of 5-year government bond yields is not available.[61]

128. That is, the ERA adopts a market risk premium, relative to the yield on 10-year government bonds, of 5.5%.[62] The yield on 10-year government bonds at the time of the ATCO Gas Draft Decision was 3.5%.[63] Together, these figures imply a required market return of 9%.

129. But the ERA then implements the Sharpe-Lintner CAPM using its fixed 5.5% MRP (which has been estimated relative to 10-year government bond yields) and an estimate of the five-year risk-free rate of 2.95%.[64] This implies an estimate of the required return for the average firm of:

$$\begin{aligned} r_e &= r_f + \beta(r_m - r_f) \\ &= 2.95\% + 1(9\% - 3.5\%) = 8.4\%. \end{aligned}$$

130. That is, having determined that the required return for the average firm is 9%, the ERA then sets the allowed return for ATCO Gas as though the required return for the average firm is only 8.4%. It uses a risk-free rate of 2.95% in one place, and a risk-free rate of 3.5% in another place – within the same CAPM formula.

GasNet inconsistency

131. In explaining its reasons for adopting a 10-year term for the risk-free rate, the AER recently had regard to the *GasNet* decision of the Australian Competition Tribunal:

> The Australian Competition Tribunal (the Tribunal) decided in its 2003 GasNet decision that 10 years is the appropriate term of the risk free rate in the CAPM. The Tribunal came to this view on the basis of two reasons:

[60] ERA ATCO GAS Draft Decision, p. 161, Paragraph 702.
[61] To be clear, our point here is in relation to the historical excess returns and dividend discount estimates that the ERA uses to construct its MRP range of 5% to 7.5%. Our point is that this range is based on estimates of the market return relative to the yield on 10-year government bonds, rather than relative to the yield on 5-year government bonds – which is what the ERA uses elsewhere in the same CAPM formula.
[62] We note that we do not agree that this is a reasonable estimate of MRP. However, the point being made here concerns the internal inconsistency of the ERA's estimation process, rather than the absolute value of the ERA's estimates.
[63] As at 9 September, 2014. Source: RBA.
[64] ERA ATCO Gas Draft Decision, p. 161, Paragraph 700.

> • as the MRP was estimated using a 10 year risk free rate, consistency demands that a 10 year risk free rate be used in the CAPM, and
>
> • it is a convention of economists and regulators to use a relatively long-term risk free rate where the life of the assets is relatively long.[65]

132. In its GasNet decision, the Tribunal stated that:

> The position of the ACCC was that it was required to make an evaluative judgment for the purposes of s 8.30 as to what the appropriate Rate of Return should be. Its position was that although consistency was desirable, best estimates have to be used when perfect information is not available, and that at various stages of the CAPM, approximations and estimates are required. The ACCC contends that such a use of estimates and approximations does not invalidate the use of the CAPM. While it is no doubt true that the CAPM permits some flexibility in the choice of the inputs required by the model, it nevertheless requires that one remain true to the mathematical logic underlying the CAPM formula. In the present case, **that requires a consistent use of the value of r_f in both parts of the CAPM equation where it occurs** so that the choice was either a five year bond rate or a ten year bond rate in both situations.[66]

133. The Tribunal went on to conclude that:

> The ACCC erred in concluding that it was open to it to apply the CAPM in other than the conventional way to produce an outcome which it believed better achieved the objectives of s 8.1. In truth and reality, **the use of different values for a risk free rate in the working out of a Rate of Return by the CAPM formula is neither true to the formula nor a conventional use of the CAPM**. It is the use of another model based on the CAPM with adjustments made on a pragmatic basis to achieve an outcome which reflects an attempt to modify the model to one which operates by reference to the regulatory period of five years. The CAPM is not a model which is intended to operate in this way. **The timescales are dictated by the relevant underlying facts in each case and for present purposes those include the life of the assets and the term of the investment**.[67]

134. In summary, the practice of the ERA in using the 10-year yield to estimate the risk-free rate in one part of the CAPM formula, and the 5-year yield to estimate the risk-free rate in another part of the same CAPM formula is inconsistent with the Tribunal's *GasNet* ruling.

The internal inconsistency in the ERA approach

135. During the ERA's Guideline process, a number of stakeholders raised the GasNet inconsistency issue – the fact that the ERA inputs two different estimates of the risk-free rate within the same CAPM formula. In responding to GGT's submission on this point, the ERA stated that:

> The Authority does not agree with GGT's assertion that an inconsistency exists with respect to the MRP calculation. The Authority is of the view that the 5-year CGS risk free rate of return applied in the Sharp-Lintner CAPM on the left is the best available proxy for the forward looking estimate of the risk free rate, consistent with the regulatory

[65] AER Draft Rate of Return Guideline Explanatory Statement, p. 182.
[66] ACT, Application by GasNet Australia (operations) Pty Ltd, [2003] ACompT 6, Paragraph 46, emphasis added.
[67] ACT, Application by GasNet Australia (operations) Pty Ltd, [2003] ACompT 6, Paragraph 46, emphasis added.

> period and the investment horizon. However, there is no similar proxy for the forward looking MRP on the right.[68]

136. This response is self-contradictory – it begins by claiming that there is no inconsistency, and then goes on to explain why the ERA considers the obvious inconsistency to be acceptable. On the first point, if one considers that the use of two different estimates of the same parameter in the same formula to be "an inconsistency" then clearly there is an inconsistency in the ERA's approach.

137. The claim that the inconsistency is acceptable is based on the notion that:

    a) The ERA believes that the risk-free rate is best estimated by the 5-year yield; but

    b) The only estimates of the MRP that are available are relative to the 10-year yield.

138. This leads the ERA to conclude that it is somehow forced to use these inconsistent estimates in the same CAPM formula. Such an argument is nonsensical. If the MRP is estimated relative to the 10-year yield, all the ERA would have to do is to add the current 10-year yield to its estimate of the MRP to obtain an estimate of the required return on the market. Then the ERA could populate the CAPM formula using the same estimate of the risk-free rate in both places that it appears. For example, the simple internally consistent calculation would be:

$$\begin{aligned} r_e &= r_f + \beta\left(r_m - r_f\right) \\ &= 2.95\% + 1\left(9\% - 2.95\%\right) = 9\%. \end{aligned}$$

139. This is no more complex and involves no additional cost relative to the ERA's current approach. It does, however, have the benefit of being internally consistent.

Conclusion

140. In our view, the same estimate of the risk-free rate should be used in the two places it appears in the CAPM formula.

[68] ERA Rate of Return Guideline Explanatory Statement, p. 87, Paragraph 456.

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Appendix 1: Instructions

Lally and the tenor of debt

The ERA asserts that the appropriate tenor for the risk-free rate is the term of the regulatory period; five years. This is based upon work by Lally (2007; and subsequently in numerous regulatory reports). Lally asserts that the only approach which provides an NPV=0 outcome is one where the cost of equity and debt has a five year term. There are four issues we require advice upon in relation to Lally's work and its subsequent use by the ERA:

1. Lally's use of a two-period model.

2. Lally's evolving viewpoint about refinancing risk, and the degree to which this changes his original findings.

3. The validity of the recent GGT proposal, which argues that regulators must capture what the market believes represents the risk-free rate and not match it to the regulatory term.

4. The ERA's assertion that, although there is published academic literature linking the term of debt to the regulatory period, there is none linking it to the term at issuance of debt (ERA Guideline Appendices, p36).

In respect of the first point, Lally posits a two-period model; assets last for two years, and are regulated as such. He posits four different models using combinations of one and two year rates. However, because the model only lasts two periods, if the regulator is using two-year rates, then this, in practice means that the regulator uses the two-year debt rate now and the one year debt rate a year from now; because the asset-life ends at the end of the next period. This is particularly important in respect of his Policies Two and Four (equations 6-8 and 13 & 14 respectively). For example, at the commencement of his discussion on Policy Two (p. 74), Lally notes:

"Since the firm is still using one year debt and the regulatory policy specified here still means use of the one year rate at time 1, then the situation in respect of the second year is unaffected".

What he means is that the revenue in this second period is equal to Lally's equation 1:

$$Rev_2 = C(1-k) + C(1-k)R_{12}$$

However, this is a function of Lally's assumption that there are two time periods. If the asset were assumed to last for three time periods, then the revenue in the second period under his Policy Two would be (in Lally's notation):

$$Rev_2 = C(1-k) + C(1-k)R_{13}^{y}$$

It is not obvious that this would then result in exactly the same cashflows and thus present value as occurs in his Policy One. A similar situation exists in his Policy Four.

The first task of this consultancy would therefore be to extend Lally's model from an asset life of two years to an asset life of three, and subsequently infinite years. We are interested in establishing how this would change Lally's conclusions and, in particular, whether it would mean that his Policy Four also solves his NPV=0 criteria. This should be done both for his simple case, and for his second case involving recontracting risk.

We are aware that other authors (notably Hall, in the same issue of the same journal) have criticised several of the underlying assumptions in Lally's model. For the purposes of this consultancy, we are not interested in these criticisms, but rather only in the narrow question of what happens if the regulatory life is extended beyond two years, and all other assumptions from Lally's model remain the same.

We believe that it is the assumption on asset life that drives Lally's results, and that, in general, setting the regulatory debt rate at the asset life minus one year (ie – one year if the asset life is two years) would allow regulated firms to meet the NPV=0 condition he establishes by mimicking the regulatory process. If the model does not solve for an infinite asset life, and Policy Four therefore is not found to meet Lally's NPV=0 condition, it would be sufficient to show that a modified Policy One (whereby the regulator and the firm set the debt rate to be the asset life minus one) would highlight this belief, and would be sufficient for the purposes of this consultancy.

In respect of the second dot point, although Lally (nor, indeed, to our knowledge, anyone else) has published no more work on this question in the peer-reviewed academic literature, he has produced numerous reports for various regulatory agencies. We are aware that Lally's viewpoint has changed over time. In particular, we understand that, particularly in recent work for the QCA (in 2010), he has indicated that there is merit in setting the debt risk premium equal to term to maturity of the prevailing debt (something the ERA also does) rather than to the regulatory period.

We seek an overview of how Lally's own views have evolved on his NPV=0 condition over successive regulatory reports, and a tying back to his initial 2007 paper. Our question is whether his subsequent revisions to his viewpoint invalidate his original findings, in the context of the model framework he has established, or whether it can still be said to hold. An alternative way to view the question is whether, in order to support his evolving viewpoint, Lally has implicitly or explicitly relaxed one or more of the assumptions underpinning his original work and whether this relaxation has other consequences for his findings that have not been explored. The obvious focus here is whether it still means the ERA's procedure of setting the term of the cost of equity and debt calculations to five years holds.

In respect of the third dot-point, GGT has recently filed a submission in which it suggests that regulators have mis-interpreted Lally's work because regulators do not set the risk-free rate, but rather set the overall cost of debt, choosing a risk-free rate which reflects market beliefs of what the risk-free rate actually is. The relevant discussion is contained in pages 71-81 of GGT's Access Arrangement Information document, available on the ERA's website. We seek independent expert opinion on whether there is merit in GGT's arguments, and whether these arguments do provide sufficient reason to change the ERA's stance on the relevant risk-free rate.

In respect of the final dot point, the ERA has argued in the appendices of its recent Rate of Return Guidelines, in the context of a discussion on whether to use the term to maturity or the term at issuance of debt, that (p36):

"While analysis has supported a term matching the length of the regulatory period (see Appendix 2 – The present value principle), the Authority is not aware of independent academic studies which objectively support matching a term consistent with the term at issuance of regulated entities debt"

We seek independent advice on whether this is in fact true. In a more general sense, is there academic literature which suggests that the term of debt ought to be set at lengths different to the regulatory period, or has this question been settled in the academic literature in the manner the ERA suggests.

We are seeking expert assistance on the above four points.