On the benchmark cost of debt

Efficiency considerations

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Secretariat Working Paper

Dr Duc Vo
Richard Begley
Stefan Mero
Beauden Gellard

Economic Regulation Authority
WESTERN AUSTRALIA

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Economic Regulation Authority
Perth, Western Australia
Phone: (08) 6557 7900

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Contents

1 Summary and conclusions

1. This working paper sets out the Secretariat's views of the efficiency properties of alternative approaches to estimating the cost of debt for the regulatory year. The working paper will inform discussion at a workshop between the Secretariat and interested parties in early July 2013. This work is being undertaken as part of the Authority's requirement to produce guidelines that will indicate to regulated entities the rate of return methodologies, estimation methods, financial models, market data and other evidence that are likely to be accepted by the regulator. The Authority must make these guidelines available by 29 November 2013.

2. The views expressed in this working paper are those of the Secretariat and should not be taken to be the views of the Authority.

3. The Authority's current approach to estimating the cost of debt is the 'on-the-day' approach, which is derived as the sum of:

   - the 5 year risk free rate, averaged over 20 days just prior to the commencement of the regulatory period; and
   - an estimate of the debt risk premium based on the average of a sample of bonds from firms with similar characteristics to the benchmark.

4. The recent changes to the National Gas Rules also provide for a 'portfolio' approach to be adopted, either:

   - the trailing average cost of debt – a long term average of historic outcomes on the overall cost of debt; or
   - the hybrid approach – a base rate derived consistent with the on-the-day approach, plus a long term average of the debt risk premium.

5. A further consideration relates to whether to adopt a single estimate once every five years, at the regulatory reset, or to update the cost of debt estimate annually.

6. The Secretariat has examined the efficiency properties of the alternative approaches to estimating the cost of debt. Economic efficiency may be considered in terms of three components:

   - Productive efficiency is achieved when firms in the economy produce any given level of output at lowest input cost. Such output may include investment in capital goods, as well as production of goods and services from the existing capital stock. The following outcomes will contribute to the achievement of productive efficiency:
     - The regulated firm funds its investments utilising the lowest input cost of debt, which reflects the prevailing interest rates that are consistent with efficient financing costs.
     - As a corollary, the regulated firm delivers its investments in the way that results in the highest net present value, using a hurdle rate that reflects the prevailing cost of funds at the time the investment decision was made.
   - Allocative efficiency is achieved when the economy produces only those goods and services which are most valued by society. This occurs at the point where the marginal cost of producing a good or service just equals the

willingness to pay for that good or service, which will be reflected in marginal revenue.[1]

  - The choice between investment and consumption in the economy needs to be based on the relative value of that investment to society as a whole. This requires that alternative investments throughout the economy, including by the regulated firm, are based on the prevailing cost of funds.

- Dynamic efficiency is achieved when firms make those investments which maximise the returns to the firm and society as a whole over time.

  - Here the cost of capital used by regulated firms – when deciding to invest in additional infrastructure – needs to be updated as market conditions change. The firm's decision should be based on the cost of capital expected to prevail over the life of the investment.

7. The on-the-day approach to estimating the cost of debt has better efficiency properties as compared to either of the portfolio approaches. The on-the-day approach is more efficient because it is a better forward predictor of the prevailing interest rate for each year of the regulatory period.

8. However, the on-the day approach has been criticised because it does not recognise that firms typically establish a debt portfolio with maturities that are staggered over time in order to avoid 'refinancing risk'. A related criticism is that regulated firms are unable to achieve the on-the-day estimate of the cost of debt because of financial market imperfections, such as the lack of suitable hedging instruments. To the extent that the benchmark firm cannot achieve the on-the-day estimate, due to financial market barriers, then there is a concern.

9. In this context, the Secretariat notes that the practice of staggering debt increases 'mismatch timing risk'. Mismatch timing risk derives from having revenue based on an assumption of the cost of debt that differs from the cost of debt that the firm actually incurs. This risk is one that is faced by both regulated and non-regulated firms.

   - Non-regulated firms operating in competitive markets face the mismatch timing risk associated with interest rates moving away from the level that underlies their revenue, and hence pricing, decisions.

   - Regulated firms also face a similar mismatch timing risk. However, mismatch timing risk currently is greater for regulated firms due to the artificial constraint imposed by the regulator in setting the cost of debt once every five years, at the start of each access arrangement period.

10. Mismatch timing risk leads to increased volatility for cash flows to equity.

11. The analysis presented in this paper suggests that mismatch timing risk can be significantly reduced by hedging the risk free rate, and a portion of the debt risk premium, through the use of interest rate swaps. This is possible for both regulated and non-regulated firms, at very low cost.

[1] Users of the regulated firm's services - both upstream and downstream – make production decisions that are based on efficient prices for the regulated service. At any particular point in time, the capital used for producing the regulated firm's output is 'sunk', and therefore does not contribute to (variable) marginal costs. Use of a regulated firm's service therefore should not depend on the cost of debt.

12. As noted, the residual basis risk is higher for the regulated firm because of the artificial constraint of fixing the cost of debt for the regulatory period.

13. However, this paper proposes that the residual basis risk for the regulated firm could be reduced by updating the on-the-day cost of debt each year. Such an approach would:

    - enhance dynamic, allocative and productive efficiency; and
    - more closely align the mismatch timing risk of the regulated firm to that faced by the non-regulated competitive firm.

14. The approach would also involve minimal transactions costs, particularly if a once every five years 'true up' in net present value terms was applied at each regulatory reset.

15. To the extent that the mismatch timing risk of the regulated firm would then be aligned with that faced by the unregulated competitive firm, then the outcome would be consistent with efficient financing costs, and with the requirement for efficiency more generally.

16. In summary, the Secretariat is seeking stakeholders' views on the costs and benefits of the alternative approaches to estimating the cost of debt, and on the implications for the approach that best meets the requirements of the National Gas Objective, the Revenue and Pricing Principles, and the Allowed Rate of Return Objective. The table on the following page summarises these costs and benefits, from the perspective of efficiency and the long term interests of consumers.

17. The Secretariat is also seeking stakeholder views in relation to the best approach to annual updating. Specifically, could there be any disadvantages to a 'once every five years true-up' of the annual estimated cost of debt, as compared to an approach which passed that cost differential through each year?

Table Efficiency considerations for approaches to estimating the cost of debt

On-the-day	• Best predictor for the prevailing cost of debt. • Base rate can be hedged, such that the firm's cost of debt is close to the prevailing cost. • Performs best in ensuring that the right types and amounts of investment are made (allocative and dynamic efficiency), and in providing incentives to deliver on those investments at least cost (productive efficiency). • Annual updates would further improve, and would align closest with the cost of debt faced by all firms in the economy.
Pure trailing average	• Worst predictor for the prevailing cost of debt. • Firm's cost of debt is likely to be furthest from the prevailing cost. • Performs least well in ensuring that the right types and amounts of investment are made (allocative and dynamic efficiency), and in providing incentives to deliver on those investments at least cost (productive efficiency). • Annual updates would improve performance in prediction terms, but distortions would remain in that the regulated firm could have a lower cost of debt than other firms in the economy, due to the potential removal of mismatch timing risk.
Hybrid trailing average	• Performance prediction close to that of the on-the-day approach. • Base rate can be hedged, so firm's cost of debt is therefore likely to be closer to the prevailing cost than the trailing average approach. • Performs moderately well in ensuring that the right types and amounts of investment are made (allocative and dynamic efficiency), and in providing incentives to deliver on those investments at least cost (productive efficiency). • Annual updates would improve performance in prediction terms, but distortions would remain in that the regulated firm could have a lower cost of debt than other firms in the economy, due to the potential removal of mismatch timing risk.

Source: ERA Secretariat

1.1 Consultation

18. Submissions on any matter raised in this Consultation Paper may be in either written form or, preferably, electronic form. Submissions should be marked to the attention of Mr Richard Begley, Regulatory Advisor and addressed to:

Rate of Return Guidelines Review
Economic Regulation Authority
PO Box 8469
Perth BC WA 6849

Email: publicsubmissions@erawa.com.au
Submissions must be received by **4:00 pm (WST)** on **Monday 8 July 2013**.

19. The ERA Secretariat prefers that all submissions be in an electronic format and be made publicly available, so as to facilitate an informed, transparent and robust consultation process. Accordingly, submissions will be treated as public documents and posted on the ERA's website, www.erawa.com.au, unless prior arrangements are made with the ERA to treat the submission, or portions of it, as confidential.

20. For further information, please contact Mr Richard Begley on (08) 6557 7900.

2 Regulatory framework for determining the rate of return

2.1 Introduction

21. This chapter sets out the Secretariat's view on the regulatory framework that informs the development of the rate of return guidelines. It first sets out the origins of, and the current broad approach to, regulation of energy utilities in Australia. It then summarises the requirements of the National Gas Law and the National Gas Rules, and draws on these to articulate a framework for the rate of return regulatory decision making process.[2]

2.2 A short history of incentive regulation

22. Incentive regulation has a reasonably short history in Australia. Up until 1990 public ownership of monopoly infrastructure was one recognised way to control monopoly behaviour, as it provided a 'window' for the government, as the major shareholder, to control output, as well as influence levels of investment and operating costs.

23. However, it also was recognised that this approach to dealing with monopolies often entailed significant economic loss, as it did not provide the expected discipline on inefficient investment and operating expenditures. Utilities often continued to 'game' the government owner, extracting monopoly rents through unproductive activities such as 'x inefficiency' and 'gold plating'.[3]

24. By the 1980s, these problems were being recognised, and in response, new regulatory approaches were being developed:[4]

> Beginning in the 1980s, theoretical research on incentive regulation rapidly evolved to confront directly imperfect and asymmetric information problems and related contracting constraints, regulatory credibility issues, dynamic considerations, regulatory capture, and other issues that regulators have been trying to respond to for decades but in the absence of a comprehensive theoretical framework to guide them.

25. This led to a rapid change in approach from the late 1980s to adopt 'incentive regulation:[5]

> What do we mean by incentive regulation? In particular, it means that the regulator delegates certain pricing decisions to the firm and that the firm can reap profit increases from cost reductions. Incentive regulation makes use of the firm's

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2 Arrangements for regulation of monopoly networks for electricity under the National Electricity Law are essentially the same as those for gas, particularly with regard to the rate of return.

3 This situation contrasted with that in the United States, where private ownership and statutory monopoly regulation through independent 'cost of service' (or rate of return) regulation had existed for much of the 20th Century. However, it was recognised from the 1960s on that this approach could also lead to inefficiencies, particularly through a tendency to increase capital investment (the 'Averch Johnson' effect). Some economists suggested that the outcomes were no better than unregulated monopoly.

4 Joskow P. 2006, *Incentive Regulation in Theory and Practice: Electricity Distribution and Transmission Networks*, Cambridge Working Papers in Economics 0607, http://ideas.repec.org/s/cam/camdae.html.

5 Vogelsang I. 2002, Incentive Regulation and Competition in Public Utility Markets: A 20-Year Perspective, *Journal of Regulatory Economics*; 22:1, p. 6.

> information advantage and profit motive. The regulator thus controls less behaviour but rather rewards outcomes.
>
> Worldwide, the introduction of incentive regulation has been part of the regulatory reform movement, consisting of privatization, liberalization and deregulation...
>
> ...The most important types of incentive regulation have been price caps, rate case moratoria, profit sharing, banded rate of return regulation, yardstick regulation, and menus. Overall, price caps have become the most widespread...
>
> ...Price caps are defined by an index of the regulated services that is adjusted annually by (1) an inflation factor that takes care of the economy-wide price level or of the level of input prices, (2) an X-factor that reflects efficiency improvements of the firm, and (3) a Y-factor that allows for pass-through of specific cost items outside the firm's control. The index is further adjusted in regulatory proceedings over the longer-term

2.3 Incentive regulation in Australia

26. The policy response in Australia was to initiate and adopt the recommendations of the 1993 Hilmer review, which set out a comprehensive program of microeconomic reform for the monopoly utility sector.[6] Hilmer's proposed reforms for competition policy included the restructuring of public sector monopoly businesses, and the arrangements to facilitate third party access to nationally significant infrastructure. The intent was to introduce the discipline of competitive markets wherever possible, and to regulate for efficiency in the remaining monopoly elements.

27. These proposals were subsequently broadly implemented by the Council of Australian Governments, through the Competition Principles Agreement of 1995 and associated reforms. In addition, under clause 2 of the Competition Principles Agreement, states and territories undertook to establish independent sources of prices oversight for their monopolistic business enterprises.

2.4 Incentive regulation for gas infrastructure

28. These arrangements, once established, continued to evolve. In the case of gas, the updated 2009 National Gas Law (**NGL**) provides for a legislated uniform national framework governing access to monopoly gas infrastructure, and arrangements for prices oversight. The national gas objective (**NGO**) sets out the aim of the NGL:[7]

> The objective of this Law is to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.

29. A number of revenue and pricing principles (**RPP**) in the NGL give effect to the objective.[8] The RPP establish that the NGO is to be promoted by targeting economically efficient outcomes, through effective *incentives* for efficient investment in infrastructure and efficient provision of services and the use of the infrastructure, specifically:

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6 For a summary, see http://ncp.ncc.gov.au/pages/reform.

7 Western Australian Government Gazette 2009, *National Gas Access (WA) Act 2009*, www.slp.wa.gov.au, p. 76.

8 Ibid.

> A service provider should be provided with effective incentives in order to promote economic efficiency with respect to reference services the service provider provides.
>
> The economic efficiency that should be promoted includes—
>
> (a) efficient investment in, or in connection with, a pipeline with which the service provider provides reference services; and
>
> (b) the efficient provision of pipeline services; and
>
> (c) the efficient use of the pipeline.

30. This specification of 'effective incentives in order to promote economic efficiency' in the RPP is entirely consistent with the incentive regulation approach. Incentive regulation provides an opportunity for the regulated utility to perform better than the regulator's ex ante forecasts of its costs. Subsequent savings are then shared between the utility and consumers. This is recognised as creating incentives for outcomes that are more efficient, and hence in the long term interests of consumers.

31. With regard to rate of return, the Australian Energy Market Commission has established the new allowed rate of return objective in the National Gas Rules (**NGR**):[9]

> The allowed rate of return objective is that the rate of return for a service provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the service provider in respect of the provision of reference services

32. In this context, the AEMC stated in its final rule determination that the new allowed rate of return objective is intended to be consistent with the National Electricity Objective (**NEO**), the NGO and the RPP:[10]

> The Commission has taken the opportunity in this final rule determination to explain how the new rules are to be interpreted. Most importantly, the new rules allow the regulator (and the appeal body) to focus on whether the overall rate of return meets the allowed rate of return objective, which is intended to be consistent with the NEO, the NGO and the RPP.

2.5 Implications for the regulator

33. At the outset, given the requirements set out above, the anchor for any regulatory decision will be the overall regulatory framework that is considered to best deliver the requirements of the NGL, NGR, NGO, RPP and the allowed rate of return objective. The Secretariat considers that this framework may be informed by an objective function, and a number of constraints:

    1. The primary objective is to achieve a rate of return for a service provider 'commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk in respect of the provision of reference services'.[11] Related objectives include a need to achieve the allowed rate of return:

[9] Australian Energy Market Commission 2012, *National Gas Rules*, www.aemc.gov.au, clause 87(3).

[10] Australian Energy Market Commission 2012, *Rule Determination: National Electricity Amendment (...)Rule 2012*, www.aemc.gov.au, 29 November, p.23.

[11] National Gas Rule 87(3) – the allowed rate of return objective.

i) for each of the regulatory years;[12]

ii) incorporating effective incentives to promote efficient investment;[13]

iii) that is in the long term interests of consumers.[14]

2. A constraint is that uncertainty about the future, information asymmetries, and circularity problems complicate the task of determining the rate of return. On this basis, it is recognised that the regulator needs only to estimate a cost of debt and cost of equity which gives the efficient service provider 'reasonable opportunity' to recover its costs over the regulatory period.[15]

3. A further constraint is a requirement to minimise transaction costs for the service provide and regulator.

34. The current regulatory approach assumes that the efficient firm that meets the above objectives provides the 'benchmark'. The 'benchmark efficient firm' informs the cost building blocks for each regulatory decision.

35. A major implication of point 1 is that the rate of return must remunerate the financing costs of the service provider, in terms of net present value. This is referred to as the NPV=0 rule.

36. The implication of the efficiency element of point 1 is that the benchmark firm is assumed to be on or near the efficiency frontier, consistent with the performance and cost structure of an efficient service provider. The efficient firm would be part of the portfolio of efficient assets held by an investor:

- The benchmark firm's efficient cost of finance will reflect the prevailing conditions in capital markets for the cost of debt and equity, taking into account its risk. The resulting discipline on its cost structure is entirely consistent with that faced by firms in competitive markets, where prices, and returns, are set with reference to the prevailing cost of capital.
- An implication of adopting the benchmark efficient firm is that the actual decisions of the service provider may differ (and often will differ) from the benchmark firm. However, under incentive regulation the regulator does not compensate the regulated service provider for its actual decisions, but compensates it *as if* it were operating efficiently. If the service provider is not actually operating efficiently relative to the benchmark then that is a matter for management and the shareholders of the service provider.
- In addition, the benchmark cannot be purely hypothetical. The benchmark should be based on the actual costs and risks faced by an efficient service provider.

[12] National Gas Rule 87(4).

[13] National Gas Law 24(3) – a Revenue and Pricing Principle – states that the 'a service provider should be provided with effective incentives to promote economic efficiency with respect to reference services'. Note that the AEMC has stated that 'The Commission has taken the opportunity in this final rule determination to explain how the new rules are to be interpreted. Most importantly, the new rules allow the regulator (and the appeal body) to focus on whether the overall rate of return meets the allowed rate of return objective, which is intended to be consistent with the NEO, the NGO and the RPP' (Australian Energy Market Commission 2012, *Rule Determination: National Electricity Amendment (...)Rule 2012*, www.aemc.gov.au, 29 November, p.23.

[14] As per the National Gas Objective.

[15] National Gas Law 24(2) – a Revenue and Pricing Principle – states that the 'service provider should be provided with a reasonable opportunity to recover at least the efficient costs the service provider incurs'.

- The benchmark approach provides high powered incentives for the regulated business. If the regulated business is able to exceed the benchmark performance, it is able to retain any increased profits during the regulatory period. If the regulated firm fails to achieve the benchmark, then its bears the relevant losses.

37. An implication of the subsidiary objective of point 1(i) relating to regulatory years is that the allowed rate of return objective looks forward to the actual regulatory years of the access arrangement period.

38. An implication of the subsidiary objective of point 1(ii) relating to effective incentives is that best practice regulation will generally set an estimated return ex ante, and then allow the firm to capture a portion of any subsequent out-performance. A portion of the out-performance resulting from this incentive regime ultimately may be shared with consumers.

39. An implication of point 1(i) and point 2 is that the regulator sets the rate of return based on the most 'reasonable' predictors of the cost of debt and the cost of equity for the future regulatory years.[16] One advantage of establishing incentive regimes under point 1(ii), noted above, is that these may be structured to help the regulator to observe the true finance costs of the firm, thereby assisting the regulator to overcome information asymmetries.

40. An implication of point 3 is that regulators are reluctant to revisit the returns to the firm too frequently, as this increases transactions costs for both the regulator and the firm. It also reduces the power of any incentives associated with an ex ante approach. Current practice is to set the regulated return for a five year period.

[16] National Gas Law 24(2) – a Revenue and Pricing Principle – states that 'a service provider should be provided with a reasonable opportunity to recover at least the efficient costs the service provider incurs...'.

3 An application: evaluating approaches for estimating the cost of debt

41. When considering approaches to the cost of debt, the framework set out above implies that we evaluate any proposed approach within the three key dimensions:

- efficiency – does the proposed approach lead to efficient financing costs; in particular, is it:
  - a good predictor for the actual cost of debt in the regulatory years;
  - an approach which retains incentives for the regulated firm to out-perform the estimated cost of debt;
- reasonable opportunity – does the proposed approach result in a cost of debt that could be achieved in the market place by a firm that met all the characteristics of the benchmark; and
- transactions costs – does the proposed approach minimise costs for both the regulator and the regulated firm with regard to the cost of debt?

3.1 Alternative approaches for estimating the cost of debt

3.1.1 The Authority's current approach

42. The current 'on-the-day' approach used by the Authority is derived as the sum of:

- the 5 year risk free rate, averaged over 20 days just prior to the commencement of the regulatory period; and
- an estimate of the debt risk premium based on the average of a sample of bonds from firms with similar characteristics to the benchmark.

3.1.2 Alternative approaches

43. Alternative approaches to estimating the cost of debt may be based on a 'portfolio approach', either:[17]

- the trailing average cost of debt – a long term average of historic outcomes on the overall cost of debt; or
- the hybrid approach – a base rate derived consistent with the on-the-day approach, plus a long term average of the debt risk premium.

44. A further consideration relates to whether to adopt a single estimate once every five years, at the regulatory reset, or to update the cost of debt estimate annually.

[17] For more details on these alternative approaches, see SFG Consulting 2012, *Rule change proposals relating to the debt component of the regulated rate of return: Report for AEMC*, www.aemc.gov.au.

3.2 Prediction performance

45. In general, the best 'ex ante' predictor of the cost of debt in a future period is the on-the-day estimate made just prior to the future period. Analysis by the Secretariat supporting this contention is provided at Appendix 1:

- The best predictor for the average cost of debt over the *whole of the access arrangement period* is the on-the-day estimate that is made just prior to the commencement of the access arrangement.
- A better predictor of the future cost of debt may be developed by shortening the prediction period, utilising an on-the-day estimate that is updated just prior to *each annual regulatory year*.

46. Under both a portfolio approach and an on-the-day approach, movements in the market return on debt are reflected in the allowed return on debt. This may be either during the regulatory control period, if annual updating is used, or between periods if no annual updating is used.

47. By incorporating market changes during the regulatory control period, the annual updating approach improves the performance of *any* predictor for the actual cost of debt. However, to the extent that the on-the-day approach is a better predictor, then again, if updated annually, it would provide the best predictor.

3.3 Economic efficiency considerations

48. Economic efficiency may be considered in terms of three components:

- Productive efficiency is achieved when firms in the economy produce any given level of output at lowest input cost. Such output may include investment in capital goods, as well as production of goods and services from the existing capital stock. The following outcomes will contribute to the achievement of productive efficiency:
  - The regulated firm funds its investments utilising the lowest input cost of debt, which reflects the prevailing interest rates and efficient financing costs.[18]
  - As a corollary, the regulated firm delivers its investments in the way that results in the highest net present value, using a hurdle rate that incorporates the prevailing cost of funds at the time the investment decision was made.
- Allocative efficiency is achieved when the economy produces only those goods and services which are most valued by society. This occurs at the point where the marginal cost of producing a good or service just equals the willingness to pay for that good or service, which will be reflected in marginal revenue.[19]

[18] All of the approaches to estimating the cost of debt will retain incentives for the regulated firm to reduce its cost of debt below the regulatory allowance. However, any shortening the period between updates of the cost of debt may reduce, but are unlikely to remove, the incentives to outperform the regulatory allowance.

[19] Users of the regulated firm's services - both upstream and downstream – make production decisions that are based on efficient prices for the regulated service. At any particular point in time, the capital used for producing the regulated firm's output is 'sunk', and therefore does not contribute to (variable) marginal costs. Use of a regulated firm's service therefore should not depend on the cost of debt.

  - The choice between investment and consumption in the economy needs to be based on the relative value of that investment to society as a whole. This requires that alternative investments throughout the economy, including by the regulated firm, are based on a hurdle rate that incorporates the prevailing cost of funds.[20]

- Dynamic efficiency is achieved when firms make those investments which maximise the returns to the firm and society as a whole over time.
  - Here the cost of capital used by regulated firms – when deciding to invest in additional infrastructure – needs to be updated as market conditions change. The firm's decision should be based on the cost of capital expected to prevail over the life of the investment, and which incorporates the prevailing cost of funds.

49. As it is a better predictor, the on-the-day approach will outperform either of the portfolio approaches with regard to efficiency considerations. Its relative performance against each of these elements is considered further in what follows, starting with dynamic efficiency.

3.3.1 Dynamic efficiency

50. Dynamic efficiency will be enhanced when firms make the 'right' investments that maximise returns over the longer term. The right investments will maximise the net present value over their life, based on a discount rate that reflects the opportunity cost of funds over that life. The prevailing cost of funds is a key component in that discount rate, and hence in ensuring that the right investment decisions are made.

51. As the on-the-day approach has been demonstrated to be a better ex ante predictor than the trailing average approach (see Appendix 1), it performs better with regard to this efficiency consideration. This is because the gap between a firm's actual debt finance cost for a new investment and the prevailing debt finance cost is minimised. It is therefore more dynamically efficient.

3.3.2 Allocative efficiency

52. A divergence between actual debt costs and the allowed regulatory return on debt – where the latter is established at the start of the regulatory period ('ex ante') – would likely result in sub-optimal investment decisions. A service provider would be incentivised to over-invest when the prevailing cost of new debt is lower than the regulated allowance, and to under-spend when the opposite is true. This would occur irrespective of whether the ex ante regulated allowance was derived from an 'on-the-day' or portfolio approach.

53. However, as the on-the-day approach has been demonstrated to be a better ex ante predictor than the trailing average approach (see Appendix 1), it performs better with regard to this efficiency consideration. This is because the gap between a firm's actual debt finance cost for a new investment and the prevailing debt finance cost is minimised. It is therefore more allocatively efficient.

[20] To ensure optimal levels of investment, correct variable (marginal) cost output pricing is required, as it will reveal the efficient level of demand, and the point at which the network is becoming constrained. Together, the efficient level of demand, combined with the total long run marginal cost of meeting that demand will signal the optimal level of investment to expand output. Here, the cost of debt is included in the total long run marginal cost, and is therefore a consideration in the investment decision.

3.3.3 Productive efficiency

54. Generally, firms adopt a staggered debt portfolio as an efficient means to manage re-financing risk and the associated liquidity risk. Prudent management of re-financing risk lowers the cost of debt.

55. However, adopting a more staggered debt portfolio may increase mismatch timing risk. Mismatch timing risk derives from having revenue based on an assumption of the cost of debt that differs from the cost of debt that the firm actually incurs. Increased mismatch timing risk may lead to a higher cost of debt, as lenders seek to account for the overall increased risk. As a consequence, there will be an optimal portfolio, which balances the increased mismatch timing risk with the reduced re-financing risk.

3.3.3.1 Re-financing risk

56. For the benchmark firm, the current regulatory approach estimates the debt risk premium by estimating the average spread to the risk free rate from a sample of observations of firms with the same credit rating as the benchmark. The resulting average credit spread reflects the average debt risk premium of the sample.

57. The prime driver of credit spreads over the base interest rate, all other things being equal, is the expected value of loss.[21] The expected value of loss is the product of the expected probability of default, and the magnitude of the resulting potential loss. The credit spread for every entity will be different, as in addition to the broader macro and industry risk factors, there will be risk factors that are specific to the entity itself.[22]

58. Given this, the estimated debt risk premium will reflect the 'average' management of the re-financing risk by entities. That is to say, the observed credit spread will reflect the cost of debt associated with the (sample average, efficient) minimisation of the default risk. The corollary is that the estimate includes a risk margin for the expected 'average' value of default for the sample, which is the average amount of residual re-financing risk. It is efficient to trade off some re-financing risk against a reduced cost of debt. To completely eliminate it would be inefficient.

59. It follows that the resulting observed cost of debt is 'around' that of an efficient finance structure. An entity that has implemented an efficient financing structure, which minimises the costs associated with default risk, given the size of its borrowing requirement, is likely to have an equal or lower credit spread than the estimated average credit spread, all other things being equal. If a regulated firm was not managing re-financing risk at least as efficiently as the average, then it would likely have a higher credit spread.

60. Given that we are seeking a 'reasonable' estimate of the cost of debt over the access arrangement period, the sample of observations gives a 'reasonable' credit spread, which includes a margin for the efficient level of residual default risk. On this basis, the sample estimate will give a debt risk premium, which when added to the risk free rate, provides for a cost of debt which the efficient firm will have a reasonable opportunity to achieve.

[21] The base rate may be either the Commonwealth Government Securities bond, or the swap rate.

[22] As noted by the Brattle Group, credit risk includes systematic and non-systematic risks (see Australian Pipeline Industry Association 2012, *Rate of Return Review*, www.erawa.com.au, Schedule 2, p. 68).

3.3.3.2 Mismatch timing risk

61. The major issue for regulated firms would therefore appear to be the mismatch timing risk. A major criticism of the on-the-day approach is that firms are unable to match the resulting estimate used by the regulator to set the return on debt. The inability to match existing staggered debt costs to the regulated on-the-day rate arises because there are barriers in financial markets that preclude complete hedging. These barriers in large part arise due to a lack of adequate debt markets in Australia, of reasonable depth and liquidity.

62. Even where an actual difference in a regulated firm's actual cost of debt arises – as compared to the regulated cost of debt – the firm's net present value of its debt may still equal zero over the long run (NPV=0), provided that the average term of the firm's debt matches the term of the regulatory estimate (five years), all other things being equal (see Appendix 2 for a summary of evidence). However, with imperfect hedging, this outcome is less assured. Nevertheless, even with imperfect hedging, the over-statement of the cost of debt will be matched by under-statement of the cost of debt over the long term. It follows then that NPV=0 is likely to be maintained over the longer term.

63. Mismatch timing risk has a cost, in that it leads to increased volatility for cash flows to equity.[23]

64. This volatility would result in a higher β, all other things being equal, so would still be compensated for the regulated firm. To the extent that this volatility was reduced, such as by moving to some kind of trailing average approach, then historic observations of the β would need to be adjusted down, to account for the reduction of this mismatch timing risk.

65. However, as noted at paragraph 33 above, it is desirable that the efficient benchmark cost of debt reflects the actual opportunity costs, and not be hypothetical. To the extent that the benchmark firm cannot match the on-the-day estimate, due to financial market barriers, then there is a concern.

3.3.3.3 Ability to reduce mismatch timing risk through hedging

66. The Authority engaged Chairmont Consulting to evaluate the degree to which a regulated firm may hedge its portfolio of debt to match the current on-the-day regulated rate, and the costs of doing so. The Chairmont Consulting report is at Appendix 3.

67. Chairmont concluded that hedging the on-the-day regulated rate is not possible:

- efficient firms stagger their debt issuance, typically issuing debt 'opportunistically' in a range of markets, as a means to manage re-financing and liquidity risk;
- this leads to mismatch timing risk, also known as re-pricing risk, which is associated with the constrained cost of debt set by the regulator through the on-the-day approach;
- regulated firms can hedge the on-the-day regulated base risk free rate for even very large amounts of debt through interest rate swaps, at low cost;

[23] SFG Consulting 2012, *Rule change proposals relating to the debt component of the regulated rate of return*, www.aemc.gov.au, p. 22.

- however, there are no effective tools for hedging the debt risk premium in Australia – Credit Default Swaps provide one avenue but this market is narrow, reasonably illiquid, and there are no Credit Default Swaps available that are linked to the debt risk premium of the companies regulated by the Authority;
- therefore, a basis risk variation between the actual and benchmark cost of debt remains.

68. Chairmont's estimates of the basis point differential between a typical efficient portfolio and the on-the-day cost under plausible scenarios is:

- up to around 150 bps where no hedging is undertaken; and
- around 50 bps if hedging of the base swap rate is undertaken.

3.3.3.4 Is some residual level of basis risk efficient?

69. Chairmont note that a typical 'competitive' firm will seek to cost effectively remove any mismatch timing risk.[24] The base rate component could be hedged by purchasing exchange traded futures on Commonwealth Government Securities, or by undertaking interest rate swaps.[25] However, the competitive firm's debt risk premium cannot be hedged consistently, except by a few large firms of sufficient size for which there is a liquid corporate debt market. As a result, the competitive firm will inevitably face some mismatch timing risk on the debt risk premium component of its past debt issuances. Chairmont note:[26]

> Most companies regardless of the industry will face either some degree of Mismatch Interest Rate Risk or some risk of an interest rate increase on the expense side which has no offsetting counterpart on the revenue side.

70. The result is that some residual basis mismatch timing risk related to the debt risk premium for a regulated firm could be consistent with that faced by an unregulated competitive firm operating in the economy:[27]

> It is noted that non-regulated companies in other industries are also likely to face some form of interest rate risk, because they do not have revenue items which equally offset changes in their debt funding costs. Some businesses are likely to face greater interest rate risk than regulated utilities and some are likely to face less. The special case of regulated energy entities arises because the revenue impact of interest rates is fixed each five years for that amount of time, whereas a non-regulated industry will typically face changing interest rate impacts continually across time.

71. Both the regulated firm and the competitive firm may readily manage the base rate timing risk through swaps.[28] To the extent that residual basis risk is similar, the regulator need not be concerned.

72. On the other hand, it may be observed that if the regulator set the cost of debt through a portfolio approach, then the regulated firm could have no residual

[24] This is the standard approach where the cost of finance is not a core business or profit centre. See Chairmont Consulting 2013, *Comparative Hedging Analysis*, www.erawa.com.au, p. 9.

[25] Chairmont Consulting 2013, *Comparative Hedging Analysis*, www.erawa.com.au, p. 4.

[26] Chairmont Consulting 2013, *Comparative Hedging Analysis*, www.erawa.com.au, p. 9.

[27] Chairmont Consulting 2013, *Comparative Hedging Analysis*, www.erawa.com.au, p. 15.

[28] Chairmont Consulting also note that hedging through swaps also hedges a portion of the debt risk premium, consistent with the spread between the risk free rate and the base swaps rate (see Chairmont Consulting 2013, *Comparative Hedging Analysis*, www.erawa.com.au, p. 14).

mismatch timing risk, where it issued debt in equal tranches consistent with the periods of the trailing average. As the mismatch timing risk relates largely to the debt risk premium, then this would be the same irrespective of whether a pure trailing average or a hybrid portfolio was adopted.

73. Removing this mismatch timing risk from the regulated firm could artificially lower the cost of debt, all other things equal, given that lenders consider all risks when setting the debt risk premium. This artificial lowering for the regulated firm, as compared to the market firm, would result in a distortion in financing costs between firms in the economy. This provides a further reason, in addition to the efficiency considerations, as to why the trailing average portfolio approach is less efficient than the on-the-day approach.

3.3.3.5 An optimum approach to setting the regulated cost of debt?

74. The 'once every five years' setting of the regulatory cost of debt under the current approach is an artificial constraint on regulated firms, which is not faced by competitive market players. This may increase the extent of the mismatch timing risk for the regulated firm, as compared to the competitive market firm. This difference occurs because the regulated debt risk premium is fixed every five years, but the competitive market debt risk premium may vary continuously.

75. A solution to the artificial constraint imposed by the once every five years setting of the regulated cost of debt could be to update the estimate of the cost of debt annually. Updating the on-the-day estimate annually would bring the cost of debt faced by the regulated firm much closer to the prevailing cost of debt faced by the competitive market firm. The resulting mismatch timing risk would also therefore be similar, and thus reasonable. Annual updating of the on-the-day estimate would also have the benefit of improving the performance of the ex ante predictor of the cost of debt, with associated dynamic efficiency benefits (as set out above).

76. However, there would be potential costs in terms of increased transactions costs, and also in a reduction in incentives to 'beat' the regulated rate.

77. Transactions costs could be minimised by only 'trueing up' any differences – between the once every five years cost of debt, made at the start of the regulatory period, and subsequent differences to the annual updated cost of debt – at the next regulatory reset. Such an approach would virtually remove transactions costs, while retaining strong incentives for efficient investment.

Appendices

Appendix 1 Predictors for the cost of debt and their comparative performance

Issue

1. The Queensland Treasury Corporation (**QTC**) has proposed the use of a 'trailing average approach' to estimating the cost of debt in cost of capital determinations for regulated entities. Specifically, they advocate the use of a 10-year trailing average, updated annually at the beginning of each regulatory year in the five-year regulatory control period.

2. The Secretariat currently advocates the use of the 'current' cost of debt as the most efficient forecast of the average cost of debt over the forward looking 5-year regulatory period. The rationale is based on the efficient market hypothesis which postulates that where rates follow a random walk, today's rate is the most 'efficient' forecast of tomorrow's rate.

3. In order to determine whether this method is efficient the Diebold-Mariano tests of forecasting efficiency were used to test the predictive power of the 20-day average, the current averaging period, versus the 10-year trailing average forecast, proposed by QTC.

Background

4. The Diebold-Mariano test previously outlined in the Authority's averaging period analysis has been identified as an effective and objective test of forecasting efficiency.[29]

Analysis

Data

5. Bloomberg's data on the 10-year Commonwealth Government Security indices were used in the analysis as this provided the longest time series. The 20-day, 60-day and 10-year averaging periods were compared. For each of these averaging periods, two additional series were created: (1) the annually updated series at the beginning of the year; and (2) the fixed series without annual updates.

Annually Updated Series

The annually updated series updated the risk-free rate estimate at the beginning of each year over a 5-year period to reflect the assumption that 20 per cent of an entire debt portfolio is refinanced each year. This update was based on either the 20 days, or the 60 days or the 10 years prior to *the relevant year* of the regulatory control period. The average was then calculated for the 5-year period and compared this average to the observed average to derive *an error forecast series* which could be tested against a competing forecast's error series.

[29] Economic Regulation Authority 2012, *Final Decision on Proposed Revisions to the Access Arrangement for the Western Power Network*, www.erawa.com.au, Appendix 9, p. 659.

Fixed Series

The fixed series only updated the forecast at the beginning of a 5-year period based on either the 20-days period, or the 60-days period or the 10-years period prior to *a relevant regulatory control period*. This average was then compared to the observed average of a historical risk-free rate for the 5-year period to derive an error series to be tested against the others.

The data covers the period from July 1979 to February 2013. Five years of data are lost from 2013 retrospectively, as the 5-year observed averages of a risk-free rate require the 5 years of data ahead. The data set comprised 7,460 observations.

Results

6. Three different scenarios were tested:

   1. Both the 20- (or the 60-) day period and the 10-year fixed series were tested against each other, to be named as *Scenario 1*.

   2. Both the 20- (or the 60-) day period and the 10-year annually updated series were tested against each other, to be named as *Scenario 2*.

Table 1 Diebold-Mariano Test Results for the 20-Day Averaging Versus the 10-Year Averaging Period

	Scenario 1	Scenario 2
Absolute Loss Function	-2.90	-3.11
Outcome:	Reject	Reject
20 Day Forecast is:	Superior	Superior

7. Results where the absolute values are greater than 1.96 are statistically significant with 95 per cent confidence. *Negative values* indicate that the twenty day average is the superior forecast, where as positive results indicate the opposite. The results indicate that, in both scenarios, the 20-day forecast is superior compared with the 10-year averaging period.

Table 2 Diebold-Mariano Test Results for the 60-Day Averaging Versus the 10-Year Averaging Period

	Scenario 1	Scenario 2
Absolute Loss Function	-2.92	-3.16
Outcome:	Reject	Reject
60 Day Forecast is:	Superior	Superior

8. Table 2 indicates that, in both scenarios, the 60-day forecast is superior over the 10-year averaging period.

9. The same tests as above were conducted using a 5 year trailing average series in place of 10 years. The results are shown below.

Table 3 Diebold-Mariano Test Results for the 20-Day Averaging Versus the 5-Year Averaging Period

	Scenario 1	Scenario 2
Absolute Loss Function	-2.57	-2.46
Outcome:	Reject	Reject
20 Day Forecast is:	Superior	Superior

10. Table 3 presents the findings that the 20-day averaging period is superior to the 5-year trailing average in the first two scenarios.

Table 4 Diebold-Mariano Test Results for the 60-Day Averaging Versus the 5-Year Averaging Period

	Scenario 1	Scenario 2
Absolute Loss Function	-2.66	-2.48
Outcome:	Reject	Reject
60 Day Forecast is:	Superior	Superior

11. Table 4 above indicates that the 60-day averaging period is superior to the 5-year trailing average in both scenarios.

Concluding remarks

12. This Appendix has presented the empirical evidence in terms of the predictive power of various averaging periods using the Diebold Mariano test. Both annual updates and no annual updates were considered. The key conclusions can be summarised as below.

- *First*, when no annual update is considered, an averaging period of 20 trading days is superior to averaging periods of 5 years and of 10 years.
- *Second*, when no annual update is considered, an averaging period of 60 trading days is superior to averaging periods of 5 years and of 10 years.
- *Third*, when an annual update is considered for both averages, an averaging period of 20 trading days is superior to averaging periods of 5 years and of 10 years.
- *Fourth*, when an annual update is considered for both averages, an averaging period of 60 trading days is superior to averaging periods of 5 years and of 10 years.
- *Fifth*, an averaging period of 60 trading days is the longest possible period which ensures that its forecasting efficiency is still statistically better than the averaging periods of 5 years and 10 years when for both averages are undertaken (including when both are subject to (i) annual updates; and (ii) no annual updates). It is noted that, in terms of forecasting efficiency, there is

no statistical difference between the averaging periods of 20 days and of 60 days (i.e. both averaging periods have the same forecasting power of the risk free rate for the subsequent 5 years).

Appendix 2 The 'NPV=0' Principle

13. In a regulated environment in which output prices are set or capped, the present value of the revenue earned from an asset must be equal to the initial investment to ensure that the total costs incurred are recovered. If no more than or no less than the total costs are recovered, in discounted terms, then the net present value is zero (NPV=0).

14. It is argued that setting the terms of the proxies for the risk free rate and the cost of debt to match the regulatory control period – which is generally five years in Australia and New Zealand – will satisfy the NPV=0 principle. This view is supported by a range of studies, each of which is summarised briefly in what follows.

15. First, under the assumption that future interest rates are the only source of uncertainty and that the company is financed entirely by equity, Marshal et al. (1981) concluded that the period associated with the risk-free rate should match the regulatory period. These authors argued that if this principle is not satisfied, then equity holders are either over or under compensated by the regulator.

16. Schmalensee (1989)[30] and Lally (2012)[31] also assumed that there is no debt and no source of risk other than the uncertainty of the future risk free interest rates. The authors concluded that the term of the risk free rate and the term of the debt margin should be matched with the regulatory control period to ensure that equity holders are not under- or over-compensated.

17. Lally (2004) relaxed the above assumptions by considering cost and demand shocks, and risks arising from depreciation methods in which the aggregate depreciation allowed by the regulator may diverge from the cost of the assets. However, in this study, Lally continued to make the same assumption that the firm is to be totally financed by equity. The author concluded that if the risk-free rate is revised at the end of each regulatory cycle, in accordance with the prevailing rate, then the appropriate rate should be that matching the regulatory period.[32]

18. Lally (2007) continued relaxing the previous assumptions by considering the implications of issuing corporate debt. The purpose of this study was to consider the implications of the regulated firm being at least partly debt financed, as well as the possibility of the firm choosing a duration for this debt finance that diverges from the length of the regulatory cycle. Lally concluded that the NPV = 0 principle is only satisfied on the following two conditions: (i) the terms of the risk free rate and the debt risk premium must be set equal to the regulatory control period; AND (ii) the regulated businesses choose their borrowing to match the regulatory cycle. Lally also concluded that departure from either of these conditions will lead to violations of the NPV = 0 principle.[33]

19. Lally agreed that these findings do not consider any re-financing risk – the risk arising due to the exposure to unusual conditions in the debt markets at the time

[30] Schmalensee R., 1989, "An Expository Note on Depreciation and Profitability Under Rate-of-Return Regulation", *Journal of Regulatory Economics*, Volume 1, No.3, pp. 293-298.

[31] Lally M. 2012, *The Cost of Equity and The Market Risk Premium*, July, p.28.

[32] Lally M. 2004, "Regulation and the Choice of the Risk Free Rate", *Accounting Research Journal*, Volume 17, No. 1, 2004, pp. 18-23.

[33] Lally M. 2007, "Regulation and the Term of the Risk Free Rate: Implications of Corporate Debt", *Accounting Research Journal*, Volume 20, No. 2, 2007, pp. 73–80.

the debt needs to be refinanced. In response to this potential problem, Lally argued that a company may seek to stagger the roll-over of the debt in such a way that the same proportion – which is relatively small – is to be refinanced each year. Lally argued that the company's actual schedule of debt can be converted into the schedule that aligns with the regulatory control period using swap contracts available in the market (interest rate swaps would be used to deal with the risk free rate of return component and credit default swaps would deal with the debt premium).

20. More recently, Lally (2010) has argued that where the average debt term used by regulated businesses materially exceeds five years (that is, the term of the regulatory cycle), and where these firms use neither interest rate swaps nor credit default swaps to convert the longer term (say 10-year) debt into the five year debt, then the "NPV = 0" principle would be violated. This is because the allowed costs would diverge from those actually incurred by the firms.[34]

[34] Lally M. 2010, *The Appropriate Term for the Risk Free Rate and the Debt Margin,* April, p.14.

Appendix 3 Chairmont Consulting's report *Comparative Hedging Analysis*

Comparative Hedging Analysis

By

Chairmont Consulting

Version: Final
Dated: 12 June 2013

CHAIRMONT
ADVISERS+IMPLEMENTERS

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1 EXECUTIVE SUMMARY

Chairmont Consulting (Chairmont) was engaged to undertake a very short and quick exercise for the Economic Regulation Authority (ERA) of Western Australia to consider a number of key issues relevant to its role as regulator of gas networks.

1.1 Objectives

The objective of this paper is to provide ERA with an understanding of:

- the main hedging options allowing a regulated firm to transform a typical staggered debt portfolio to align with an 'on the day' regulated rate; and
- the typical costs of undertaking those main options – over and above standard costs of finance in the portfolio, i.e. what is the marginal cost of the main 'hedge' options in bp.

1.2 Staggered Debt Issuance Combined with Volatility Causes Mismatch Timing Risk

- Efficient companies can and do fund themselves using a range of debt instruments. They issue debt in a staggered manner over time in whichever market is most attractive at that time.
- For a regulated entity this debt timing behaviour is the main reason for a structural difference in their total debt cost versus the allowed benchmark cost of debt. This is called Mismatch Timing Risk.
- Markets have experienced heightened levels of volatility over recent years, which should prudently be assumed to continue into the future. Upon considering possible tools for hedging general market volatility it has been concluded that none are appropriate for hedging the Mismatch Timing Risk of utilities. Instead, specific hedges for this risk are further considered.

1.3 Hedging is Limited by Product Availability not the Transaction Cost

- The interest rate applicable to corporate debt can broadly be decomposed into a base rate and a Debt Risk Premium (DRP) or credit spread. The most liquid hedging tool for corporate credit spreads are Credit Default Swaps (CDS). In Australia, the market for CDS is narrow and illiquid. There are no CDS available which are linked to the credit spreads of the utilities which operate on ERA networks. No other effective tools for hedging credit spreads for these entities have been identified.
- Operators have the possibility to hedge either the risk-free base rate, via exchange traded futures on Commonwealth Government Securities (CGS), or the swap base rate using interest rate swaps. It is shown that using interest rate swaps hedges a greater portion of the operator's Mismatch Timing Risk than if the operator hedged the risk free rate.
- Transaction costs of hedging with swaps are shown to be negligible. The quantum of risk if no hedging is undertaken, and the DRP component which cannot be hedged far exceed transaction costs of hedging with swaps.

- The current benchmark calculation process is defined in a manner which will lead to overstatement or understatement of the targeted cost of debt concept.

1.4 Size of Risk Depends on Debt Issuance Profile and Hedging Decisions

- Any quantitative estimation of the difference between actual and benchmark cost of debt for an operator over an Access Agreement (AA) period is heavily influenced by its outstanding debt profile at the start of the period. The debt issuance pattern the operator then undertakes over the upcoming AA period also has a significant influence on the difference in those rates. There can be market situations, such as currently, where an operator with a staggered debt profile and no base rate hedging is unable to achieve the calculated benchmark, regardless of what it does. This occurs because fixed rates have fallen considerably compared to the past five years.
- For assumed plausible scenarios, there could be a large difference between actual and benchmark cost of debt of over 150bp, if no hedging with swaps is undertaken.
- If operators hedge with swaps, using the same scenarios in the previous point, the potential difference in total cost is less than 50bp, which is significantly less than the result if no swap hedge is undertaken.

1.5 Risk can only be Partially Eliminated

- Apart from a deliberate choice to take the risk, there appears to be no reason for operators not to hedge the swap rate. The rationale is as follows:
    1. The variation between actual and benchmark cost can be significant;
    2. The market for interest rate swaps with a five year maturity is very liquid and can absorb very large volumes; and
    3. Transaction costs for entering a swap are insignificant compared to potential for profit/(loss) from interest rate movements.
- Other potential hedging practices, such as using Floating Rate Notes (FRNs) to fix the DRP, have been found to not be feasible. Consequently, the most effective means for an operator to hedge to the current benchmark rules is to hedge the base rate by transacting interest rate swaps in the benchmark fixing period. Over the course of time the operator would then issue floating rate debt or fixed rate debt and use swaps to convert the payments into floating rate.
- Operators will face DRP movement risk which they cannot effectively hedge.

2 INTRODUCTION

Chairmont was engaged to undertake a very short and quick exercise for the Economic Regulation Authority (ERA) of Western Australia to consider a number of key issues relevant to its role as regulator of gas networks.

2.1 Objectives

The objective of this paper is to provide ERA with an understanding of:

- the main hedging options allowing a regulated firm to transform a typical staggered debt portfolio to align with an 'on the day' regulated rate; and
- the typical costs of undertaking those main options – over and above standard costs of finance in the portfolio, i.e. what is the marginal cost of the main 'hedge' options in bp.

2.2 Methodology

This paper contains a top down approach to examining the matters contained within the terms of reference. This approach has been adopted because debt funding is impacted by current global and local market conditions. Furthermore, macro-economic conditions impact different industries and segments within an industry differently.

Having considered the macro-economic factors there was an examination of the interest rate risk faced by regulated firms. This contains a detailed analysis of the individual elements of risk, products that can be used to hedge risk and other factors impacting on hedging decisions by regulated corporates.

Finally, the specific evaluation of hedging options under the current rules are addressed.

3 MARKET AND RISK CONSIDERATIONS

3.1 Global Financial Crisis (GFC)

The peak period of the GFC was around the failure of Lehman Brothers in October 2008.

The global economy in the years immediately prior to the GFC was characterized by many national economies having significant amounts of public and private debt, inflated assets prices and poor lending practices of financial institutions where risks were commoditized and sold off in complex financial products. The individual risk elements and the associated implications of these products were not fully understood, particularly by investors, but also issuers and product promoters.

3.2 Post-GFC Market Conditions

The market conditions in a post GFC world may be summarised as follows:

- Some foreign equity markets, notably the United States of America (USA), have exceeded pre-GFC valuations, although the Australian market has not recovered to pre-GFC levels in terms of valuations and transaction volumes. The strong performance of the USA equity markets in part is because of the significant Quantitative Easing (QE) being undertaken by the US Federal Reserve and the growth in technology companies, e.g. Apple, Oracle, Google, Facebook and Salesforce.com.
- Credit margins for most corporate and many government entities remain significantly above levels seen during the 2000's, especially those of 2006-07. As noted above in the years immediately preceding the GFC, risk was not correctly priced.
- Many derivative markets, including Credit Default Swaps (CDS), have less liquidity and less breadth than in the mid 2000's. There are less market players providing a narrower range of products for a reduced number of "referenced entities".
- Debt now has more stringent credit underwriting terms and there is a significantly lower volume of transactions compared to pre-GFC.
- Regulators, notably the Bank for International Settlements (BIS), have introduced new banking capital rules, e.g. credit and operational risks (Basel II) and liquidity ratios (Basel III).
- Volatility in many markets has remained sporadically higher than during the 2000's. Some studies show that there has been a long-term trend to more volatility in equity and other markets since the early 1970's, where the mid 2000's was unusually benign and the period 2008-09 unusually extreme in this longer term picture. The reasons for this trend of greater volatility include the end of the Bretton Woods system, floating exchange rates, de-regulated financial markets and recently improved technological advances in the area of program trading.

Summary: Financing conditions are generally still more difficult and expensive than pre-GFC. As a general rule the shorter the maturity date, the more liquid the market and the sharper the pricing.

3.3 Financing and Hedging Products

Debt products relevant to capital raising and hedging activities of Australian corporates in a post-GFC environment include:

- domestic fixed rate bonds and Floating Rate Notes (FRNs);
- syndicated and bilateral bank loans;
- fixed and floating rate debt issues in European, US and Asian markets;
- share issues;
- exchange traded financial futures;
- interest rate and cross-currency swaps;
- Forward Rate Agreements (FRAs);
- CDS; and
- hybrid or lower ranking structured debt, e.g. convertibles for the retail as well as wholesale market.

3.4 Debt Funding Markets for Australian Corporates

The Australian corporate bond and FRN market is small with limited levels of liquidity apart from for a few names, e.g. Telstra. Most issues are fixed rate and for terms out to 10 years, although some callable issues have longer potential maturities. The Australian government has taken steps to encourage the development of an active and liquid corporate bond market, however to date there has been limited traction and the market remains under-developed compared to some foreign debt markets, e.g. USA.

In 2010-12 there was a surge in new issuance of hybrid and other debt issues with equity-like features, e.g. step up coupons that in essence make the debt perpetual. The majority of these were issued by banks. These were very popular with retail investors seeking high yields rather than capital growth. They are, however less likely to be a major funding vehicle in the future, especially for non-bank entities because benchmark interest rates are at historical lows meaning the total yield (return) is too low to be attractive to investors. Also, investors have realised that this investment structure is not as attractive as it first appeared and Future of Financial Advice (FOFA) has banned the commissions for financial advisers.

Bank loans, typically syndicated throughout the market by lead managers remain a major source of debt finance for medium and large corporates. Companies are usually able to raise larger amounts in a single debt raising in this market compared to the bond market, however the term of loans is shorter than for bonds. Three years is a typical loan term, and they are rarely beyond five years. Bond issues are more often terms of seven and ten years. Another attraction of the bond market is that the issuance margin is usually lower than for loans, currently the difference is around 20-30bp. There are, however, higher issuance costs usually associated with bonds and the margin advantage is not always available, especially to lower rated issuers.

Foreign capital markets remain a viable alternative for many larger corporates as there is strong demand for higher yield Australian dollar (AUD) debt, especially while excess liquidity is being injected into the US and Japanese markets through central bank QE. The cross currency swap market continues to be strong, allowing Australian corporates to issue in foreign currency and hedge back to AUD.

Summary: A typical efficient company raises debt opportunistically over a period, using as many of the available markets as required. Companies rated BBB to A- might raise debt of varying maturities a few times a year using foreign and domestic bond and loan markets. Their decision will depend on the current investor or lender appetite and the company's interpretation of pricing benefits.

3.5 Risk Management - Conceptual Approaches

There are two conceptually different approaches to managing risk where both approaches are forms of hedging.

There is the "risk elimination" approach whereby a corporate either identifies natural hedges within its operations, e.g. revenue and expense streams are matched in the same currency so as to eliminate any currency risk, or the corporate undertakes market based transactions that eliminate or reduce the risk through using a product, e.g. interest rate swap. This approach means that there is no up or downside over the term of the transaction.

The alternative method is the insurance approach, i.e. buy insurance based on the "probability" that an event will arise, e.g. option. This approach means that the downside is eliminated and upside maintained.

It is important to note that both techniques are used simultaneously in complex transactions.

It is critical to recognise these different conceptual approaches as they provide a different starting point to risk management, however gas network operators' treasury units are not normally profit centres, i.e. corporate treasury units are not allowed to take market positions, e.g. interest rate, as their role in respect to financial risks is to hedge.

3.6 Mismatch Interest Rate Risk

In general terms, risk (the chance of unplanned net losses or profits) arises when revenues and expenses are not exactly matched. For businesses which have revenues and expenses closely tied to interest rates, there will be a significant exposure to risk when the reference interest rate, e.g. BBSW, or LIBOR for the revenue side differs to that for the expense side. This interest rate risk is called Mismatch Risk. Most companies regardless of the industry will face either some degree of Mismatch Interest Rate Risk or some risk of an interest rate increase on the expense side which has no offsetting counterpart on the revenue side.

There are three important factors that will impact on the potential for gains or losses from mismatch risk. These are:

- The relationship between the two reference interest rates, i.e. how different are their characteristics, e.g. term, industry, credit rating and any timing difference between when the two reference rates are set. This timing mismatch risk is discussed later;
- The "normal" correlation between the two reference interest rates; and
- Market volatility that impacts on the "normal" correlation. As noted above the current trend is for higher volatility over the medium term.

Over the very long term it is possible that the average impact of Mismatch Interest Rate Risk will be zero. However, for any particular period of years, the windfall profit or loss resulting from this risk can be very significant.

Summary: Mismatch Interest Rate Risk arises when there are two different reference rates for revenue and expenses. This can become important when the reference rates are significantly different and during periods of increased volatility.

3.7 Can Volatility be Hedged?

A key question is can general market volatility as distinct from reference interest rate volatility be hedged?

There are tools for managing volatility in some markets. These include:

- Options;
- VIX futures which are used to manage implied volatility of the S&P500 share price index;
- Gold VIX futures; and
- Dynamic allocation techniques, e.g. Continuous Proportional Portfolio Insurance (CPPI).

These tools are very specific to a particular product or purpose. The critical factors that need to be considered with these products are:

- Basis risk. This is where the hedging tool does not exactly correspond with the risk to be hedged, and therefore inadvertently creates a new risk.
- Pricing costs, e.g. option premium. This is an insurance cost and therefore can be significant.
- Transactions costs, e.g. buy/sell spreads, brokerage and on-going management fee for dynamic allocation.

These factors will likely outweigh any potential benefit when applied to interest rate mismatch for an Australian corporate borrower.

Summary: For the purposes of this exercise we believe that it is not worthwhile to further consider these tools.

3.8 Transaction Costs

The cost of actually transacting in debt markets or hedging markets[1] has not changed greatly in the past decade or two, except during the worst of the GFC. Managing a debt portfolio and undertaking hedging to minimise risk between the two reference interest rates typically only requires a small number of infrequent transactions. Accordingly the costs of transactions are minor compared to the size of debt and the risk.

Summary: The impact of Mismatch Interest Rate Risk is likely to be much greater than the transaction costs of managing that risk.

[1] For example bond issuance costs (apart from the interest rate), the bid-offer spread on swaps and brokerage on futures contracts.

4 HIGH LEVEL ASSUMPTIONS AND BACKGROUND

4.1 Characteristics of a Benchmarked Efficient Operator

An operator in the ERA regulatory system is assumed to:

- be a private sector entity;
- be credit rated in the range BBB to A-;
- use 60% gearing;
- issue debt in a staggered manner across the Access Agreement (AA) period[2];
- be an operator on only a single network, i.e. undiversified benchmark-to-actual funding cost risk; and
- have cost of debt which is independent of cost of equity.

4.2 Relevant Gas Networks and Size of Debt

The three relevant pipelines impacted by ERA's benchmarking process are:

- Dampier Bunbury Natural Gas Pipeline (DBNGP): This has $2 billion of debt, where the benchmark is to be set in January 2016. It is 80% owned by DUET and 20% by Alcoa;
- Goldfields Gas Transmission (GGT): This has $240 million of debt, where the benchmark is to be set in July 2015. It is 88.2% owned by APA Group; and
- Mid West South West (MWSW): This has $500 million of debt, where the benchmark is to be set in March 2015. It is 100% owned by ATCO Gas which is a fully owned subsidiary of ATCO Canada.

4.3 Operator Behavioural - Issuing and Hedging Assumptions

There are two fundamental issuing and hedging behaviours that are to be considered in this analysis.

1. Operators attempt to match their cost of debt as closely as possible to the benchmark cost of debt. The constraints on achieving this are, a company will:
    - issue debt progressively over time and they will not re-finance all of their debt within the 20 or 60 day benchmarking period. This minimizes the re-set risk during periods of market dysfunction associated with non-progressive debt issuing; and
    - not re-set their credit margin within the short 20 or 60 day window of benchmark fixing, even if the market could absorb that funding by the operator without affecting pricing. This is also done to minimize re-set risk.

[2] For the later quantitative estimation, it is assumed that the firm chooses an average outstanding debt maturity of approximately three years. It issues 15% of its required debt at the benchmark fixing period and in years 1, 2, 4, 5 and 6 following that fixing. The issuance term for debt will vary from 5 to 7 years.

In terms of hedging strategies a company will attempt to hedge the total cost of debt (Base Interest Rate + Debt Risk Premium (DRP)) within the benchmark period, using tools other than simple issuance.

2. An operator will attempt to match or hedge only as much debt as is required to allocate to a particular network.

   For example, an operator may require total debt of $3 billion to provide the contracted services across a number of different networks. Whereas, the debt required for their activities on the specific network for which the benchmark rate is applied, is a portion of this $3 billion.

5 HEDGING ANALYSIS

5.1 Definition of Hedging

Managing mismatch risk means that 'hedging' would need to be undertaken. Hedging is used here to mean "using other financial instruments to attempt to reduce the variability of the interest rate risk faced by the operator arising from mismatch risk".

5.2 Description of the Current Benchmark Calculation

The National Gas Rules (NGR) allow for either a trailing average methodology or the current ERA method of a prevailing rate approach. The rules also allow for the benchmark to be calculated and applied once every several years or annually. The current ERA method to apply a benchmark rate for five years and calculate it is as follows:

$$R_{reg} = r_f + DRP_f$$

The Regulatory Rate (R_{reg}) is the sum of a Risk Free Rate (r_f) plus a Debt Risk Premium above the Risk Free Rate (DRP_f).

The components are measured as follows:

- r_f is measured as the average rate of a 5-year Commonwealth Government Securities (CGS) over a 20 trading-day measurement period; and
- DRP_f is calculated in three steps:
    1. Observe the yields of all outstanding fixed rate Australian bonds with a credit rating from BBB to A- and a maturity date greater than two years.
    2. Measure the spread between each of the corporate bonds and the equivalent maturity CGS for each of the 20 days.
    3. Each of those individual DRP_f numbers is then weighted to create an average DRP_f. The weighting process gives greater weight to bonds with longer maturities and with larger outstanding volumes.

5.3 Implications of the Benchmark Calculation of DRP

As a consequence of DRP_f measurement step 1 above, the qualifying bonds for inclusion in the calculation will include bonds from different industries. However, bonds from different industries should be excluded from the benchmark unless the industry has similar characteristics, e.g. infrastructure. Secondly, the results will be skewed depending on the average rating and maturity at the time the calculation is made. This is because the set of bonds chosen may reflect specific appetite for a particular industry or rating grade which were previously in demand.

As a consequence of DRP_f measurement step 3 above, the final average DRP_f will suffer some bias. The heavier weighting of longer maturity bonds in the averaging calculation biases the DRP_f to be that of a longer term bond. Even if the un-weighted average maturity of outstanding debt is five years, the weighting process will mean the effective maturity will be beyond five years. Typically, except in times of credit crisis, longer term DRP are higher than shorter term DRP. Because the weighting process places greater emphasis on longer dated maturities there is an unnecessary bias that increases the final DRP_f.

Summary: The DRP calculation will be influenced by the composition of the qualifying bonds at the time, regardless of whether these are representative of the utilities industry and the current market conditions. The calculation approach leads to a bias for longer term spreads. This would appear to be inconsistent with the aim to focus on a five year maturity, as per the risk free rate.

5.4 Implications of the Benchmark Calculation of the Base Rate (CGS versus Swap Rate)

There are two different starting points for decomposing the total corporate debt rate. ERA's approach is to use CGS as the base rate. Whereas, corporates use the swap rate because they cannot directly access the risk free rate as they do not have the ability to issue CGS or CGS-linked debt.

The corporate debt market uses the interest rate swap curve as the basis for decisions about pricing and management. Accordingly in the discussion below we specify two different DRP:

1. DRP_f is the spread of corporate debt over the equivalent maturity CGS; and
2. DRP_s is the spread of corporate debt over the equivalent maturity interest rate swap.

The difference between these two DRP will be the Spread of Swap (SS) over CGS for that maturity.[3]

From the operators' point of view, their concern is simply that their total cost of debt is the same as, or lower than, the benchmark set by ERA. The difference in focus of base rate should not be problem from the operator's perspective because the end financing cost is the same regardless of the approach. This is demonstrated through the following breakdown of the yield of a corporate bond at any particular point in time.

The market convention is to define total yield of a corporate bond as swap rate plus the spread over swap.

$$\text{Yield} = R_s + DRP_s$$

Because R_s is just R_f + SS, the total yield can also be written as:

$$\text{Yield} = R_f + SS + DRP_s$$

It was noted above that $DRP_s = DRP_f - SS$

Hence the market convention of looking at the total yield can be rewritten as:

$$Y = R_s - SS + DRP_f$$

$$= R_f + DRP_f$$

This is also the way ERA compose the total yield.

Summary: The regulatory rate and the operators' practical funding activities use two different base rates. These are just two different ways of splitting up the total interest rate.

[3] SS is almost always positive, hence it is expressed as "over" CGS.

5.5 Mismatch Timing Risk

5.5.1 Definition of Mismatch Timing Risk

It is assumed that an operator will not usually issue all of its debt, and hence fix total interest cost within the fixing period. Accordingly, a potential interest rate risk is introduced for the operator who issues in a progressive manner, whereas the benchmark calculation is based on a 20 day period.

Consequently, timing mismatch is defined as the difference between issuing all of a corporate's debt over a 20 day period and staggering the issuances over an undefined period, usually being a number of years.

This means that Mismatch Timing Risk is the risk of the total interest cost facing the corporate over the staggered issuance period being different to the total interest cost during the 20 days benchmarking period. This risk can have either a positive or negative outcome.

It is noted that non-regulated companies in other industries are also likely to face some form of interest rate risk, because they do not have revenue items which equally offset changes in their debt funding costs. Some businesses are likely to face greater interest rate risk than regulated utilities and some are likely to face less. The special case of regulated energy entities arises because the revenue impact of interest rates is fixed each five years for that amount of time, whereas a non-regulated industry will typically face changing interest rate impacts continually across time.

The scope of the current analysis has not allowed time to examine the possibility of ERA changing to an annual re-fixing of the benchmark. It is possible that annual refixing could reduce the impact of Mismatch Timing Risk for regulated firms, as the more frequent calculation may be able to better incorporate changes in the credit margins.

5.5.2 Management of Mismatch Timing Risk Through Non-staggered Issuance

There are a number of possibilities for managing Mismatch Timing Risk through non-staggered issuances. These are:

1. Issuing to the domestic market for smaller networks, e.g. GGT means it is possible to eliminate Mismatch Timing Risk because the issuance can usually be absorbed by the domestic market. The normal size of "vanilla" bond issuance in the domestic market in the past two to three years has ranged between $100m and $400m. However, the corporate is fully exposed to the vagaries of credit markets by issuing all debt at one point in time.
2. Issuing into the foreign markets for slightly larger networks, e.g. MWSW, means that Mismatch Timing Risk could be eliminated. Utilities have been able to issue amounts of up to $700m of vanilla debt in foreign markets which could be swapped back to AUD. The vagaries of credit markets exposure apply in this scenario also.
3. Issuing of Structured Debt. There have been larger issuances of structured debt that could eliminate Mismatch Timing Risk, however these hybrids come at a higher margin. These issuances cannot be relied upon as a mechanism to raise debt because of variable investor appetite for structured programs.

For a network as large as DBNGP it is not possible to issue all its debt in the 20 day period at reasonable prices and therefore, it does not have the choice of issuing exactly to benchmark timing.

Summary: Small to medium sized networks could issue all their debt during a 20 day period, however it would expose them to unacceptable funding concentration risk. Larger network operators would not be able to issue all their debt in one issuance, and even if they could it would be a poor risk management practice.

5.6 Hedging Approaches

In section 5.4 it was explained that there are two different ways to decompose the total interest rate used by ERA versus that of an operator. There are four possible components which could either individually or together be hedged using alternative approaches. The operator could:

- Attempt to use the ERA concept of total yield as the sum of R_f and DRP_f; or
- Use the more standard market practice of considering R_s and DRP_s.

The most difficult part is managing DRP whether it is DRP_f or DRP_s.

5.6.1 DRP Hedging Solutions

There are only a small number of products freely available in the market which directly reference a credit spread (DRP). These may be categorised into:

- index based products, e.g. Exchange Traded Funds (ETF); and
- both single name and index linked, e.g. CDS.

The most liquid and visible index in Australia is the Market iTraxx index. This index tracks the average credit spread for the selected issuers across time. It is the benchmark index that has many products linked to it. As with other indices, e.g. Australian Securities Exchange (ASX) S&P/ASX200 Index is in itself not tradeable.

Globally available products based on indices of this type include futures contracts, ETFs, CDS and structured products.

If the credit spread of a single entity is the point of interest to a market participant, the only available instrument is a CDS. While CDS spreads are not the same as the issuance spread (DRP) of a bond from that issuer, they will usually broadly track movements in the DRP for that issuer.

There is no market for CDS for utility companies which are relevant to the hedging question for ERA. In Australia, it is the top 10-15 companies by ASX market capitalisation that have any type of CDS liquidity and the liquidity is thin for some of them.

To hedge a credit spread of a utility company it is possible to use a CDS or other product referenced to credit spreads of other issuers, e.g. BHP or the iTraxx. However, usually this type of hedge is too inexact to be employed for risk reduction[4] and in "normal" market conditions is not recommended.

This approach may assist in providing a partial hedge to a general increase in credit spreads across the market. In an environment where risk is not being correctly priced, using a CDS hedge may assist in reducing the impact of a significant increase in credit spreads.

[4] It can often occur that the company faces a higher funding spread even though the spread of a CDS on iTraxx has not increased, or potentially even decreased.

Summary: For an Australian efficient operator there is no market to effectively, and in a cost efficient manner, hedge their DRP.

5.6.2 Base Rate Hedging Solutions

The most effective solution to manage:

- R_f is to use exchange traded government bond futures with three and 10 year maturities; and
- R_s is to use interest rate swaps in any maturity up to 10 years. FRAs can be used but are normally applied for shorter single maturity periods, e.g. 6 months.

The critical decision for an operator is to determine which base rate it wishes to manage. Based on the analysis above, the factors that an operator must consider include:

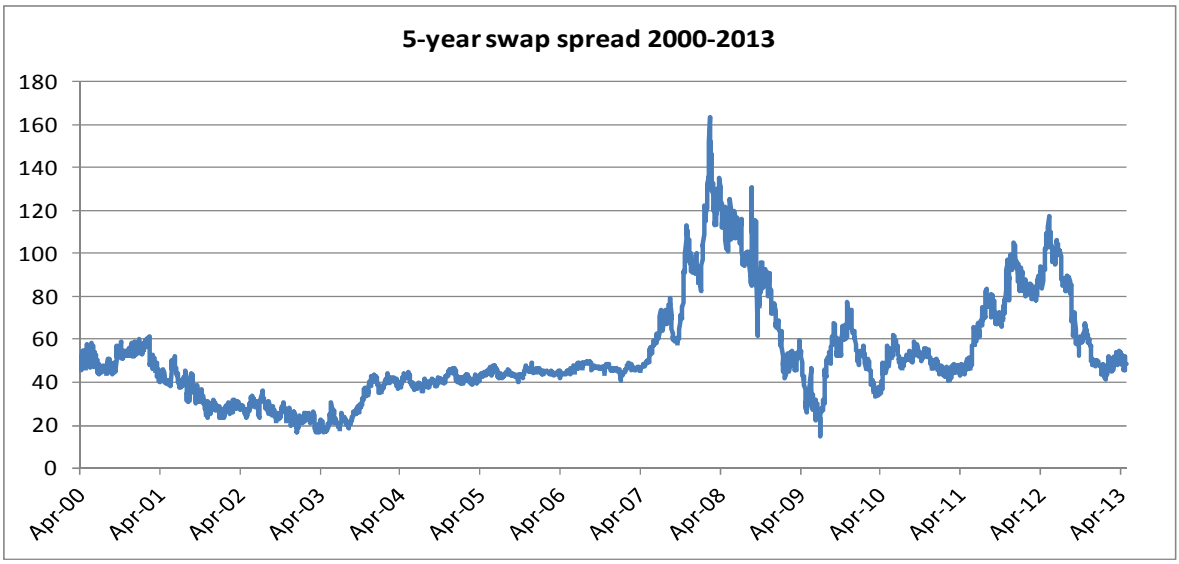
- the total cost of debt and how to keep it at or below the benchmark total cost of debt;
- the tools to hedge DRP_f or DRP_s are inefficient; and
- that there are efficient and effective tools to hedge both R_f and R_s.

5.6.3 Hedging Decision – Which Base Rate?

The starting point to minimise mismatch risk is for an efficient operator to hedge as much of the total debt cost as possible. As outlined above there are tools to effectively manage R_f and R_s. Whereas, it is not possible to effectively hedge either of the DRP.

As an operator can choose between hedging R_f or R_s, the decision then becomes which basis rate provides the most coverage for their total cost of debt. In making this decision the operator needs to consider which is the more volatile DRP_f or DRP_s? This is because DRP is the component of the total cost of debt that cannot be effectively hedged.

In section 5.4 the difference between DRP_f and DRP_s is shown to be the swap spread (SS). Graph 1 below shows the 5-year SS since the year 2000.



Graph 1: 5 Year Swap Spread

Graph 1 shows the following:

- pre-GFC, even in the earlier share market downturn of 2000-02, the swap spread centred around 40bp and stayed mainly in a range of 20-60bp;
- during the GFC, as for many other markets, the previous scale of 'possible' was broken and dramatic increases were seen, before subsiding back to pre-GFC levels by mid-2009; and
- since the GFC, the spread has remained highly volatile. Notably, between May 2011 and May 2013 it rose from under 50bp to peak near 120bp in May 2012 before falling all the way back to being currently under 50bp.

The implication for utilities is that if they only hedge R_f, there can be an additional significant jump in the part of their total interest cost that is unhedged, i.e. the SS part of DRP_f. Only if DRP_s reduces by the same amount at the identical time as the SS increases[5] is the effect neutralised. This scenario does occur, however it is an infrequent event as demonstrated in the following example.

Between the second quarter 2011 and the second quarter 2012, the 5-year SS rose strongly by approximately 70bp. In that time the 5-year issuing DRP_s for a utility rated A- rose from approximately 110bp to 170bp. This means at that time a borrower only fixing R_f would have suffered higher funding costs of around 70bp from the rise in the SS, as well as approximately an extra 60bp in DRP_s.

Although the SS has returned to the levels of the second quarter of 2011[6], DRP_s remains elevated near the 140bp level.

The 2011-2013 experience of a positive correlation between SS and DRP_s is as the theory suggests. Namely, SS in part does reflect perceptions of credit quality of the banking sector or highly rated corporates. When the market is worried about the credit quality of these institutions, it will also be concerned about the credit quality of lower rated corporates. An observation is that SS can move independently of DRP_s even though there is a positive correlation.

In practice issuers and investors tend to discuss the credit premium of a particular issuer in terms of the spread to swap. Issuers also tend to attempt to keep the spread to swap constant or lower, in their negotiations with bankers and bond managers, reflecting the primary role of DRP_s as the perception of credit risk of a particular company.

Summary: R_s is the most efficient base rate for operators to hedge to because it eliminates an additional part of the variability of total cost, that being SS.

5.6.4 Hedging Process

Operators can hedge easily by paying the fixed rate and receiving the floating rate in interest rate swaps during the 20 day averaging period. This can generally be done for the entire

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[5] Data for the DRP_s of a particular utility's bond is not as complete and reliable as for swap rates, due to significantly less trading of the bonds. For that reason it is not included in the graph of daily movements in DRP_s. Nonetheless, a reasonable indication of DRP_s can be obtained from limited bond trading data and new issue data of the utilities.

[6] Which is also approximately equal to the pre-GFC level.

amount of debt required for servicing the particular network being benchmarked.[7] The volume of swaps required to hedge DBNGP, the largest network regulated by ERA, should not 'move the market' price of swaps if transacted across the 20 days in normal circumstances. If the benchmark calculation period and hedging period was increased to 60 days, it would further reduce any risk of the volume being a problem.

As the operators issue debt throughout the previous and upcoming AA period, they should always create floating rate debt. This still allows them to choose between FRNs, fixed rate domestic bonds or foreign debt, as long as they use swaps to make the net cost BBSW plus their credit spread.

5.6.5 Transaction Costs of Hedging

As seen above, the one series of swaps undertaken during the fixing period are the only additional transactions beyond their basic funding needs. The typical effective bid-offer spread for an interest rate swap is approximately 5bp[8]. As the utility only transacts one side of the swap at the beginning of the swap term, the transaction costs are the difference between the market mid-rate and the offer side of the spread, i.e. only 2.5bp. Given that the actual level of the swap rate typically moves by more than 5bp (and sometimes 20bp or more) within the trading day, the transaction cost element is negligible compared to the risk position.

Summary: The variation in R_s and DRP_s across the 20 day averaging period are significantly larger than the 2.5bp estimated transaction costs of locking in the fixed swap rate. Therefore, transaction costs of hedging are a secondary order matter.

5.7 Basis Risk – What Risk is left with Operators?

There are three reasons for basis risk:

1. Mismatch Timing Risk of DRP_s. This was examined in section 5.5. It is particularly relevant in the context of regulated utilities because they continuously issue debt over the years prior to and following the benchmark fixing period, i.e. they need to look back as well as forward. Whereas, non-regulated corporates concentrate on the future as they do not need to manage to an external benchmark.
2. Divergence from the benchmark average. There will be a basis risk for any operator to the extent to which their DRP differs from the weighted average DRP during the benchmark fixing period, e.g. due to credit rating.
3. Deliberate basis risk. All operators have the choice to deliberately take additional actions which differ from the assumptions of the benchmark. They would presumably do that if they thought it would reduce their overall cost of debt.

[7] Unless they take the commercial decision to keep some fixed rate risk in the expectation that they will be able to fix a lower rate at another time.

[8] Effective here means that while any one bank may quote a bid-offer spread of up to 10bp, by tendering the transaction to a panel of banks the corporate can usually achieve a narrower spread between the best bid and best offer from the panel.

5.8 Regulatory Arbitrage

5.8.1 How the current rule could be gamed

As in all regulatory situations, it is in the interest of operators to do anything which lowers their cost versus the benchmark. Any rule which is put in place may provide opportunities to arbitrage and therefore manipulate outcomes. If the rule definition makes it too easy to achieve and outperform the benchmark, then the rule does not achieve its aim of promoting efficiency. Conversely, if the benchmark is unachievable then the efficiency objective of the regulator will also not be met.

5.8.2 Definitional Divergence of the Benchmark

The current definition of the benchmark does not reflect the behaviour of an efficient company, due to the assumed inefficient issuing pattern of funding all within one month.[9] However, it does not mean that the current benchmark is either biased against operators or allows too much leniency because the divergence between benchmark and funding cost may have an expected value of zero over the long term, i.e. sometimes positive and sometimes negative by the same amount in the short term.

Over-statement

If the definition of an efficient operator is valid, the benchmark calculation of DRP will be overstated because it does not include foreign issuance of like issuers where the spread is lower than for the local market at that the time of issuance.

The current benchmark calculation could further overstate the true DRP in the following situations:

- if the secondary market margins are higher than issue margins. This could occur because lead manager banks seeking the issuance fees are usually able to achieve lower primary margins than trade in the secondary market where there is no incentive for buyers and sellers to push the margin down. This occurs frequently;
- in times when the weighting process makes the benchmark maturity greater than five years and simultaneously longer term DRP are higher than shorter term. This occurs frequently; and
- if the secondary market yields of reference bonds are artificially high during the 20 day measurement period. This could be due to falling interest rates during the 20 days combined with slow update of market prices due to illiquidity or irregular pricing. This occurs occasionally.

Under-statement

The reasons why the benchmark calculation could under-state the true DRP relevant to a utility are:

- if the corporate bond sample includes bank-related debt which may trade at lower margins than utilities of the same rating;

[9] An extension of the fixing window to 60 days would likely make little difference to the discrepancy between benchmark and actual over the long run.

- if larger issues have lower margins because the benchmark weighting process places more emphasis on larger issues; and
- it excludes bank loans which usually carry slightly higher margins.

5.8.3 Moving to a 10 year trailing average DRP calculation

Even if the benchmark was changed to a "10 year trailing average" there would still be a divergence. Any calculation, regardless of the methodology will at a point in time produce a result based only on history or a "guess-estimate" of the future, whereas an operator will have debt maturing and need to refinance at rates as they apply across the five year fixed rate. The longer the period that the fixed benchmark applies, the more likely it is that there will be a greater divergence between the actual rate and the static one. For example, if the benchmark only applied for one year instead of five years, the size and impact of a divergence between benchmark and actual should be less than that in the 5 year scenario. Therefore, it can be expected that if the 10 year trailing benchmark were to be introduced, it would not match the typical behaviour of an efficient corporate and would become the basis for attempts by operators to pursue regulatory arbitrage.

6 QUANTITATIVE ESTIMATES

Estimating a measure of performance or risk for utilities with staggered debt portfolios compared to the ERA benchmark can only be very subjective and indicative at best. The quantification will vary wildly depending on the assumed staggered debt portfolio. The result will be influenced by the date of raising the debt, term of debt and proportion of the total debt portfolio[10].

The estimates highlight factors and behaviour which have a significant impact on total cost and the relativity between them.

6.1 Estimate of the Current Rules Benchmark Rate

If the benchmark were to be estimated at this point in time the total fixed rate would be approximately 4.85% where the components of this are a five year swap rate of 3.30% and a DRP_s of 155bp. The DRP estimate is based on a 5.5 year issue of a BBB+ issuer. This term and rating were chosen to reflect the bond selection and weighting process used by the ERA.

6.2 Assumptions - Outstanding and New Debt Issuance

The assumptions used are:

1. The issuer is assumed to be BBB+ rated, the same as the benchmark operator implicit in the benchmark calculation above.
2. Approximate current DRP_s for a five year issue is 145bp. Note that this margin is slightly less than the DRP measured in the benchmark, because the benchmark calculation results in a maturity of slightly more than 5 years.
3. The current five year swap rate is approximately 3.3%.
4. Accordingly, if a BBB issuer raised five year money now, they could expect to pay a fixed rate of approximately 4.75% p.a.
5. Assumed outstanding debt issues are shown in Table 1 below.

Issue date	Maturity	Term remains	Margin* (DRP_s)	Swap rate at issue *	Total fixed rate
	Jun-13	-			
Jun-06	Jun-14	1	30	6.18	6.48
Jun-07	Jun-15	2	30	6.63	6.93
Jun-10	Jun-17	4	180	5.65	7.45
Jun-11	Jun-18	5	140	5.63	7.03
Jun-12	Jun-19	6	220	3.55	5.75

Table 1: Assumed Outstanding Debt Issues

[10] Even when the impact of excluding foreign debt markets and bank loans from the benchmarking calculation is ignored.

*The swap rates in the table are as they were at the relevant issue date. The DRP_s is a reasonable approximation of issuance margins experienced at the relevant time.

6. Assumed new debt issues across the upcoming five year AA period are shown in Table 2 below.

Issue date	Maturity	Margin (DRP_s)
May-13	May-18	145
May-14	May-21	See scenarios
May-16	May-22	See scenarios
May-16	May-23	See scenarios

Table 2: Assumed new debt issues across the upcoming five year AA period

6.3 Future Interest Rate Scenarios

To illustrate the variability of the outcome, three scenarios for DRP_s are considered. All future debt is issued at:

1. Current margin of 145bp (D1).
2. The lowest margin of the outstanding debt portfolio of 30bp (D2).
3. The highest margin of the outstanding debt portfolio of 220bp (D3).

Consequently, the range of DRP_s across the scenarios could be around 200bp.

The three corresponding scenarios for the swap rate at the time of new issuance are considered. The swap rate:

1. Remains the same as the current 5-year rate of 3.30% (S1).
2. Continues to fall to new historic lows of 1.50% (S2).
3. Rises closer to that of the past 10 years of 6.0% (S3).

Consequently, the range of swap rates across the scenarios could be as high as 450bp.

The range of scenarios can then be seen in Table 3 below.

Code	Scenario	DRP_s	R_s	Fixed rate
D1/S1	"No change"	145	3.30%	4.75%
D2/S2	"Both fall"	30	1.50%	1.80%
D3/S3	"Both rise"	220	6.0%	8.20%

Table 3: Scenarios for Future Debt Issuance Cost

6.4 Comparative Analysis of the Relative Performance and Hedging Costs of Current Rules/No Hedging

In this comparison, the issuer is assumed to issue at fixed rates across the debt drawdown activity, not hedging the benchmark base rate.[11]

The gradual maturity of the existing debt and issuing of new debt at rates from the three scenarios defined above result in the following total interest rate costs.

Code	Scenario	Total average cost over 5 years	Divergence from benchmark cost
D1/S1	"No change"	5.90%	1.05%
D2/S2	"Both fall"	5.19%	0.34%
D3/S3	"Both rise"	6.73%	1.88%

Table 4: Total Interest Cost Outcomes - No Hedging

Scenario Conclusions

1. Even in an extremely optimistic scenario D2/S2, where both fixed rates and credit margins fall and stay low, a utility using this approach could not achieve the benchmark rate. The result occurs because current fixed rates are much lower than those of the past years when much of the company's outstanding debt was fixed.
2. The more debt which is already outstanding before the upcoming AA period, the less the impact of new issuance during the upcoming AA period.
3. For the assumptions made here, there could be a difference of over 150bp in the total cost by not hedging the swap rate, as well as facing a variable DRP.
4. Not hedging the base rate with interest rate swaps will cause large variation in the divergence between the benchmark and the actual cost of debt. As noted earlier, interest rate swaps in adequate volume are available in the market and have minimal transaction costs. There appears to be no reason for companies not to hedge the base rate, apart from a deliberate decision to take the risk of the fixed rate falling from the level applicable at the benchmark fixing time.

[11] An operator could instead raise funds always at floating interest rates and pay whatever the BBSW rate is each quarter. That possibility would be even further from commercial practice of a company and would lead to similar large variability of results depending on the period and the staggered debt assumptions.

6.5 Comparative Analysis of the Relative Performance and Hedging Costs of Current Rules/Lock in Swap Rate at the Time of Determination

In this exercise the issuer is assumed to issue at floating rates across the debt drawdown activity, while fixing the 5-year swap rate during the benchmark fixing period.[12,13] Their total cost of debt will then effectively be the swap rate plus the weighted average DRP_s of their debt portfolio.

The gradual maturity of the existing debt and issuing of new debt at rates from the three scenarios defined above result in the following total interest rate costs.

Code	Scenario	Total average cost over 5 years	Divergence from benchmark cost
D1	"No change DRP_s"	4.81%	-.04%
D2	"Lower DRP_s"	4.53%	- 0.32%
D3	"Higher DRP_s "	4.99%	0.14%

Table 5: Total Interest Cost Outcomes – Hedging with Swap

Scenario Conclusions:

1. If the DRP_s remains at the current rate, this company would benefit from a slightly lower total cost of debt at 4bp below the benchmark. This primarily reflects the 5.5-year maturity of the benchmark calculation producing a DRP which is 10bp above the actual 5-year issuing margin.
2. The more debt which is already outstanding before the upcoming AA period, the less the impact of new issuance during the upcoming AA period.
3. As this is a swap hedging situation the potential difference in the total cost is only 46bp which is significantly less than the 'No Hedge' case. This 46bp represents the range between the best case and worst case in these simple scenarios (a profit of 32bp at best and a loss of 14bp at worst).
4. The worst case in this random example is only 14bp each year. However with a different starting debt portfolio or at different times in the credit cycle, the potential loss could become larger. Nonetheless, the scale of possible loss through Mismatch Timing Risk should be much smaller than if the companies do not hedge the base rate.

[12]The assumption here is that they achieve the same swap rate as the 20-day averaging process. They could achieve something very close by transacting 1/20th of the required swap amount near the close of business each day.

[13] To achieve a floating rate linked to BBSW for each issuance, they could either issue FRNs linked to BBSW, issue fixed rate AUD bonds and swap the rate back to BBSW, or issue foreign denominated bonds and swap the foreign interest rate back to AUD BBSW.

5. The numerical outcome for this swap hedge case is much lower than that calculated in the SFG paper. Importantly, it is concluded there is a much more significant reduction in risk by hedging with swaps, as opposed to doing nothing.
6. The SFG paper on page 36 has calculated a Standard Deviation for the difference between actual and benchmark cost of 243bps when no swap hedging is used. On page 37 the Standard Deviation between actual and benchmark cost is calculated as 220bps even though a swap is used to hedge the base rate for five years. The observations about these figures are:
    - Fixed rates are generally more variable than credit margins. As the largest component of an interest cost is the base rate, if this is fixed then there should be a significant reduction in total risk. The SFG calculations do not appear to reflect this; and
    - The formula on page 37 at point 139 implies the difference between actual and benchmark cost as being limited to the difference between the DRP_s calculated in the benchmark period and the average DRP_s of debt issuance across time. This appears correct, however the calculation of 220bps appears too large for a "normal" deviation in credit spreads. It is stressed that the timeframe for this assignment and agreed scope did not allow a detailed analysis of the formulae and data used by SFG in their report of 21 August 2012.

    In conclusion, utilities can and should fix the swap rate during the fixing period for the entire five years.

6.6 Comparative Analysis of the Relative Performance and Hedging Costs of Current Rules/Hedge DRP through Floating Rate Notes and Lock in Swap Rate at Time of Determination

The premise of this question is that all the debt will be issued in the form of FRNs during the short fixing period, i.e. there is no progressive debt issuance. For an operator with outstanding debt this would all be retired and then re-issued in the fixing period.

The conceptual difficulty with this premise is that an efficient operator would issue debt in a staggered manner, not all at once. The practical problems are:

- the impact on risk, notably the operator will be subject to full re-pricing and illiquidity in a crisis period;
- callable FRNs have higher spreads which will automatically increase the operator's overall cost of debt above the benchmark making it most likely that it will not be achievable; and
- there is no advantage to limiting issuances to just the FRN market and it may be a disadvantage. A fixed credit margin could be achieved by issuing fixed rate debt and swapping, or by raising bank debt.

For the above reasons it is not considered efficient for an operator to exclusively issue FRNs during the benchmark fixing period to manage its DRP. If there were to be derivatives linked to FRNs an operator could consider using these instruments to hedge DRP as it does not involve the issuance of debt. However, there is currently no market in derivatives linked to FRNs.

6.7 Comparative Analysis of the Relative Performance and Hedging Costs of Other Rules/Hedge to "On The Day" Cost of Debt via Options Identified

As noted throughout the paper, there are no other liquid and direct hedging tools which provide adequate risk reduction for the DRP of utility companies.

7 TERMS OF REFERENCE

The ERA requested at very short notice and within a limited timeframe that Chairmont provide commentary on the following items. Given the limited budget and scope Chairmont undertook this exercise on a best endeavours basis.

The scope was as follows:

- Understand the main hedging options allowing a regulated firm to transform a typical staggered debt portfolio to align with an 'on the day' regulated rate;
- Understand the typical costs of undertaking those main options – over and above standard costs of finance in the portfolio, i.e. what are the marginal cost of the main 'hedge' options in bp; and
- Compare the relative performance and hedging cost of:
    1. Current rules/no hedging
    2. Current rules/lock in swap rate at the time of determination
    3. Current rules/hedge DRP through a floating rate notes and lock in swap rate at the time of determination
    4. Other current rules/hedge to 'on the day' cost of debt via options identified by Chairmont as per point 2 above.

8 DISCLAIMER

This report is not personal advice and is intended to provide general factual information only. It has been prepared without taking into account your personal objectives, financial situation or needs. Before acting on the information in this document you should consider its appropriateness having regard to your own objectives, financial situation and needs.

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