Queensland Competition Authority

Issues Paper

Trailing average cost of debt

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We wish to acknowledge the contribution of the following staff to this report:

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SUBMISSIONS

Closing date for submissions: 24 April 2014

Public involvement is an important element of the decision-making processes of the Queensland Competition Authority (QCA). Therefore submissions are invited from interested parties concerning assessment of this Issues Paper. The QCA will take account of all submissions received.

Submissions, comments or inquiries regarding this paper should be directed to:

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EXECUTIVE SUMMARY

The Queensland Competition Authority (the QCA) is undertaking a comprehensive review of its cost of capital methodology. As part of this review, the QCA is further reviewing its theoretical framework for estimating the regulatory cost of debt. In October 2013, the QCA released a discussion paper in which PricewaterhouseCoopers (PwC) recommended a methodology for estimating the benchmark cost of debt at a particular point in time. This issues paper considers the trailing average cost of debt approach which calculates the regulatory cost of debt as a moving weighted average of the benchmark cost of debt for different periods as an alternative to the current 'on the day' approach.

This issues paper seeks comments from interested parties so that a final position paper can be prepared on the trailing average cost of debt approach to estimating the allowed cost of debt for firms regulated by the QCA.

Current cost of debt framework

Similar to many other Australian regulators, the QCA's current practice for estimating the regulatory cost of debt is based on using an 'on the day' approach which uses the benchmark cost of debt that is estimated just prior to the start of the regulatory cycle. The QCA's current 'on the day' approach is based on consideration of the Net Present Value Principle (the 'NPV = 0 Principle') while also addressing refinancing risk. This regulatory approach is a relatively low-cost and objective measure of the regulatory cost of debt which provides regulated firms with incentives to adopt reasonably efficient financing arrangements and match borrowings to the term of the regulatory cycle to minimise interest rate risk.

QCA's current 'on the day' approach is based on an implicit debt management strategy that the efficient firm will manage refinancing risk by issuing longer term debt and mitigate interest rate risk by undertaking the required swap contracts to effectively align the term of debt issues with the regulatory cycle. However, this debt strategy cannot be fully implemented in practice due to the lack of available credit default swaps to allow regulated firms to align the debt premium component of their debt with the term of the regulatory cycle. Given that the current approach estimates the benchmark cost of debt at prevailing interest rates, the only possible way for the regulated firm to align the allowed and actual debt risk premium component of the cost of debt is to refinance the entire debt portfolio at the start of each regulatory period.

As a result, the current regulatory approach results in a violation to the NPV = 0 principle due to the potential mismatches between the allowed debt premium and actual debt premium incurred by the regulated firm. While Lally (2010, pp. 36-41; 2014, p. 45) has demonstrated that this violation would not be substantial, other stakeholders have argued that the mismatch between allowed and actual debt risk premiums is relevant, in particular given recent experience since the onset of the global financial crisis (GFC) in 2007-08.

Analysis of the split cost of capital concept in the QCA's recent Information Paper has also raised the issue of how the regulatory cost of debt should be set. Consistent with the risk allocation principles forming the basis for the split cost of capital rationale, it has been argued that the regulatory cost of debt should not be fixed for the regulated firm at the start of the regulatory cycle. The rationale is that firms do not have the ability to influence the cost of debt in the relevant market and so they should not bear the associated risk that actual debt costs will vary from allowed debt costs.

Application of a trailing average to the benchmark cost of debt

The trailing average cost of debt approach seeks to more closely align the regulatory cost of debt with the actual cost of debt incurred by the benchmark firm adopting an efficient debt policy. Various proponents

argue that such an approach represents a more efficient market benchmark to the extent that market practice involves issuing debt at different points in time with a staggered maturity profile rather than the typical assumption that all debt is effectively issued at the start of each regulatory period.[1] The regulatory cost of debt under this approach is calculated as a moving weighted average of multiple estimates of the benchmark cost of debt, with the time span corresponding to some term of debt (e.g. 10 years) preceding and inclusive of the current year.

Stakeholders have argued that adopting a trailing average cost of debt approach would improve the alignment between the regulatory cost of debt approach and the firm's actual debt management strategy. This would reduce interest rate risk arising from the mismatch between the allowed cost of debt and the actual debt servicing costs incurred by the firm. It is claimed that this would in turn lower the variability in the returns attributable to equity holders and also reduce the risk of financial distress for the regulated firm. In addition, this may lead to a smoother profile for the regulatory cost of debt compared with the current typical regulatory arrangements, decreasing the variation in prices over time and reducing the scope for measurement error.

However, there are potential problems that need to be considered as part of deciding whether to adopt a trailing average cost of debt approach. For instance, Lally (2014, pp. 43-44) argues that a trailing average applied to the total cost of debt will typically provide an excessive allowance by using the average borrowing term of unregulated, comparable firms (e.g. 10 years) whilst ignoring swap contracts (for the risk-free rate component of the cost of debt) that unregulated, comparable firms would likely use to reduce the effective borrowing term (and reduce the risk-free rate incurred by the firm). If there is scope for higher profits to be achieved by the firm from continuing to use swaps under this regulatory arrangement, there could potentially be a violation of the NPV = 0 principle. This issue is not expected to be as significant for the trailing average applied to the debt risk premium only, since under this approach it is assumed that interest rate swap contracts (for the risk-free rate component of the cost of debt) are used by firms to reduce the effective borrowing term to the term of the regulatory cycle (e.g. 5 years).

In addition, there are a number of methodological issues that warrant further consideration prior to adopting this type of approach, namely:

(a) the appropriate data sources and methodology for estimating the benchmark cost of debt, given the need for more frequent annual estimates for input into the trailing average calculation

(b) whether to update the regulatory cost of debt on an annual basis during each regulatory cycle

(c) whether to apply the trailing average to the total cost of debt or, alternatively, only to the debt premium part of the total cost of debt (using an 'on the day' rate for the risk-free rate component)

(d) the appropriate weighting approach and resulting implications for investment incentives

(e) transitional arrangements that ensure firms and customers are not adversely affected

(f) whether to apply the trailing average cost of debt approach across all regulated firms.

Using a trailing average cost of debt approach requires the benchmark 'prevailing' cost of debt to be estimated on a more frequent basis than the current 'on the day' approach. As a consequence, the potentially greater complexity and costs associated with the PwC recommended econometric approach rather than a third party provider data source would need to be considered. The trailing averaging approach uses multiple estimates of the benchmark cost of debt, reducing the impact of a single benchmark cost of debt estimate on the regulatory cost of debt calculation for a particular year. Possible

[1] Either through the actual issuance of debt at the beginning of the period, or through entering into swap contracts to align the firm's actual schedule of debt issues with the regulatory cycle.

third party provider data sources include the Bloomberg fair value curves traditionally used by regulators and the newly developed Reserve Bank of Australia (RBA) estimates of Australian non-financial corporation yields.

Updating the regulatory cost of debt on an annual basis can potentially further reduce interest rate risk arising from the mismatch between the allowed cost of debt and the actual debt servicing costs incurred by the firm. The associated mechanism for updating allowed revenue and prices will generally occur through either annual adjustments or using a retrospective true up at the end of the regulatory period. Annual adjustments could result in higher costs and higher price variations for consumers within the regulatory cycle. In contrast, a retrospective true up could result in reduced complexity and costs as compared with annual adjustments to allowed revenues and prices, but may result in higher step changes in allowed revenues and prices at the start of each regulatory period. However, this could be addressed by smoothing of prices over a longer term than the current regulatory cycle.

A weighting method aims to minimise potential investment distortions by assigning the benchmark 'prevailing' cost of debt to the portion of the total debt of a firm that is assumed to be financed each year. However, applying weights may also result in increased complexity and reduced transparency of the regulatory approach. Issues can arise in determining the appropriate data source for estimating the regulated firm's debt issuance profile that aligns with efficient debt financing practices. In addition, ensuring that new borrowings from investments are compensated at the prevailing rate for the fixed benchmark term of debt may result in divergence over time from the assumed broadly uniform maturity profile of the benchmark efficient firm's debt portfolio. Weighting methods also result in firm-specific estimates of the regulatory cost of debt, even if other benchmark characteristics (e.g. credit rating and term of bond) are the same.

The adoption of a trailing average cost of debt approach requires consideration of whether transitional arrangements are required to ensure regulated firms or customers are not adversely affected. These arrangements will need to consider: existing debt exposures of regulated firms under the current 'on the day' cost of debt approach that may require restructuring; minimising the potential for gaming by regulated firms to lock in windfall gains; and practical issues regarding the availability of historical cost of debt information at the start of the new approach. Queensland Treasury Corporation (QTC) and the Regulatory Development Branch of the Australian Competition and Consumer Commission (ACCC) have proposed alternative transitional arrangements for dealing with these considerations.

Finally, there will need to be consideration of whether to apply the trailing average cost of debt approach across all regulated firms, or determine the appropriate regulatory approach based on the most 'efficient' benchmark for a given regulated firm on the basis of certain, firm-specific parameters. A single approach may lead to various mismatches between the regulatory cost of debt and the actual interest rate exposures of those regulated firms that employ debt management practices that are not closely aligned with the benchmark assumptions. The option of multiple approaches may provide the regulated firm with incentives to choose an option (or switch between options over time) on the basis of revenue maximisation rather than actual efficient debt management practices. Transitional arrangements to reduce these incentives may increase the complexity of the regulatory approach.

Table 1 below summarises the key features of the current 'on the day' approach as compared with the two main types of trailing average cost of debt approaches which have been considered recently in the Australian regulatory context:

(a) applying the trailing average to the total cost of debt (risk-free rate and debt premium)

(b) applying the trailing average only to the debt risk premium component of the total cost of debt (and using an 'on the day' rate for the risk-free rate component).

Table 1 Comparison of Key Aspects of Different Regulatory Cost of Debt Approaches

	Current 'on the day' approach	*Trailing average applied to the total cost of debt*	*Trailing average applied to the debt premium (hybrid)*
Combination of viable debt strategy and regulatory policy that satisfy the NPV = 0 principle	Lally (2014, p. 45) argues that violations of the NPV=0 principle are not substantial.	Lally (2014, p. 14-15) demonstrates that this approach would satisfy the NPV = 0 principle. However, if this approach results in an excessive allowance for the cost of debt leading to scope for higher profits, there could potentially be a violation of the NPV = 0 principle.	Lally (2014, p. 14-15) demonstrates that this approach would satisfy the NPV = 0 principle.
Implications for capital expenditure and new entrants	Lally (2014, p. 45) argues that this approach has lower incentive problems than trailing average approaches as the prevailing 'on the day' rate at the start of the regulatory cycle is more contemporary and the risk-free rate can be hedged if investment timing is known.	Lally (2014, p. 44) argues that this approach has greater incentive problems than the hybrid approach, since the risk-free rate cannot be hedged. Incentive problems can be overcome with a weighted trailing average if complexity issues are manageable.	Lally (2014, p. 44) argues that this approach has lower incentive problems than the trailing average total cost of debt approach, since the risk-free rate can be hedged if investment timing is known. Incentive problems, as compared with the current approach, can be overcome with a weighted trailing average if complexity issues are manageable.
Allocation of interest rate risk	Helm (2009, pp. 23-25) argues that, by fixing the cost of debt rate for the regulated firm ex ante, the regulator actually imposes an external risk (i.e. interest rate risk) onto the firm that it cannot possibly control.	Updating the trailing average cost of debt on an annual basis can potentially further reduce interest rate risk for the regulated firm. The effect is similar to that for the hybrid method.	This approach will have a similar effect on interest risk for the regulated firm to that for the total cost of debt method. However, QTC (2013b, p. 110) argues that this approach may expose consumers to higher interest rate risk due to potential changes in the risk-free rate between regulatory cycles.
Variation in output prices over time	There is more potential for variation in output prices under the current approach compared with the trailing average approaches.	Using market data from 2003 to 2013, Lally (2014, pp. 24-27) shows that output prices under this approach would have shown less variation than the other approaches.	This approach was shown to have less variation than the current approach, but slightly greater variation than the trailing average total cost of debt approach.
Potential overstatement of allowed cost of debt	The QCA's current cost of debt framework is based on an implicit debt management strategy that the efficient firm will borrow ten year debt and enter swap contracts to reduce the effective term of the risk-free rate to match the regulatory period (Lally 2010, pp. 10-11). Lally (2014, p. 44) argues that a potential overstatement will not	Lally (2014, p. 13) contends that the debt strategy for the trailing average is staggered borrowing with no interest rate swap activity. As a result, both the term of the risk-free rate and debt risk premium will be equal to the benchmark debt term. Lally (2014, pp. 43-44) argues that this approach will typically provide an excessive allowance by using the average debt term of unregulated, comparable	Lally (2014, p. 14) shows that the debt strategy for the trailing average is staggered borrowing combined with interest rate swaps to reduce the effective term of the risk-free rate component for two possible purposes: • for the unregulated firm, to optimally trade off the reduced borrowing cost with increased interest rate volatility; • for the regulated firm, to reduce interest rate risk by aligning the risk-free rate component of the incurred cost of debt with the

	Current 'on the day' approach	*Trailing average applied to the total cost of debt*	*Trailing average applied to the debt premium (hybrid)*
	arise because the term of the risk-free rate is based on the regulatory cycle rather than comparable firms.	firms, whilst ignoring swap contracts that such firms would likely engage to reduce the effective borrowing term (and reduce the risk-free rate incurred by the firm).	risk-free rate allowance. Lally (2014, p. 44) argues that a potential overstatement will not arise because the term of the risk-free rate is based on the regulatory cycle rather than comparable firms.
Implementation and complexity	This regulatory approach is relatively easy to implement.	This approach is easier to understand and implement than the trailing average of the debt premium approach. There are transitional issues to address in implementation. Both trailing averaging approaches will entail some increase in complexity compared with the current approach, due mainly to the need to annually estimate the benchmark cost of debt and implement a complex weighting methodology.	Transitional issues will not need to be considered for the risk-free rate component (since the implied debt strategy for the risk-free rate is unchanged). Both trailing averaging approaches will entail some increase in complexity compared with the current approach, due mainly to the need to annually estimate the benchmark cost of debt and implement a complex weighting methodology.

Specific consultation issues are summarised below in Table 2 and at the end of relevant chapters.

Table 2 Summary of consultation issues

Ch.	*No.*	*Consultation Issue*
3	3.1	Please comment on the possible advantages and disadvantages of the QCA adopting a trailing average cost of debt approach rather than the current 'on the day' approach to determining the regulatory cost of debt.
3	3.2	How should the QCA address the potential problems that arise from implementing a trailing average cost of debt approach, in particular potential overstatement of the allowed cost of debt and complexity in implementation of the trailing average cost of debt?
3	3.3	Are there any other issues for stakeholders that the QCA should consider as part of deciding to adopt a trailing average cost of debt approach?
4	4.1	Are there any issues that need to be considered in applying the PwC estimation methodology to derive the prevailing cost of debt for the benchmark firm each year under a trailing average cost of debt approach?
4	4.2	If the QCA were to adopt a trailing average approach, should the average apply to the entire benchmark cost of debt or to the debt risk premium component only?
4	4.3	Should the QCA consider making annual adjustments to the regulatory cost of debt? If so, how should the QCA address the issues relating to annual adjustments?
4	4.4	What are the advantages and disadvantages of applying a weighted, rather than simple, average under a trailing average cost of debt approach?
4	4.5	What is the most appropriate data source and weighting approach for minimising the potential mismatch between the allowed and actual cost of debt without distorting incentives for regulated firms to seek to achieve an efficient debt policy?
4	4.6	What are important considerations when developing transitional arrangements that ensure regulated firms and customers are not adversely affected?

Ch.	*No.*	*Consultation Issue*
4	4.7	Should the QCA apply a single cost of debt approach across all regulated firms, or should it determine the most 'efficient' benchmark for a given regulated firm on the basis of certain, firm-specific parameters?
4	4.8	Should the QCA consider allowing different regulated firms to choose the cost of debt benchmark approach that they prefer (subject to certain pre-specified limitations)?

THE ROLE OF THE QCA – TASK, TIMING AND CONTACTS

The Queensland Competition Authority (QCA) is an independent statutory authority to promote competition as the basis for enhancing efficiency and growth in the Queensland economy.

The QCA's primary role is to ensure that monopoly businesses operating in Queensland, particularly in the provision of key infrastructure, do not abuse their market power through unfair pricing or restrictive access arrangements.

In 2012, that role was expanded to allow the QCA to be directed to investigate, and report on, any matter relating to competition, industry, productivity or best practice regulation; and review and report on existing legislation.

Task, timing and contacts

The QCA is undertaking a comprehensive review of its cost of capital methodology for regulated businesses. A series of discussion papers covering various aspects of the cost of capital have been released for public comment.

This issues paper presents a detailed discussion of the rationale underlying the trailing average cost of debt approach, a consideration of the potential problems with this approach and methodological issues that arise from implementing this approach.

This issues paper was prepared taking account of submissions relating to the trailing average cost of debt that have been received in response to other papers released by the QCA as part of its cost of capital review, in particular submissions to the split cost of capital and cost of debt discussion papers.

The paper seeks comments from interested parties so that a final position paper can be prepared on the trailing average cost of debt approach for estimating the allowed cost of debt for a firm regulated by the QCA.

Submissions are invited on this issues paper by the due date and can be forwarded to the contact below.

Key dates

20 March 2014 - Release of Issues Paper

24 April 2014 - Closing date for submissions

Contacts

Enquiries regarding this project should be directed to:

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1 INTRODUCTION

The Queensland Competition Authority (the QCA) is undertaking a comprehensive review of its cost of capital methodology. The cost of capital referred to here is the weighted average cost of capital (WACC) applicable to the assets of regulated businesses under its jurisdiction. The WACC is a weighted average of the cost of equity and the cost of debt, with the respective weights representing the shares of equity and debt in the capital structure of the firm. The cost of equity and cost of debt components of the WACC need to be set at a level to ensure investment can be financed at economically efficient levels.

As part of this review, the QCA has recently released cost of capital papers related to:

(a) risk and the form of regulation

(b) risk-free rate and the market risk premium

(c) the split cost of capital

(d) cost of debt estimation methodology

(e) gamma.

As part of continuing work on other cost of capital related issues, the QCA is further reviewing its theoretical framework for estimating the regulatory cost of debt. The QCA's current framework is similar to many other Australian regulators in that an 'on the day' rate is used to estimate the regulatory cost of debt.

Recently, however, several proposals have arisen in regulatory contexts that involve moving away from a strictly 'on the day' rate and replacing it with some form of 'trailing average'. The term 'trailing average cost of debt' refers to a moving weighted average of the cost of debt with the weights representing a portion of the total debt of a firm that is assumed to be financed each year.

The most detailed considerations of this issue in the Australian context have been by the Australian Energy Market Commission (AEMC) and the Australian Energy Regulator (AER). In its final rate of return guideline published in December 2013, the AER decided to change from its current 'on the day' approach to a trailing average approach for estimating the allowed cost of debt for firms that it regulates. It reasoned that this approach provided a more efficient benchmark to the extent that market practice involves a more staggered approach than the typical assumption that all debt is effectively issued at the start of a regulatory period.

Analysis of the split cost of capital concept in the QCA's recent Information Paper has also raised the issue of how the regulatory cost of debt should be set. Consistent with the risk allocation principles forming the basis for the split cost of capital rationale, it has been argued that the regulatory cost of debt should be indexed on an annual basis through the regulatory period. The rationale is that firms do not have the ability to influence the cost of debt in the relevant market and so they should not bear the associated risk that actual debt costs will vary from allowed debt costs.

One problem with this perspective (depending on the specific form of recovery of debt costs) is that if actual debt costs are always recovered, firms would have no incentive to adopt the most efficient debt portfolio. However, several submissions to the QCA have highlighted the benefits from adopting a trailing average cost of debt approach based on a benchmark efficient debt portfolio.

The purpose of this paper is to explore the trailing average cost of debt approach in more detail and to assess its potential for application by the QCA. This paper includes: an outline of QCA's existing cost of debt framework and implications of this approach; a detailed discussion of the rationale underlying the trailing average cost of debt method and potential problems with this approach; and methodological issues that need to be considered in estimating the trailing average cost of debt.

2 BACKGROUND

2.1 The QCA's cost of debt methodology

At present, the QCA's cost of debt theoretical framework is based on implementing the Net Present Value Principle (the 'NPV = 0 Principle') while also addressing refinancing risk. This framework includes, inter alia, the following key elements:

(a) using an 'on the day' approach for setting both the risk-free rate and debt risk premium components of the cost of debt (i.e. averaging over the 20 business days immediately preceding the start of the regulatory cycle)

(b) setting the term of the risk-free rate and debt risk premium equal to the term of the regulatory cycle (N years)

(c) determining the benchmark regulated firm's 'efficient' (average) term of debt (T years), from issuance to maturity[2]

(d) if the efficient term of debt (T years) is assessed to be greater than the term of the regulatory cycle (N years), then

  (i) efficient hedging costs are allowed to enable the firm to enter into interest rate swaps to convert the risk-free rate component of the cost of debt into N-year debt

  (ii) if credit default swaps are not available in the required quantities to hedge the debt premium component, an allowance equal to the difference between T-year and N-year debt premiums is provided to proxy for the transaction costs of credit default swaps

(e) an allowance for annual debt issuance costs is also provided.

Using an 'on the day' risk-free rate that matches the regulatory cycle satisfies the fundamental regulatory test that the present value of the future cash flows of the regulated firm should equal the initial investment (i.e. the 'NPV = 0' principle) (Lally 2010). This principle is equivalent to the statement that the regulated price should cover the firm's efficient costs, including the cost of capital (Schmalensee 1989).

Estimating a risk-free rate immediately prior to the start of the regulatory cycle (i.e. an 'on the day' rate) follows from the fact that present values always involve using a current discount rate, and 'current' in a regulatory context means at the start of the regulatory cycle (Lally 2012, p. 7). The current 'on the day' rate is estimated over a short averaging period (20 business days)[3] that immediately precedes the start of the regulatory cycle. This short averaging period balances the trade-off between avoiding anomalies arising from short-term variations in an 'on the day' rate and using the most current information.

The QCA's current framework recognises the potential for the regulated firm to face refinancing risk. Refinancing risk is the risk of unusual conditions in credit markets at the time of refinancing, in particular, the unavailability of credit at an efficient price and/or exposure to

[2] PricewaterhouseCoopers (2013, p. 21) concluded that an efficient term of debt of 10 years is an appropriate assumption, consistent with the Authority's most recent regulatory reviews (e.g. South East Queensland Distribution-Retail Price Monitoring 2013-15).

[3] Australian regulators have tended to use different averaging periods, ranging from five to forty days.

market power of credit providers that may arise when all of a firm's debt is refinanced contemporaneously (QCA 2010, p.35). Lally (2010, pp. 8-9), the AER (2013c, pp. 103-107) and SFG (2012, pp. 23-24) have recognised that rolling over the entire debt portfolio at the start of each regulatory period would result in refinancing risk that is unacceptably high.

Lally (2010, pp. 9-10) has stated that refinancing risk is a valid concern if the average debt term (from issuance to maturity) of relevant competitors materially exceeds the term of the regulatory cycle. This reflects that the only rational reason for a firm, subject to a fixed regulatory cycle, to issue debt longer than the regulatory cycle is to reduce its refinancing risk.

To address the potential for the regulated firm to face refinancing risk, the QCA determines an efficient term of debt (from issuance to maturity) based on comparator analysis. If the QCA assesses the efficient term to be greater than the term of the regulatory cycle, it provides hedging costs to enable the firm to reduce interest rate risk by matching the effective term of debt to the term of the regulatory cycle. This is considered to be consistent with the practice of providing allowances to firms for efficiently managing other business risks, for instance in the allowance of insurance premiums.

Lally (2010, pp. 10-11) has demonstrated that the regulator could still satisfy the NPV = 0 principle even when the average term of debt (i.e. T years) materially exceeds the regulatory term (i.e. N years) provided that:

(a) the term of the risk-free rate and debt risk premium in the allowed cost of debt closely matches the term of the regulatory cycle (i.e. N years)

(b) swap contracts are available to convert the firm's actual schedule of debt issues to one that aligns with the regulatory cycle, in particular it is assumed that the efficient firm in this situation would enter into:

    (i) interest rate swap contracts to convert the risk-free rate component into N-year debt

    (ii) credit default swap contracts to convert the debt premium component into N-year debt.

However, credit default swap contracts for the volume required by regulated firms are not feasible based on the current structure of the Australian credit default swap market (PwC 2013, p. 7). In this instance, the QCA considers that a reasonable proxy for the cost of credit default swaps is the difference between the T-year and N-year debt risk premiums (QCA 2010, p. 37). This is numerically equivalent to Lally's preferred option of providing a regulatory cost of debt that incorporates a term of the debt risk premium equal to T years (with no allowance for credit default swaps) (Lally 2010, pp. 15-16). While this approach is considered a good approximation of the actual debt costs faced by the regulated firm, it results in a violation to the NPV = 0 principle to the extent there are mismatches between the allowed and actual debt premium incurred.

The QCA's current framework results in a single ex ante estimate of the regulatory cost of debt for the subsequent years of the regulatory period. As a result, this cost of debt is not updated during the regulatory period.

2.2 Related developments

Other Australian regulators' methodologies have also applied an 'on the day' rate to estimate the regulatory cost of debt. Recently, however, several proposals have arisen in regulatory

contexts that involve moving away from a strictly 'on the day' rate and replacing it with some form of 'trailing average'.

AEMC review

A detailed consideration of this issue has been in the context of the AEMC's Final Rule Determination on the economic regulation of network service providers (AEMC 2012).[4] While the QCA is not bound by the outcome of the AEMC review, it considers that the conceptual approaches and issues canvassed in that review provide a useful reference point. A conclusion from this review is that the regulator should not set the regulatory cost of debt without considering the interrelationship between the (regulator's) choice of a cost of debt approach and the regulated firm's 'best', or 'efficient', debt management strategy.

A direct implication of this conclusion is that the regulatory approach for setting an 'efficient' cost of debt might differ from regulated firm to regulated firm, depending on each firm's characteristics. As a result, the rule change does not prescribe a specific, 'one-size-fits-all' approach for estimating the regulatory cost of debt. Rather, it allows for a number of possible approaches, where these are based on one of two possible starting points, namely a:

(a) current 'on the day' rate – proxied by a short averaging period (e.g. 5-40 days) that immediately precedes the start of the regulatory cycle (broadly consistent with the QCA's current practice) or

(b) trailing average – an historical trailing average of the total cost of debt, over a number of years corresponding to some term of debt (an 'efficient' term, e.g. 10 years) preceding and inclusive of the current year of the regulatory cycle.

Given these two basic approaches, the AEMC's final rule gives the regulator the flexibility to vary from either approach by:

(a) applying the trailing average only to the debt risk premium component of the total cost of debt (and using an 'on the day' rate for the risk-free rate component)

(b) updating the regulatory cost of debt on an annual basis during a particular regulatory cycle and/or

(c) using the swap rate (that matches the length of the regulatory period) as the base interest rate in the regulatory cost of debt, rather than using the government bond yield.

As a result, there are a number of combinations of possible approaches, each of which might reflect an 'efficient' cost of debt approach for a given regulated firm, depending on that firm's particular characteristics (e.g. business size, asset profile, ownership structure, etc.). There might also be other possible approaches not considered within the AEMC review.

AER rate of return regulation

This issue was considered further by the AER during its extensive consultative process in 2013 to develop revised rate of return guidelines to reflect the changes to the National Electricity Rules (NER) and National Gas Rules (NGR) by the AEMC. Prior to this change, the AER typically used an 'on the day' approach with the term for the risk-free rate and debt premium equal to ten years, with no provision for hedging costs (AER 2009).

[4] On 29 November 2012, the AEMC published its final rule determination and final rule on the network regulation rule changes under sections 102 and 103 of the National Electricity Law (NEL) and sections 311 and 313 of the National Gas Law (NGL).

While the AEMC rule change provided the AER with the flexibility to apply different cost of debt approaches for different service providers, in its final guidelines the AER proposed using a single cost of debt approach for a single benchmark efficient entity. A key consideration in the AER's final decision not to allow regulated firms to propose a particular cost of debt approach was its inconsistency with incentive based regulation (AER 2013c, pp. 100-102). Firms may have the incentive to propose an approach that maximises their allowed revenue rather than reflect their actual debt management strategy. While this could be alleviated with transitional arrangements, the AER considered that these would add to the complexity of regulatory policy.

In its final rate of return guideline published in December 2013, the AER decided to change from its current 'on the day' approach to a trailing average approach for estimating the allowed cost of debt for regulated firms. Key elements of this approach that were outlined in the final guidelines include (AER 2013c, p. 98):

(a) applying the trailing average to the total cost of debt

(b) applying the trailing average over a ten year period (covering the current year and preceding years) reflecting the benchmark term of debt (issuance to maturity)

(c) calculating a simple average that applies equal weights (i.e. 10%) to each element of the trailing average

(d) annually updating the regulatory cost of debt estimate

(e) applying transitional arrangements consistent with the proposed approach by the Queensland Treasury Corporation (QTC), with a ten year transitional period from the current approach to the trailing average approach.

Other regulators

Other regulators use different frameworks. Historically, other Australian regulators' methodologies have shared the same broad-level cost of debt approach; that is, they have applied an 'on the day' rate to estimate the regulatory cost of debt. The cost of debt under this type of approach is generally determined just prior to the commencement of a regulatory pricing period and is not updated during the regulatory period.

For example, until recently the Independent Pricing and Regulatory Tribunal of New South Wales (IPART) used an 'on the day' approach with the term for the risk-free rate and debt premium equal to the term of the regulatory cycle. Following a review of their WACC methodology over 2013, IPART has decided to now derive an estimated range for the cost of debt using both an 'on the day' rate and a long-term historical average (approximated using ten year averages), with no annual adjustments during the regulatory period which is typically three to five years (IPART 2013, pp. 10-15). IPART has also decided to adopt a ten year risk-free rate and debt premium, reflecting recent evidence that this term reflects the efficient financing costs of a benchmark entity operating in a competitive market.[5]

The Essential Service Commission's (ESC's) most recent regulatory decision was its 2013-2018 price review for Greater Metropolitan Water (June 2013), in which it used an 'on the day' approach with a 10-year risk-free rate and debt premium (ESC 2013, pp. 102-111). In its final

[5] IPART's primary objective (established in its 2013 review) is to set a WACC that reflects the efficient financing costs of a benchmark entity operating in a competitive market. IPART claims market evidence indicates that firms seek debt with a maturity of ten years. IPART states that NPV neutrality is less likely to hold under its new cost of debt methodology given the use of a mix of current and historical averages in their calculations (IPART 2013, pp. 10-13).

decision, ESC foreshadowed the commencement of a review of their WACC methodology in 2013–14 (ESC 2013, p. 111).

The Economic Regulation Authority of Western Australia (ERA) has typically used an 'on the day' rate with a 5-year term for the risk-free rate and debt margin that corresponds with their five-yearly regulatory reviews (ERA 2011).

In its development of a new regulatory framework for electricity and gas networks (the RIIO model) that emerged from its comprehensive review of the existing framework (RPI-X@20 Review), the UK regulator Ofgem decided to base the cost of debt allowance on a long-term trailing average applied to the entire cost of debt (Ofgem 2010b, pp. 108-109). This is updated annually using a mechanistic process that is shown in a spreadsheet based model that is publicly released on their website (Ofgem 2013). In its first price controls under this new framework[6], Ofgem decided to implement a simple (equally weighted) approach given the relative simplicity of this approach despite an apparent slightly lower degree of accuracy (Ofgem 2011, pp. 25-28).

2.3 Implications of the current approach

2.3.1 Net present value principle

A fundamental principle of regulation is the NPV = 0 Principle. The principle states that the present value of the regulated firm's expected cash flows should equal the initial investment, given a discount rate equal to the risk-adjusted opportunity cost of capital and efficient costs. The QCA has applied the NPV = 0 Principle, either implicitly or explicitly, in setting regulatory prices in recent decisions. In particular, the principle has been applied in setting the term for the risk-free rate in QCA decisions on Aurizon Network (QCA 2010, pp. 33-38) and on the South East Queensland water and wastewater retail/distribution entities (QCA 2011, pp. 233-238).

If the allowed revenues are less than those revenues that satisfy this principle then investors will not have an appropriate incentive to invest, and if the allowed revenues are greater than those revenues that satisfy this principle, then the incremental revenue reflects the excess profit that regulation seeks to prevent in the first place (Schmalensee, 1989).

The QCA's current cost of debt framework is based on an implicit debt management strategy that the efficient firm will borrow ten year debt and enter swap contracts so that the term of their debt issues effectively matches the regulatory period (Lally 2010, pp. 10-11). This approach recognises that rolling over the entire debt portfolio at the start of each regulatory period is not a viable debt policy as it would result in refinancing risk that is unacceptably high (Lally 2014, p. 13). As a result, the efficient debt management strategy for a firm in this situation is to manage refinancing risk by issuing longer term debt and mitigate interest rate risks by undertaking the required credit default and interest rate swaps.

Lally (2014, p. 13-14) argues that while interest rate swaps could be used to align the risk-free rate with the allowed rate, credit default swaps are not available in the market to hedge the debt premium component. Consequently, this debt policy is also not viable (Lally 2014, pp. 13-14):

> *This strategy is not feasible (and therefore not viable) because credit-default swap contracts are in general either not available on the desired bonds or in sufficient quantities for many of the regulated businesses in question.*

[6] The first price controls by Ofgem to reflect the new RIIO model that incorporated the 10 year simple trailing average index were for electricity and gas transmission (RIIO-T1) and gas distribution (RIIO-GD1) over the eight year regulatory period from 1 April 2013 to 31 March 2021.

Lally (2014, p. 41) concludes that the QCA's current 'on the day' cost of debt approach violates the NPV = 0 principle:

> *Faced with the current regulatory regime, the best a firm can do is to borrow long-term, with staggering, to deal with refinancing risk and to use interest-rate swap contracts to align the risk-free rate component of its cost of debt with the regulatory cycle. Consequently, although the regulator allows a DRP that reflects the rate prevailing at the beginning of each regulatory cycle, the firm pays the trailing average DRP. This mismatch between the DRP allowed by the regulator and the rate actually paid by the business leads to the NPV = 0 principle being violated and also gives rise to very moderate bankruptcy risk.*

The resulting implications for the NPV = 0 test are stated as follows (Lally 2010, p. 11):

> *However, with five yearly resetting of the ten year debt margin, the resulting process would violate the NPV = 0 test because the allowed premium would sometimes diverge from that actually incurred by a firm. For example, suppose the firm is established now and partially funds itself with ten year debt involving a current debt premium of 1.5%. The regulator will set prices for the first five years using the same ten year debt premium, and therefore no difference arises in the first five years. However, in five years time, the regulator will reset prices using the ten year debt premium prevailing at that time and this may differ from the current debt premium. In that event, the price allowed by the regulator for that second five year period will diverge from the costs incurred by the regulated firm. Nevertheless, the divergence could be in either direction.*

Lally (2010, pp. 36-41; 2014, p. 45) has demonstrated that the violation of the NPV = 0 principle under the current approach would not be substantial. The key source of divergence from NPV = 0 is the difference in future debt risk premiums between that allowed by the regulator and that incurred by the regulated firm. In analysis for the AEMC, SFG Consulting (2012, pp. 36-37) shows that the current 'on the day' approach results in significantly larger deviations between the regulatory allowance and debt servicing costs than a trailing average approach, resulting in cash flow volatility to equity holders.

QTC also submitted to the AER that the mismatch between allowed and actual debt risk premiums is not trivial, in particular given recent experience since the onset of the global financial crisis (GFC) in 2007-08 and the relatively higher proportion that the debt risk premium now contributes to the total cost of debt (around 50%) (QTC 2013a, pp. 13-14).

2.3.2 Link between regulatory policy and firm's debt strategy

The AEMC review concluded that the link between the regulatory cost of debt approach and the regulated firm's efficient debt management strategy needs to be considered when developing regulatory policy. The AEMC review concluded that the 'best', or most 'efficient', cost of debt benchmark might not be the same across regulated firms, as they will have different ('efficient') debt management strategies depending on their firm-specific characteristics.

For example, QTC has previously submitted to the AER that hedging the risk-free rate component using interest rate swap contracts may be feasible for smaller firms but raise difficulties for firms with larger debt portfolios (QTC 2013a, pp. 7-8). A large volume of interest rate swap contracts with the same tenor (i.e. the length of the regulatory cycle) will need to be entered in, or close to, the twenty day average period to closely hedge this risk-free rate component. This may result in market illiquidity issues and potential opportunistic pricing by market participants.

The AEMC (2012, p. 65) concluded that applying the same regulatory approach to all firms (e.g. 'on the day' rate) may result in a mismatch between the regulatory approach and the firm's debt management strategy.

2.3.3 Investment signalling

The QCA's current framework results in a single ex ante estimate of the regulatory cost of debt being applied to all new capital expenditure that may occur in subsequent years of the regulatory period. As a result, this framework does not take into account changes to the prevailing cost of debt during the regulatory period. The regulated firm will be exposed to the risk that the prevailing cost of debt at the time of future investment is significantly different to the regulatory 'on the day' cost of debt for at least the remainder of the current regulatory period (ACCC 2013, pp. 7).

For a large capital expenditure project requiring significant debt financing, there may be incentive problems if the prevailing cost of debt is materially higher than the allowed cost of debt. This would result in the regulated firm earning an allowed cost of debt return for the new investment that is less than the debt servicing costs over the remainder of the regulatory period. The regulated firm may be incentivised to delay commencement of this project to a point in time when the prevailing cost of debt is more favourable (or until the beginning of the next regulatory cycle, when the allowed cost of debt would be set to the prevailing rate).

Lally (2014, pp. 18-19) notes that if the timing of the new capital expenditure is known, the risk associated with movement in the risk-free rate can be hedged using a forward rate contract. However, Lally acknowledges that the movement in the debt risk premium cannot be hedged in the absence of credit default swaps.

2.3.4 Risk allocation

In a series of papers and commentary articles, Professor Dieter Helm (Oxford University) has proposed an alternative regulatory model with two principal components: i) the 'split' cost of capital; and ii) the indexation of the cost of debt. The indexation of the cost of debt is not an essential component of the split cost of capital concept and is considered separately in this paper as a potential way to improve price regulation.

Helm (2009, pp. 23-25) believes that there is no rationale to fix a cost of debt for the regulated firm ex ante (i.e. at the start of the regulatory cycle). Helm argues that, as the cost of debt is exogenous to the firm (i.e. it is beyond the firm's control), it is inefficient to fix an ex ante cost of debt for five years when interest rates vary continuously.

Rather, Helm argues that, by fixing the rate for a 5-year period, the regulator actually imposes an external risk (i.e. interest rate risk) onto the firm that it cannot possibly control. This interest rate risk results from the potential mismatch between the allowed cost of debt and the firm's actual debt servicing costs. While some regulators consider that this design gives the regulated firm the incentive to 'beat the market', Helm argues that treasurers of firms have no knowledge of what decisions the central bank will take on interest rates; that is, they cannot possibly 'know better' than the market.

In addition, Helm argues that this action has, in general, led regulators to systematically over-estimate the cost of debt to the detriment of customers. In the United Kingdom, the extent to which regulators have allowed the regulated firms a risk-free rate in excess of the actual risk-free rate from 1997–2007 is well documented (CEPA 2007, pp. 5–6). However, under the current 'on the day' approach used by the QCA whereby the risk-free rate and debt premium are based on observed market data at the beginning of the period, it is not clear that this systematic bias would prevail in the longer term.

Helm's view is supported by Brealey and Franks (2009), who argue that a regulated firm cannot possibly influence its cost of debt, given its capital structure. They further argue that, as the

firm cannot control the risk-free rate, a regulatory framework that fixes interest rates for a period of 5 years cannot lead to optimal investment. Brealey and Franks (2009) argue that this possibility arises because, if the cost of finance rises during the regulatory period, then the firm will not proceed with planned investments that are no longer profitable. While they acknowledge that regulated firms could potentially hedge such changes in the cost of finance, their view is that hedging in this situation is too problematic. Specifically, they argue that the hedging would be conditional on the investment proceeding and the latter poses serious pre-commitment difficulties (but they do not elaborate further on this point) (Brealey and Franks, 2009, pp. 438-439).

3 THE TRAILING AVERAGE COST OF DEBT APPROACH

3.1 Description

A trailing average cost of debt approach calculates an historical trailing average of the cost of debt, over a number of years corresponding to some term of debt (e.g. 10 years) preceding and inclusive of the current year. The trailing average can be applied to the total cost of debt or, alternatively, only to the debt risk premium component of the total cost of debt (and use an 'on the day' rate for the risk-free rate component). A variation of this approach involves updating the regulatory cost of debt on an annual basis during the current regulatory cycle.

For example, in its final rate of return guideline published in December 2013, the AER proposes to determine the regulatory cost of debt for each year within a regulatory cycle (following the transitional arrangement period) using the following formulae (AER 2013b, p. 19):

$$kd_t = \frac{1}{10} \cdot \sum_{j=1}^{10} rd_{t-10+j}$$

where:

- kd_t refers to the regulatory ('trailing average') cost of debt for regulatory year t
- rd_{t-10+j} refers to the estimated cost of debt that was issued in year t-10+j.

This approach implicitly assumes that the benchmark efficient firm staggers its borrowing evenly over time, so that 10% of its total debt requires refinancing each year.

A similar approach set out by QTC (2012a) entails estimating a benchmark portfolio of fixed-rate debt with equally spaced maturity dates out to 10 years, with 10 per cent of total debt assumed to mature each year and refinanced with new 10 year fixed rate debt. Over time the average cost of such a debt portfolio would be a 10 year trailing average of 10 year fixed debt. In contrast to the AER method, QTC propose a weighted average that ensures that the annual weights are adjusted to reflect changes in the regulated firm's debt balance arising from capital expenditure that is incurred in a particular year. This ensures that new capital expenditure during the regulatory period is compensated at the prevailing cost of debt.

To avoid the scope for windfall gains or losses, QTC has proposed transitional arrangements that have been incorporated in the AER guideline. Initially the regulatory cost of debt would be determined based on the current approach and each subsequent year a portion of the debt (e.g. 10%) would be refinanced at prevailing market rates.

Under these approaches, firms would be allowed to recover the regulatory 'trailing average' cost of debt but not their actual cost of debt. This is consistent with incentive-based regulation, as it gives firms the incentive to adopt the most efficient debt portfolio.

3.2 Rationale for the trailing average cost of debt approach

Proponents have highlighted the benefits from adopting a trailing average cost of debt approach based on a benchmark efficient debt portfolio. It is argued that such an approach would represent a more efficient market benchmark to the extent that market practice involves a more staggered approach than the typical assumption that all debt is effectively issued at the

start of each regulatory period.[7] This would improve the alignment between the regulatory cost of debt approach and the firm's debt management strategy, reducing interest rate risk arising from the mismatch between the allowed cost of debt and the actual debt servicing costs incurred by the firm.

It could also lead to a smoother profile for the allowed cost of debt compared with the current typical regulatory arrangements, decreasing the variation in prices over time and reducing the scope for measurement error (QTC 2014, p. 11).

3.2.1 Efficient debt financing costs

The AER (2013c, p. 102) considered that the trailing average cost of debt approach results in a regulatory cost of debt that aligns more closely with the efficient debt financing costs of the benchmark firm. QTC (2014, pp. 10-11) has also argued that the trailing average cost of debt approach is consistent with the efficient debt financing costs that arise from adopting an efficient debt financing and risk management strategy. This includes the costs involved in a firm managing its refinancing and interest rate risk exposures.

The regulatory cost of debt should represent the cost of debt incurred by the benchmark firm adopting an efficient debt policy (QCA 2010, p. 34). This is consistent with, for example, the approach for determining the regulatory allowance for operating costs which aims to estimate the operating costs incurred by an efficiently operating firm.

The efficient debt policy of a benchmark firm would generally be considered with reference to market evidence of efficient unregulated firms that are otherwise similar to the regulated firms. A possible debt management strategy that a firm may adopt to manage refinancing risk would involve staggering its borrowing with an equal proportion maturing each year over a sufficiently long average term of debt (Lally 2010, p. 9). In its report to the AEMC review, SFG Consulting suggests that this debt management practice is consistent with the usual practice of unregulated firms with long-lived fixed assets (SFG 2012, p. 38).

In its cost of debt submission to the QCA in January 2014, QTC (2014, pp. 14-17) provided details of debt maturity profiles for both regulated utilities and unregulated infrastructure firms. QTC (2014, pp. 10-11) argued that both regulated and unregulated firms have displayed a preference for adopting staggered maturity profiles with an average term of borrowing of at least ten years.

In its review of its rate of return guidelines, the AER (2013c, p. 105) also observed from submissions by regulated firms that:

> *Many debt financing strategies may have been available to service providers under the current 'on the day' approach. However, we observe that most service providers hold a diversified portfolio of debt with staggered maturity dates. This means that a service provider will only have to refinance a proportion of its debt at any point in time. Holding a portfolio of debt with different terms to maturity allows a service provider to manage its refinancing risk.*

To manage interest rate risk, QTC submits that an unregulated firm would tend to adopt a debt management strategy which results in a relatively stable long-term cost of debt that aligns closely with its relatively stable revenues (QTC 2014, pp. 7-8). QTC contends that this would also be achieved by adopting staggered borrowings with an average term (issuance to maturity) of at least ten years.

[7] Either through the actual issuance of debt at the beginning of the period, or through entering into swap contracts to align the firm's actual schedule of debt issues with the regulatory cycle.

Under the current 'on the day' regulatory approach, it is assumed that the regulated firm will manage refinancing risk by issuing longer term debt. A regulated firm will manage interest rate risk by entering into interest rate swap contracts to convert the risk-free rate component of their cost of debt to the term of their regulatory cycle (Lally 2014, p. 44). Only the risk-free rate component can be hedged though, due to the unavailability of the required credit default swap contracts to hedge the debt premium component.

However, it is expected that this hedging would not be required under a trailing average cost of debt approach as the allowed cost of debt will be consistent with the actual cost of debt incurred (PwC 2013, p. 8):

> *For example, it has been argued that if a regulator were to apply a trailing average approach over 10 years, and the regulated business was large enough, it would stagger its debt portfolio to provide a natural hedge that follows the regulatory debt cost allowance. Hence, it would not be necessary for these firms to swap their long term debt to align with the regulatory period.*

3.2.2 Net present value principle

Lally (2014, pp. 14-15) argues that the use of a trailing average cost of debt approach does not contravene the NPV = 0 principle, provided the implicit debt management strategy followed by the firm is consistent with the regulatory arrangements and feasible. In particular, Lally (2014, p. 14-15) demonstrates that the following trailing averaging cost of debt approaches each have an associated viable[8] debt strategy and would therefore satisfy the NPV = 0 principle:

(a) applying a benchmark trailing average to the total cost of debt

(b) applying a benchmark trailing average to only the debt risk premium component of the total cost of debt (and using an 'on the day' rate for the risk-free rate component).

The first of these approaches implies a debt management strategy in which the efficient firm will borrow long-term with staggering of repayments to ensure that only a small proportion of debt matures each year. This strategy is also viable as it reduces refinancing risk to a minimal level, and will provide a natural hedge that minimises the mismatch between the allowed cost of debt and the actual debt serving costs incurred.

However as discussed further in section 3.3.1, Lally (2014, pp. 43-44) considers that applying a trailing average to the entire cost of debt will typically result in an overstatement of the regulatory cost of debt. Lally advises that the efficient debt policy of a comparable, unregulated firm would continue to use interest rate swaps to reduce the effective borrowing term for the risk-free rate component to reduce its cost of debt. The QCA considers that if there is scope for higher profits to be achieved by the firm from continuing to use swaps under this regulatory arrangement, there could potentially be a violation of the NPV = 0 principle.

The second approach is based on a matching debt management strategy in which the benchmark firm borrows long-term (staggering its borrowing) and uses interest rate swaps to align the risk-free rate component with the regulatory period. This strategy also results in refinancing risk being mitigated, with interest rate risk minimised for both the risk-free rate component (through the use of interest rate swaps) and the debt risk premium component (through the natural hedge provided by staggered borrowings that are reflected in the allowed cost of debt).

Lally (2014, pp. 14-15) contends that these are the only combinations of viable debt policy and regulatory approach that satisfy the NPV = 0 principle:

[8] Lally (2014, p. 13) defines a viable debt policy as feasible and not so inefficient that firms would avoid it.

> *In summary, only two possible debt strategies for a business are viable. The first involves borrowing long-term and staggering the borrowing to ensure that only a small proportion of the debt would mature in any one year; this reduces refinancing risk to a minimal level. The second additionally involves the use of interest rate swap contracts (relating to the risk-free rate component of the cost of debt). Each of them has a matching regulatory policy. For the first, the matching regulatory policy would be for the allowed cost of debt to be set in accordance with the trailing average cost, and this combination of corporate debt policy and regulatory policy would therefore satisfy the NPV = 0 principle. In respect of the second debt policy, additionally involving the use of interest-rate swap contracts, the matching regulatory policy would be for the allowed risk-free rate within the cost of debt to be set in accordance with the rate prevailing at the beginning of the regulatory cycle whilst the DRP would be set in accordance with the trailing average. This combination of corporate debt policy and regulatory policy would therefore also satisfy the NPV = 0 principle.*

3.2.3 Variation in cash flows to equity holders over time

Any mismatches between the allowed cost of debt and actual debt servicing costs will impact on the return attributable to equity holders. Reducing this mismatch may also reduce the risk of financial distress for the regulated firm.

Lally (2014, pp. 20-23) assesses the net cash flows faced by a hypothetical firm under the current 'on the day' approach during the post-GFC period (2007 to 2013) in the context of the regulated firm's risk of financial distress. The net cash flows attributable to the allowed cost of capital are assumed to equal the regulatory return on equity adjusted for any mismatches between the allowed debt risk premium and that actually incurred by the firm. While Lally (2014, p. 22) shows that the downside risk associated with the movements in net cash flows to equity holders is low in this particular example (resulting in minimal risk of bankruptcy under the current 'on the day' approach), it could be argued that there is some volatility in the annual movements due to the mismatch between the allowed and actual debt risk premiums. For example, resetting the debt risk premium in 2010 (i.e. at the cyclical turning point) results in an initial mismatch at the start of the regulatory cycle that is the primary driver of the large increase in net cash flows in this year.

SFG Consulting (2012, pp. 52-68) examines the implications of such mismatching in terms of the resulting effects on the regulated firm's cash flow volatility. Using a simulation method to assess various combinations of regulatory approach and debt management strategy[9], the cash flow risk is assessed using the volatility (i.e. standard deviation) of equity returns and interest coverage[10] over time. Assuming that refinancing risk is a valid consideration, this analysis shows that the volatility of return to equity holders and interest coverage are minimised when the regulatory approach matches the firm's debt management strategy (for example, both following a trailing average approach) (SFG 2012, pp. 60-61).

One particular issue with this analysis is that the method for deriving the allowed return on equity is not consistent with standard regulatory practice of allowing a market risk premium that is constant over time (Lally 2014, pp. 23). SFG Consulting (2012, p. 53) instead models the market risk premium as a function of the debt risk premium. In addition, for the scenarios entailing a mismatch between the regulatory approach and debt management strategy (e.g. regulatory 'on the day' cost of debt approach combined with trailing average debt management

[9] Possible regulatory approaches and debt management strategies are categorised as prevailing ('on the day'), five year trailing average or ten year trailing average, with trailing average applied to the total cost of debt.

[10] Interest coverage is derived as earnings before interest and tax (EBIT) divided by interest. This is used to measure the risk that the firm will not be able to meet its debt servicing obligations (i.e. the risk of financial distress).

strategy), it is assumed that the regulated firm has not hedged the risk-free rate component of their borrowing costs (SFG 2012, p. 59). It is therefore difficult to use the results from this analysis to compare the trailing average approach with the current 'on the day' approach.

3.2.4 Variation in output prices over time

In deciding to move to a trailing average cost of debt, the AER (2013c, pp. 109-110) concluded that this approach will smooth the movement in the regulatory cost of debt resulting in lower price volatility between regulatory cycles. QTC (2012a, p. 2) has also argued that this approach would reduce the risk that consumers will be exposed to prices being set at a time of temporarily high interest rates or cyclical turning points, avoiding large 'step changes' in prices between regulatory reviews.

Lally also contends that output prices may show less variation over time under a trailing average cost of debt approach. Using market data from 2003 to 2013, Lally (2014, pp. 24-27) compared the variation in the allowed cost of capital between the 'on the day' and trailing average cost of debt approaches. From this analysis, Lally (2014, p.27) concluded that:

> *Using data from 2003 to 2013, output prices would have exhibited moderately less variation if a trailing average were applied to the DRP compared to the current regime and substantially less if a trailing average were also applied to the risk-free rate component of the cost of debt.*

3.2.5 Allocation of interest rate risk

Helm (2009, pp. 23-25) believes that there is no rationale to fix a cost of debt for the regulated firm ex ante (i.e. at the regulatory cycle start). Helm argues that, as the cost of debt is exogenous to the firm (i.e. it is beyond the firm's control), it is inefficient to fix an ex ante cost of debt for 5 years when interest rates vary continuously.

As a result, Helm (2009, p. 24) suggests that, in the context of the regulatory asset base (RAB), the regulator should:

(a) set an ex ante cost of debt on an annual basis that is equal to an index-linked bond rate plus a 'small' premium, although Helm does not explain how to determine that premium

(b) make an ex post error correction on an annual basis for the divergence between the assumed cost of debt and the actual cost of debt outcome.

In making this case, Helm observes that the argument does not depend on the exact index or time interval chosen by the regulator - there are a range of possible choices for each and such a process will necessarily be imperfect (but will be a material improvement on existing regulatory arrangements) (Helm 2009, p. 24).

One problem with this perspective (depending on the specific form of recovery of debt costs) is that if actual debt costs are always recovered, firms would have no incentive to adopt the most efficient debt portfolio. This could be partially overcome by continuing to set the regulatory cost of debt using a benchmark index-linked bond rate, giving the regulated firm the incentive to achieve lower debt financing costs than the benchmark rate.

Helm suggests that the cost of debt should be indexed to current market rates (i.e. the index-linked bond rate) to reflect the true cost of debt to entities. In his critique of Ofgem's ten year trailing average methodology, Helm (2011, p. 15) contends that:

> *The correct mechanism should be to reflect the rate on a continuous real time basis, but, of course, the companies have legacy debt over varying time periods. Thus, to protect past positions and expectations, an appropriate reform might be to index in real time all future debt, and to roll forward the actual cost of past debt, subject to a prudential test.*

However, linking the regulatory cost of debt to current market rates may expose consumers to increased interest rate risk. Under this approach, regulated firms will not have the incentive to smooth movements in their debt servicing costs (e.g. by staggered issuance of fixed rate debt) as their revenue will be directly linked to current market interest rates. This differs from observed practices of unregulated firms who seek to smooth their debt servicing costs to align with stable revenues. This approach may expose consumers to increased price volatility as a result of this higher exposure to interest rate risk.

3.3 Potential problems with the trailing average cost of debt approach

3.3.1 Overstatement of regulatory cost of debt

Lally (2014, pp. 43-44) considers that applying a trailing average to the entire cost of debt will typically result in an overstatement of the regulatory cost of debt.

The trailing average cost of debt approach assumes that the benchmark firm will adopt an efficient debt policy comprising borrowing long-term (i.e. at the benchmark term of debt) with a staggered maturity profile to ensure that only a small proportion of debt matures each year. This recognises that the efficient debt management strategy for the benchmark firm in this situation is to manage refinancing and interest rate risk by issuing longer term debt with repayments staggered evenly over time.

Lally (2014, p. 43) advises that the efficient debt policy of a comparable, unregulated firm would be to issue long-term debt to minimise refinancing risk and additionally use interest rate swaps to reduce the effective borrowing term for the risk-free rate to reduce its cost of debt (assuming a positive yield curve). Lally argues that while the average term of bonds issued by comparable, unregulated firms could be observed, it would not be possible to measure the impact on this average term of using interest rate swaps to effectively reduce the term of the risk-free rate. Lally (2014, p. 43) suggests that the effective reduction in the term as a result of using interest rate swaps would be chosen by the unregulated firm to:

> *...optimally trade off the reduction in refinancing risk from longer term debt, the increase in the risk-free rate with the effective debt term, the transactions costs of the swap contracts, and the increased interest rate volatility arising from a shorter effective debt term.*

Lally argues that if the impact of this interest rate swap activity on the 'efficient' term of debt is ignored, the risk-free rate component of the regulatory cost of debt will be overstated. This overstatement is illustrated using the following example (Lally 2014, p. 44):

> *To illustrate this point, suppose that otherwise similar unregulated firms have ten-year debt, use interest rate swap contracts to convert the risk-free rate component of their cost of debt to the three-year rate, the average ten-year DRP is 2%, the average ten-year risk-free rate is 6%, the average three-year risk-free rate is 5%, and the transactions costs of the swap contracts are 0.2%. The average cost of debt of these firms is then 7.2%, comprising the average three-year risk-free rate of 5% and the ten-year DRP of 2%, and the transactions costs of the swap contracts. However, a regulator who merely observed their average debt term of ten years and ignored their interest-rate swap contracts would allow a ten-year cost of debt, with an average rate of 8%. The average overstatement would then be 0.8%.*

This issue does not affect the current approach and the trailing average applied to the debt risk premium, since these approaches both use an 'on the day' rate for the risk-free rate component with the term of the risk-free rate set equal to the term of the regulatory cycle. The allowed cost of debt would be expected to be lower on average for these two approaches due to the lower term of the risk-free rate in the regulatory cost of debt.

Lally (2013, p. 11) presents a similar argument in a paper for the AER as part its consultation process for the AER draft rate of return guidelines. In response, QTC (2013c, pp. 9-10) argues that for an unregulated firm with relatively stable revenues, exposure to a shorter term risk-free rate will increase the potential mismatch between the firm's revenues and its debt servicing costs. QTC submits that this will increase the probability of financial distress, especially if the firm is highly geared. QTC also questions whether the lower interest rate associated with the reduced effective borrowing term would more than offset this increase in risk.

In its final rate of return guideline, AER (2013c, p. 141) decided to apply a benchmark term of debt of 10 years for both the risk-free rate and debt risk premium components, concluding that the benchmark firm would not be expected to engage in any interest rate swap activity.

3.3.2 Investment signalling

Lally (2014, pp. 18-19), SFG Consulting (2012, pp. 63-67) and the ACCC's Regulatory Development Branch (2013, p. 19) have argued that a trailing average cost of debt approach could distort incentives if capital expenditure is compensated at the historical trailing average cost of debt rather than the prevailing rate at the time of investment. While possible investment distortions are also an issue under the current 'on the day' cost of debt approach, the risk-free rate component can be hedged if the timing of future investment is known (Lally 2014, pp. 18-19). In addition, Lally argues that the 'on the day' rate will generally be more contemporary at the time of investment than a historical average rate.

SFG Consulting (2012, p. 7) concluded that if a trailing average cost of debt approach is implemented then it is important that there is an associated mechanism for managing this incentive distortion. QTC has also emphasised the importance of ensuring that new capital expenditure during the regulatory period is compensated at the prevailing cost of debt in its cost of debt submission to the QCA (QTC 2014, p. 9).

QTC has outlined its proposed mechanism for managing investment incentives in the calculation of a trailing average cost of debt in its October 2013 submission to the AER Consultation Paper (QTC 2013c, pp. 28-29). This method calculates weights that reflect debt issuance as a result of capital expenditure with the objective of compensating new borrowings at the prevailing cost of debt. Under this proposed approach, new debt arising from capital expenditure is initially compensated at the prevailing cost of debt and in subsequent years this cost of debt converges to the simple (equally weighted) trailing average. Application of this approach would result in some increased complexity with the use of firm-specific weights (and therefore regulatory cost of debt) rather than the simple (equally weighted) approach adopted by the AER.

3.3.3 Implications for the cost of equity

Moving to a trailing average cost of debt approach may also have implications for the cost of equity, since the benchmark beta parameter could be affected by the regulatory cost of debt approach (Lally 2014, p. 28).

SFG Consulting (2012, p. 68) has demonstrated differences in the volatility of equity returns between different regulatory cost of debt approaches using simulation analysis. Lally suggests though, that it is not possible to estimate the possible impact since the estimation of beta is largely an empirical exercise based on returns data sourced from regulated firms under the current 'on the day' cost of debt regime.

3.3.4 Implementation and complexity

The trailing average cost of debt approach aims to more closely align the regulatory cost of debt with the actual cost of debt faced by the benchmark firm. However, this greater precision may introduce increased complexities to the regulatory approach. In particular, the following aspects of the trailing average cost of debt methodology can potentially increase the complexity and administration costs of the regulatory approach as compared with current practice:

(a) the more frequent (annual) estimation of the benchmark cost of debt, as compared with existing practice of a single measurement at the start of each regulatory period

(b) methodological and transparency issues associated with calculating weights that ensure new borrowings arising from investments are compensated at the prevailing rate.

These issues are addressed in Section 4.3.

3.4 Consultation issues

The QCA seeks comments in relation to the potential adoption by the QCA of a trailing average cost of debt approach.

Request for comments

3.1 Please comment on the possible advantages and disadvantages of the QCA adopting a trailing average cost of debt approach rather than the current 'on the day' approach to determining the regulatory cost of debt.

3.2 How should the QCA address the potential problems that arise from implementing a trailing average cost of debt approach, in particular potential overstatement of the allowed cost of debt and complexity in implementation of the trailing average cost of debt?

3.3 Are there any other issues for stakeholders that the QCA should consider as part of deciding to adopt a trailing average cost of debt approach?

4 ESTIMATING THE TRAILING AVERAGE COST OF DEBT

4.1 Introduction

The trailing average cost of debt approach is characterised by the calculation of a moving average of an annual series of prevailing 'on the day' cost of debt estimates over a specified time span covering the current year and preceding years. As a result, this approach requires the prevailing cost of debt faced by the benchmark firm (i.e. the benchmark cost of debt) to be estimated on a more frequent basis than the current 'on the day' approach, potentially resulting in a higher level of complexity and administration costs.

In addition to establishing the appropriate data sources and method for measuring the benchmark cost of debt estimate at a point in time, the methodology for calculating the trailing average cost of debt also needs to be determined. In particular, key considerations include the relevant cost of debt measure to which the trailing average is applied (i.e. debt risk premium only or total cost of debt), the annual update process, the appropriate weighting methodology, possible transitional arrangements and whether the regulator should allow multiple benchmarks.

4.2 Estimating the benchmark cost of debt

Irrespective of whether the regulatory cost of debt approach is based on an 'on the day' rate or a trailing average cost of debt, an estimation approach for the benchmark cost of debt is still required. This generally involves the following steps:

(a) defining an appropriate benchmark for the regulated firm, primarily in terms of the 'efficient' term of debt issuance and benchmark credit rating

(b) estimating the prevailing cost of debt at a particular point in time that aligns with these benchmark parameters.

In considering the appropriate data sources and methodology to be used when estimating the benchmark cost of debt, the regulator will generally assess whether to use an index produced by a third party data provider such as Bloomberg or a statistical method using an in-house individual bond yield data set compiled by the regulator.

The QCA recently engaged PricewaterhouseCoopers (PwC) to provide advice on a cost of debt estimation methodology for regulated businesses (PwC 2013). PwC's paper on its recommended data sources and statistical method is available on the QCA's website. As detailed in Appendix A, PwC recommended that QCA should estimate the benchmark cost of debt using an econometric method with individual bond yield data.

4.2.1 Third party data provider source

Regulators including the QCA have traditionally relied upon one, or a combination, of the Bloomberg and CBASpectrum estimated 'fair value' yield curves to estimate bond yields that match the required benchmark characteristics. A fair value yield curve describes the estimated market yield to maturity for bonds with a given credit rating, over a range of terms to maturity. Regulators have only tended to reference the available Australian individual bond yield data as a ‘cross-check’.

With the onset of the GFC, Australian bond market liquidity declined substantially, particularly for long term bonds (i.e. greater than six years). Since that time, there has been some recovery

in liquidity, but the impact of the GFC has meant that even less Australian data has been available than prior to the GFC. Due to the increasing illiquidity of long term bonds in the Australian bond market, in October 2007, Bloomberg ceased publishing its 10-year BBB fair value yield curve. Subsequently, in September 2010, CBASpectrum ceased publishing its fair value yield curves across all credit ratings for Australian corporate bonds.

With these changes in the availability of third party data provider yield estimates, the QCA moved to relying solely on the available Bloomberg fair value yields (generally 7-year BBB) and adopted an extrapolation approach to adjust this estimate to the efficient term of debt. For example, the SEQ Distribution-Retail Interim Price Monitoring 2010-13 Report prepared by the QCA (2011, pp. 249-250) used a Bloomberg 7-year fair value yield extrapolated to obtain a 10-year term.

The AER (2013c, pp. 126-127) and QTC (2014, p. 3) have both contended that a key benefit of using a third party data provider is its independence from the regulatory process. In proposing to use a third party data source in the design of its new trailing average cost of debt approach, the AER (2013c, 126-127) also recognised that a third party data source is easy to apply, particularly in the context of a trailing average approach that ideally requires only a mechanistic update of the regulatory cost of debt each year. PwC describes the Bloomberg fair value curves as a relatively low cost alternative (2013, p. 72) with the following advantages in estimating the benchmark cost of debt (2013, p. 41):

(a) Reasonably straightforward to apply and objective;

(b) Produced by a professional service;

(c) Supported by the Tribunal;[11] *and*

(d) For the 10 year, BBB+ point, has been subject to extensive testing against bond data.

A drawback of using a third party data source is the limited combinations of broad credit rating bands by debt terms that are currently available for corporate bonds issued in Australia. Bloomberg only publishes Australian 'fair value curves' for four major credit rating bands (i.e. BBB, A, AA and AAA), with a single specified term of debt associated with each broad credit rating band. While PwC (2013, pp. 41-42) acknowledges that there are accepted extrapolation methods for adjusting yield estimates to a different term of debt, there may be further complications if required to adjust to a different benchmark credit rating (e.g. BBB+).

A further potential difficulty with annually estimating the benchmark cost of debt is the potential discontinuation of the third party data source, particularly for the data series matching the required benchmark characteristics. In its final rate of return guideline, the AER proposed to specify in each regulatory determination how the benchmark cost of debt would be derived in the instance that the required data sources are discontinued (AER 2013b, p. 21). The lack of transparency associated with a proprietary algorithm is also an additional important concern with using a third party data source, although Bloomberg is recognised for its strong reputation (PwC 2013, p. 3). In PwC's opinion, Bloomberg fair value curves, extrapolated or not, are best used as a reference, rather than the main method of estimation (PwC 2013, p. 72).

As an alternative third party data source to Bloomberg, IPART (2013, pp. 13-14; 2014) and the AER (2013c, p. 128) have flagged the potential use of the Reserve Bank of Australia's (RBA's)

[11] The Australian Competition Tribunal has recently endorsed the Bloomberg fair value curve in its 2012 review of final decisions by AER relating to APT Allgas and Envestra gas access arrangements.

new monthly estimates of non-financial corporate yields.[12] These estimates cover non-financial corporate yields and credit spreads for various terms of debt (3, 5, 7 and 10 years) for each of broad credit bands A (i.e. A+, A or A-) and BBB (i.e. BBB-, BBB or BBB+).

IPART (2014) has proposed using this third party data source to estimate the regulatory cost of debt from 1 July 2014[13], with key advantages being the transparency of this method and closer match with their revised benchmark term of debt.[14][15] The AER (2013c, p. 128) also mentioned this series as a possible data source for use in its trailing average cost of debt approach. QTC submitted that these estimates may provide a useful reference check for the QCA when estimating its benchmark cost of debt (QTC 2014, p. 3). Table 3 provides examples of the RBA aggregate measures for a particular month that could potentially be used in a regulatory context to estimate the benchmark cost of debt or benchmark debt risk premium.

Table 3 RBA Aggregate Measures - 10 year BBB-rated securities

RBA Aggregate Measures	***January 2014***
Yield (per cent) - 10 year	7.15
Spread to swap (basis points) - 10 year	276.50
Spread to CGS (basis points) - 10 year	314.60

Source: RBA Statistical Table F3 - Aggregate Measures of Australian Corporate Bond Spreads and Yields

Note however that in addition to domestic bond market issues, these estimates also incorporate offshore bond issues by Australian non-financial corporations to provide a greater sample size. While, traditionally, the QCA has referenced fair value yields that have excluded offshore debt issuance, PwC (2013, pp. 12-15) did not consider the inclusion of international bond data when estimating the benchmark debt risk premium to be inappropriate on theoretical grounds. According to PwC, as debt premia are observable, there is no need to refer to a specific asset pricing model (e.g. domestic CAPM) as is the case of cost of equity. They noted that their position was consistent with the views of IPART and Professor Kevin Davis.

IPART recently changed its methodology to include Australian bonds that are issued in either Australian or United States (US) bond markets. Kevin Davis provided the following advice to IPART regarding empirical considerations and theoretical validity given that the domestic CAPM is used to estimate other WACC parameters:

(a) since using currency swaps in combination with offshore issues in foreign denominations generates a domestic currency cost of debt, there are no empirical issues in using overseas debt costs (Davis 2010, p. 7)

[12] RBA statistical table 'Aggregate Measures of Australian Corporate Bond Spreads and Yields – F3' has been published from December 2013 onwards. The underlying methodology was outlined in Arsov I et. al. 2013, New Measures of Australian Corporate Credit Spreads, RBA Bulletin, December.

[13] Specifically, IPART have decided to average RBA's credit spreads over the last two months prior to their WACC decision to estimate the benchmark debt risk premium.

[14] IPART (2013, pp. 13-14) decided to increase its 'target' term to maturity from 5 to 10 years in its recent review of its WACC methodology.

[15] The RBA approach is able to achieve an average tenor closer to IPART's 10 year target by including bonds with embedded options at longer maturities. For bonds with embedded options, the RBA uses an option adjusted spread which measures the spread that is not attributable to the value of the option.

(b) as the regulatory cost of debt is not determined with reference to the CAPM, it is not inconsistent to use foreign market data in estimating the cost of debt (Davis 2010, pp. 9-10).

4.2.2 In-house estimation method

The limitations with third party data sources have led regulators to explore alternative estimation methods using in-house bond yield data sets. This could entail the use of some type of averaging approach or an econometric method such as the PwC recommended approach.

Regulators such as IPART (2011b, p. 2) and ERA (2011) have previously derived a point estimate (e.g. mean or median) from a sample of bonds that meet specific criteria in relation to credit rating, industry sector, type of bond, market of issuance and term to maturity. IPART claimed to 'target' a debt term of 5 years, but the actual term reflected in its allowed debt premium depended on the terms to maturity of bonds in its sample (IPART 2010, p. 10). At the time of its 2011 decision on debt margin methodology, the mean term of its sample was 6.6 years (IPART 2011b, p. 34). Following its recent decision to increase its 'target' term to maturity from 5 to 10 years (IPART 2013, pp. 13-14), IPART has proposed using RBA's new monthly estimates of non-financial corporate yields to ensure a closer match to its target bond term (IPART 2014).

PwC observed that cost of debt estimation methodologies based on an averaging approach can be highly inflexible (PwC 2013, pp. 24-31). This type of approach will only provide an appropriate estimate for a specific term to maturity if the composition of the sample is such that it provides that coincidental result. As an illustration, if a regulator seeks to estimate the ten-year debt risk premium for a given credit rating band with a sample that consists of mainly five to seven-year term bonds, an averaging approach will not provide an appropriate estimate and likely understate the cost of debt with such characteristics.

PwC (2013, p. 71) believe that an econometric approach results in a higher degree of statistical precision over a range of debt terms and credit ratings than the use of Bloomberg fair value curves. It also has the advantage of being highly transparent relative to the Bloomberg fair value curves. PwC's recommended econometric approach is discussed in more detail in Appendix A.

Under a trailing average cost of debt approach with annual updates to the regulatory cost of debt, the use of an in-house estimation method will ideally require the data sources, bond sample criteria and estimation method to be clearly outlined prior to the commencement of the regulatory cycle. This will enable annual updates to be undertaken at minimal regulatory cost and reduce the risk of any debate by stakeholders regarding the allowed cost of debt. PwC's proposed approach includes recommended data sources, bond sample criteria and recommended econometric functional form that has since been applied by Incenta Economic Consulting (2013) in its review of the regulatory cost of debt for Aurizon Network's 2013 Draft Access Undertaking. Incenta Economic Consulting (2013, p. 40) has shown that using the PwC recommended approach is practicable and capable of producing comparable results to an extrapolated Bloomberg methodology.

The use of PwC's recommended approach to estimating annual updates of the benchmark cost of debt is likely to be more complex than use of an index produced by a third party data provider. Since there may need to be some level of judgement applied in the econometric approach, it is likely that these estimates will need to be derived on an annual basis (whether or not the regulatory cost of debt is updated on this basis). This may require familiarity with issues such as the contemporary state of the Australian debt market. However, these issues are considered to be manageable.

4.3 Methodology for calculating the trailing average cost of debt

The trailing average cost of debt approach aims to more closely align the regulatory cost of debt with the actual cost of debt faced by the benchmark firm. However, this greater precision may introduce increased complexities to the regulatory approach as explained in Section 3.3.4. This section discusses various aspects of implementation.

4.3.1 Possible approaches

As previously outlined, the trailing average cost of debt approach is characterised by the calculation of a moving average of a cost of debt measure over a specified number of years preceding and inclusive of the current year. There are two main types of trailing average cost of debt approaches which have been considered recently in the Australian regulatory context:

(a) applying the trailing average to the total cost of debt (risk-free rate and debt premium)

(b) applying the trailing average only to the debt risk premium component of the total cost of debt (and using an 'on the day' rate for the risk-free rate component).

The first of these two approaches implies that the regulated firm adopts a debt strategy of fixed rate debt issuance with staggered maturity dates over the benchmark term of debt. The second approach reflects an implicit debt strategy of fixed rate borrowings with a staggered maturity profile combined with interest rate swaps that align the risk-free rate component with the term of the regulatory cycle. Lally (2014, pp. 13-15) shows that both of these implied debt strategies are viable with a matching regulatory policy and, as a result, both satisfy the NPV = 0 principle.

Applying the trailing average to the total cost of debt has the key advantage of being easier to implement and aligns with market practice of comparable, unregulated firm. It is also simpler to understand with no interest rate swaps required in the matching debt strategy.

Note also that the debt strategy implied by the trailing average applied to the debt risk premium only is broadly similar to the assumed debt strategy under the current 'on the day' cost of debt approach. PwC (2013, p. 7) questions whether the regulated firm would need to enter into interest rate swaps, though, if the regulatory approach was to calculate a trailing average applied to the total cost of debt. The QTC (2013a, pp. 8-10) have also suggested that hedging the risk-free rate component using interest rate swap contracts may be feasible for smaller firms but raise difficulties for firms with larger debt portfolios.

The AER (2013a, p. 110) and SFG Consulting (2012, p. 43) suggest that movements in the risk-free rate and debt risk premium tend to partially offset each other over time. This can result in the trailing average on the total cost of debt producing a more stable estimate of the regulatory cost of debt (and therefore prices) over time.

While the trailing average applied to either the total cost of debt or the debt premium component will result in similar levels of refinancing and interest rate risks for the regulated firm, QTC (2013b, pp. 21-22) argues that the latter approach will expose consumers to greater interest rate risk. This risk arises due to the possibility of 'step changes' in prices between regulatory reviews, since the risk-free rate component of the benchmark cost of debt may substantially change when it is fully reset at the start of each regulatory cycle.

Lally (2014, p.27) acknowledged that applying the trailing average to the total cost of debt (rather than to the debt risk premium) has the benefit of lower price variation over time. However, Lally (2014, p. 44-45) outlined the following disadvantages of applying a trailing average to the entire cost of debt rather than to the debt premium only:

(a) it results in an overstatement of the allowed cost of debt by providing an allowance for the risk-free rate component for the benchmark term of debt (e.g. 10 years), which ignores the likely use of interest rate swaps by comparable, unregulated firms to reduce the effective borrowing terms (and interest costs) for the risk-free rate;

(b) it entails larger investment distortions[16] since the risk-free rate component for new borrowings cannot be hedged at the beginning of the regulatory cycle because the total cost of debt (including the risk-free rate) is a moving historical average; and

(c) transitional arrangements for the risk-free rate component will be required (since there is a change in the implied debt policy in relation to the risk-free rate).

In relation to the first point, Lally argues that it is not possible to measure the benchmark 'efficient' term of the risk-free rate component of debt issued by comparable, unregulated firms, as the interest rate swap behaviour of these firms is not observable. However, a benchmark term of debt that is based on debt issuance of unregulated firms (i.e. ignoring interest rate swap behaviour) has the advantage of being readily observable, and is based on a debt financing strategy that manages refinancing and interest rate risk.

In terms of possible investment distortions, a weighting mechanism such as the QTC proposed approach is a possible approach to ensuring the prevailing cost of debt is assigned to new debt arising from capital expenditure in a particular year (see section 4.3.5). However, there is not expected to be a significant difference between the simple (equally weighted)[17] and weighted trailing average unless there is a sufficiently large increase in debt issuance in a particular year.

4.3.2 Length of trailing period

Lally (2014, p. 13) shows that a viable debt strategy for a regulated firm is borrowing long-term (at the benchmark term of debt) at different points in time in order to have a staggered maturity profile. The matching regulatory policy for this debt strategy is for the regulatory cost of debt to be calculated using the trailing average approach, with the length of the trailing period reflecting the benchmark term of debt. Lally (2014, p. 15) claims that this combination of viable debt strategy and regulatory policy will satisfy the NPV = 0 principle.

In its review of the cost of debt estimation methodology for businesses regulated by the QCA, PwC examined the term of debt of five benchmark regulated energy transmission / distribution businesses. As a result of this analysis, PwC (2013, p. 21) recommended that the benchmark term of debt be set at 10 years, as the evidence indicates an average term that is close to ten years at the present time. This is consistent with the QCA's most recent regulatory reviews[18] which assessed the efficient term of debt as 10 years given refinancing risk. PwC (2013, p. 21) recommended that this term of debt should be reviewed whenever a new regulatory cost of debt is set, unless this term had been assessed within the previous 12 months.

4.3.3 Averaging period

Rather than using a point estimate of the cost of debt, standard regulatory practice is to use a short averaging period (e.g. 20 days) to balance the trade-off between avoiding anomalies

[16] Assuming there is no mechanism (e.g. QTC proposed approach) to assign the prevailing rate to investments.
[17] A simple trailing average approach applies equal weights (i.e. 10%) to each element of the trailing average. For example, a 10% weighting would be applied to each individual cost of debt for a benchmark term of 10 years.
[18] For example, SEQ Retail Price Monitoring 2010-13 and 2013-15, and Seqwater Irrigation Price Review 2013-17.

arising from short-term variations in an 'on the day' rate and using the most current information. In order to satisfy the 'NPV = 0' principle, the current 'on the day' cost of debt approach requires the cost of debt to be observed (over the short averaging period) immediately prior to the start of the regulatory cycle. This practice implies a debt management strategy in which the regulated firm's entire debt portfolio is effectively issued (either through actual debt issuance or by using interest rate swaps) over this short averaging period.

A trailing average cost of debt approach will require averaging periods to be specified for each year of the regulatory cycle. Given the trailing average cost of debt approach seeks to recognise the link between regulatory policy and a firm's debt management strategy, the selection of firm-specific averaging periods could be used to reflect individual debt issuance practices. This could also prevent all regulated firms being required to enter the market (to issue bonds or interest rate swaps) at the same point in time (ACCC 2013, pp. 53-54). The AER rate of return guideline allows the regulated firm to propose the averaging period to apply each year at the beginning of the regulatory cycle. This averaging period can range from ten consecutive business days up to a maximum of twelve months (AER 2013b, pp. 21-22).

QTC (2013b, p. 13) has proposed the quarterly estimation of prevailing bond yields as an average of daily estimates during March, June, September and December. The benchmark 'prevailing' cost of debt for a particular year would then be derived as the average of these quarterly estimates. This approach aims to reduce the impact of estimation error and better reflect investment and associated debt issuance occurring throughout the year.

4.3.4 Annual updating of the regulatory cost of debt

Under the trailing average cost of debt approach, the regulator could retain the same regulatory 'trailing average' cost of debt over the entire regulatory period, or subject this to annual updating within the regulatory period to incorporate the particular year's prevailing cost of debt in the trailing average. Updating the trailing average cost of debt on an annual basis can potentially further reduce interest rate risk arising from the mismatch between the allowed cost of debt and the actual debt servicing costs incurred by the firm.

The AER (2013c, p. 112) has decided to annually update the regulatory cost of debt under its proposed trailing average approach. This decision was based primarily on the principle that annual updates can help to minimise the mismatch between the allowed and actual cost of debt, as changes in the prevailing rate will be reflected in the regulatory cost of debt on a timelier basis. The AER believes that it is feasible to update the regulatory cost of debt annually at a reasonable cost. The AER sought to minimise the annual cost by using a third party data source to estimate the annual benchmark cost of debt that is used to automatically update the regulatory cost of debt using a simple (equally weighted) trailing average method.

An annual update process would need to consider the potentially greater complexity associated with the PwC recommended econometric approach, as compared with use of a third party data source. PwC (2013, p. 71) has also recognised that its econometric approach will be more costly than the use of a third party data source with an extrapolation method.

The ACCC's Regulatory Development Branch (2013, pp. 30-35) argues that a regulatory 'trailing average' cost of debt that is fixed over the entire regulatory period should still ensure that debt servicing costs incurred by the regulated firm are recovered over the long term. Under strict

assumptions,[19] the annual benchmark cost of debt inputs that are under-weighted in the trailing average calculation in one regulatory cycle are 'self-corrected' by being equally over-weighted in the next regulatory period's calculation. However, the AER (2013c, p. 112) note that this 'self-correction' does not account for the time value of money and may take longer during prolonged cycles of increasing or decreasing interest rates.

Lally (2014, pp. 30-31) also suggests that if a trailing average cost of debt approach is adopted, then annual updates of the regulatory cost of debt should be a part of this approach:

> *In summary, if a regulator does adopt a trailing average regime for the cost of debt or the DRP, the results from fixing that value at the beginning of the regulatory cycle or engaging in annual updating (either formally or via an 'unders and overs' account) can be significantly different. Furthermore, the use of a trailing average regime is premised on the need to better match the allowed cost to that actually incurred. Since the cost actually incurred better corresponds to the trailing average with annual updating, this suggests that annual updating should be used if a trailing average regime is adopted.*

A simple example illustrates how the regulatory cost of debt outcome can differ under a simple (equally weighted) trailing average cost of debt approach with and without annual updates. For illustrative purposes, the benchmark cost of debt is measured using the RBA's non-financial corporate yields (with 10 years to maturity; BBB bond credit rating).[20] This example has the following assumptions:

(a) the regulated firm faces two hypothetical regulatory cycles (2005-2009 and 2010-2014)

(b) the trailing period is set equal to the benchmark 'efficient' term of debt (i.e. 10 years)

(c) under the current 'on the day' approach, the allowed risk-free rate and debt risk premium are both set for the term of the benchmark term of debt (i.e. 10 years)[21]

(d) the 2005-2009 cycle signified the commencement of the trailing average cost of debt scheme and, as a result, both approaches commence at the same prevailing cost of debt[22]

(e) the trailing average is applied to the total cost of debt

(f) the trailing average is updated on an annual basis using the January yield estimate.

Figure 1 shows that the trailing average approach with annual updates is more reflective of the prevailing cost of debt over time. This would potentially reduce the mismatch between allowed and actual costs if the regulated firm has a matching debt policy with staggered borrowings. In addition, annual updates may result in smaller step changes in the regulatory cost of debt at the start of a new regulatory cycle.

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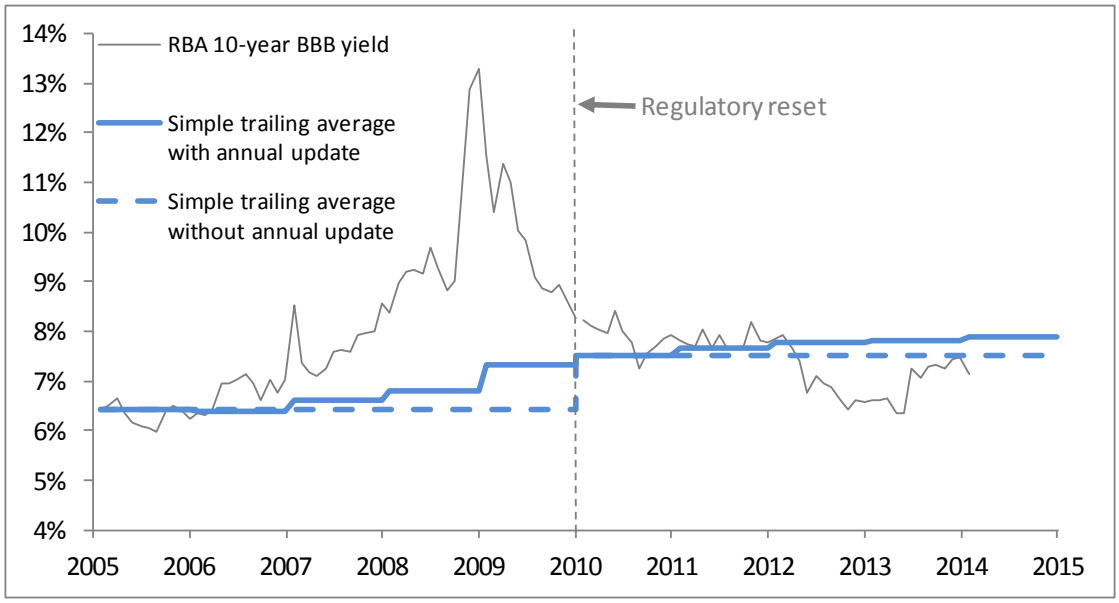
[19] Assumptions include the absence of time value of money, benchmark 'efficient' term of debt is a whole number multiple of the regulatory period and the firm's debt policy is consistent with a simple weighted trailing average cost of debt approach, i.e. constant debt balance over time (ACCC 2013, p. 35).

[20] Note that the new RBA series has not been assessed by QCA and is used for illustrative purposes only.

[21] This differs slightly from the QCA's current approach which sets the allowed risk-free rate for a term equal to the term of the regulatory cycle, with interest rate swap costs also provided to convert the risk-free rate component from the benchmark term of debt to the term of the regulatory cycle.

[22] The trailing average cost of debt approach in this example is assumed to follow the QTC transitional arrangements. This is explained further in section 4.3.6, whereby the initial regulatory cost of debt is the prevailing 'on the day' rate, and subsequent years introduce a 10% weighting to the particular year's prevailing cost of debt.

Figure 1 Comparison of simple trailing average with and without annual updating



Source: RBA Statistical Table F3 - Aggregate Measures of Australian Corporate Bond Spreads and Yields, QCA analysis

If annual updates of the regulatory cost of debt are to be implemented as part of a trailing average cost of debt approach, the linkage with allowed revenues (and prices) also needs to be considered. Issues include whether the update in the allowed revenues (and prices) is a mechanistic process that is simple and transparent or closer in form to an annual determination. Possible implementation options include (AER 2013c, p. 112):

(a) annually reviewing the allowed revenue (and prices) in each year of a regulatory period to reflect the updated regulatory cost of debt

(b) applying a retrospective true-up as part of the next regulatory review, with prices in the next regulatory period reflecting any under- or over-recovery.

Under the first option, if prices automatically reflect the impact of an annually updated regulatory cost of debt this may result in increased price volatility within the regulatory period. This could be partially mitigated by only adjusting prices if the change in the regulated cost of debt is greater than a specified threshold. This type of mechanism would implicitly assume that the change in the cost of debt was expected to continue. However, reviewing the allowed revenue annually may also be associated with greater complexity and costs, particularly if the updating process involves expert judgement.

A retrospective true-up could result in reduced complexity and costs as compared with annual adjustments to allowed revenues and prices, but may result in higher step changes in allowed revenues and prices at the start of each regulatory period. However, this could be addressed by smoothing of prices over a longer term than the current regulatory cycle[23]. This would in effect mean that under-recovery of costs could be capitalised into the RAB for recovery over a longer term than the current regulatory cycle. The optimal price profile can be considered as a separate issue but requires reasonable surety of RAB recovery which is likely for much regulated essential infrastructure.

[23] Possible approaches to price smoothing are outlined in the recent QCA (2014b) Information Paper *Financial Capital Maintenance and Price Smoothing*.

4.3.5 Weighting

A trailing average cost of debt approach will require weights to be applied to each of the individual cost of debt estimates being averaged over the trailing period. A weighting scheme aims to minimise investment distortions by assigning the prevailing cost of debt to the portion of the total debt of a firm that is assumed to be financed each year. The weights used in a trailing average cost of debt approach will generally represent the portion of the total outstanding debt that is assumed to be financed in each year of the trailing period. The three principal considerations when determining the appropriate weighting scheme are:

(a) whether each cost of debt estimate should be equally weighted (i.e. a simple average) or assigned a weight that reflects the firm-specific debt profile over time

(b) the approach to estimating the debt issuance profile of the regulated firm

(c) the methodology for deriving firm-specific weights (if applied).

Simple average approach

Recent moves to adopt a trailing average cost of debt approach by the AER (2013c, pp. 115-119) and Ofgem (2011, pp. 25-28) in the UK have favoured the estimation of a simple (equally weighted) trailing average. This estimation approach assumes that the benchmark firm issues fixed rate debt in equal proportions over the average term of debt, maintaining a constant debt balance over time. This may occur, for example, by the regulated firm largely funding its renewal capital expenditure through its regulatory depreciation allowance. Both the AER and Ofgem adopted this approach due to its reduced complexity and greater transparency.

However, it was acknowledged that this simplified approach could potentially result in significant mismatches between the allowed and actual cost of debt for regulated firms with substantially changing debt profiles. In its first price control reviews[24] to reflect its new 10 year trailing average cost of debt approach, Ofgem (2011, p. 28) decided to implement a simple (equally weighted) averaging method but provided regulated firms with an avenue to propose a different approach to weighting if they could demonstrate 'exceptional circumstances' (e.g. significant investment programme over the regulatory cycle resulting in an actual debt issuance profile substantially different from the debt issuance profile implied by a simple averaging method).

To illustrate how the simple (equally weighted) trailing average approach with annual updates compares with the current approach, the example from the previous section is extended to include the current 'on the day' rate. Under the transitional arrangements proposed by QTC, both approaches have the same cost of debt outcome in the first year of the trailing average cost of debt approach. By the end of the ten year transitional period, the simple trailing average for 2014 (the final year of the second regulatory cycle) is derived as:

$$\mathrm{kd}_{2014} = \frac{1}{10} \cdot \sum_{j=1}^{10} \mathrm{rd}_{2014+j-10}$$

$$= \frac{1}{10} \cdot (\mathrm{rd}_{2005} + \mathrm{rd}_{2006} + \mathrm{rd}_{2007} + \mathrm{rd}_{2008} + \mathrm{rd}_{2009} + \mathrm{rd}_{2010} + \mathrm{rd}_{2011} + \mathrm{rd}_{2012} + \mathrm{rd}_{2013} + \mathrm{rd}_{2014})$$

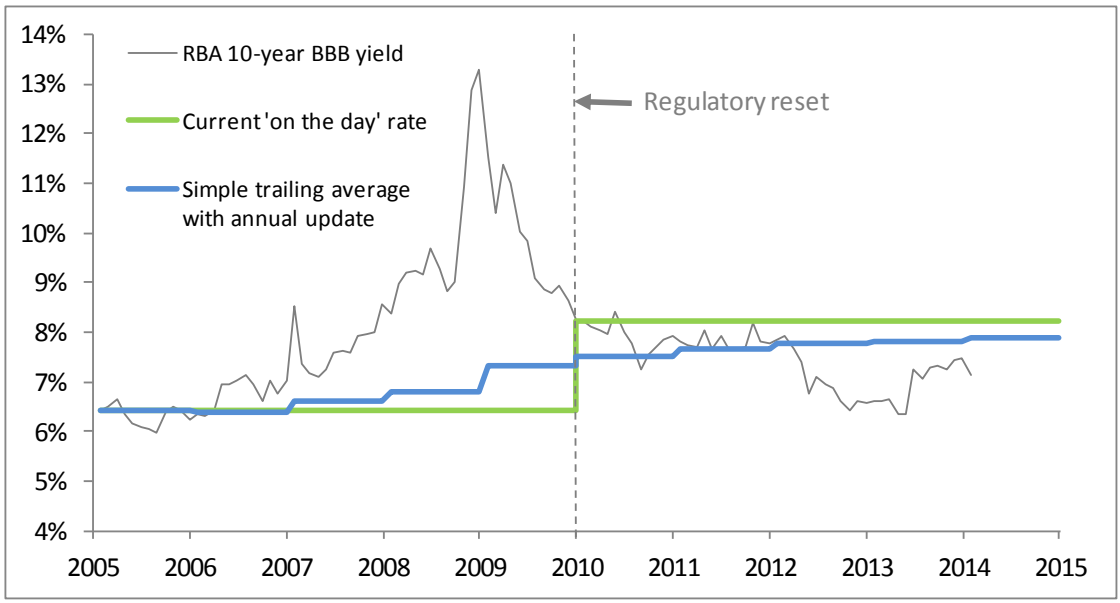
[24] The first price controls by Ofgem to reflect the new RIIO model were for electricity and gas transmission (RIIO-T1) and gas distribution (RIIO-GD1) over the eight year regulatory period from 1 April 2013 to 31 March 2021.

$$= \frac{1}{10} . (6.41 + 6.35 + 8.53 + 8.36 + 11.52 + 8.23 + 7.83 + 7.85 + 6.62 + 7.15)$$

= 7.88%

Figure 2 shows that the simple trailing average approach with annual updates is more responsive than the current approach to the changing cost of debt over time, and results in smaller step changes in the regulatory cost of debt over time. For a regulated firm that issues debt over the benchmark term of debt with a relatively uniform maturity profile, this regulatory approach will generally provide a closer match between allowed and actual debt costs.

Figure 2 Comparison of current 'on the day' rate and simple trailing average with annual updates



Source: RBA Statistical Table F3 - Aggregate Measures of Australian Corporate Bond Spreads and Yields, QCA analysis

Lally (2014, pp. 18-19) argues that a simple trailing average approach will introduce greater investment distortions than the current 'on the day' approach as it will generally result in larger mismatches at the time of investment between the regulatory 'historical average' cost of debt and the prevailing rate. For example assuming a five year regulatory period, Lally (2014, p. 18) says that a 10 year simple trailing average cost of debt will on average reflect the cost of debt with a 5 year lag while the current 'on the day' approach will assign a cost of debt with an average lag of only 2.5 years (i.e. average lag since the prevailing cost of debt was set at the start of the regulatory cycle). This will result in either an inadequate allowance for the cost of debt (if the allowed rate is less than the prevailing rate at the time of investment) or excessive allowance (if the allowed rate is greater than the prevailing rate actually incurred).

QTC (2014, pp. 9-10) and SFG Consulting (2012, pp. 63-67) have also argued that a trailing average cost of debt approach could distort investment incentives if weights in the rolling average do not reflect new debt issuance (as a result of capital expenditure) in a particular year.

Estimating the debt issuance profile of the regulated firm

Estimation of weights to be used in a trailing average approach will require assumptions regarding the debt issuance profile of the regulated firm adopting an efficient debt policy, including:

(a) the amount and timing of new borrowings required to finance investments

(b) the proportion of existing debt that is refinanced each year.

New borrowings to finance investments could reflect actual data or benchmark assumptions applied to the RAB, specifically (AER 2013a, pp. 111-113):

(a) actual debt issuance by the regulated firm or

(b) actual change in the regulated firm's RAB multiplied by the benchmark gearing ratio or

(c) forecast change in the regulated firm's RAB multiplied by the benchmark gearing ratio.

The use of actual data debt issuance data to derive weights may increase the complexity of the regulatory task, as the regulator would need to examine and understand the individual firm's financing arrangements. Specifically, only those debt issues directly associated with capital expenditure approved for inclusion in the RAB should be compensated in the allowed return on capital. Differences between the firm's actual debt issuance profile and the implied debt profile underlying the RAB may result in a regulatory cost of debt (and therefore WACC) that does not align the present value of future revenues of the regulated firm with the costs associated with approved investments, assuming a discount rate equal to the risk adjusted opportunity cost of capital.

A weighting scheme using actual data (options (a) or (b) above) may also distort incentives as the regulated firm would be able to influence the overall regulatory cost of debt through the timing of its investments (AER 2013c, p. 116) and may not have the incentive to adopt more efficient financing arrangements. In addition, at the time of resetting the regulatory cost of debt, actual data will not be available for the current year and the preceding year - both required in the trailing average calculation.

In terms of weights based on forecast data, QTC (2013c, p. 20) has submitted to the AER that this may reduce investment distortions as regulated firms will have the incentive to follow their forecast investment profile to minimise potential mismatches between the allowed and actual cost of debt. However, this does not provide the regulated firm with the incentive to review the timing of new investment in response to the prevailing cost of debt (AER 2013c, p. 117). Furthermore, if forecast investment does not occur, then there will be distortions as the regulatory cost of debt will not reflect the actual debt costs incurred (ACCC 2013, p. 39).

While estimation of the regulated firm's debt balance each year will provide guidance on the increase in debt balance each year, it will not provide an indication of the proportion of existing debt balance that is refinanced each year. While it could be assumed at the start of the trailing average cost of debt approach that existing debt will mature on a relatively even basis,[25] new debt issuance over time to finance investments will not necessarily be uniform given the sometimes 'lumpy' nature of investment over time. However to minimise refinancing risk, firms may still seek to issue new debt arising from investments in a manner that results in their overall debt portfolio maintaining a roughly uniform maturity profile.

Possible weighting approaches

Two possible approaches are considered.

The first possible approach outlined by the ACCC's Regulatory Development Branch (2013, pp. 36-39) and previously by QTC (2012c) incorporates increases in the debt balance in the associated year's weight, with this new debt assumed to be subsequently refinanced on a rolling

[25] PwC (2013, p. 19) for instance suggests that a prudent debt policy would aim to achieve a relatively even refinancing requirement in each year.

basis over the benchmark term of debt. For a benchmark term of debt of ten years, key assumptions are:

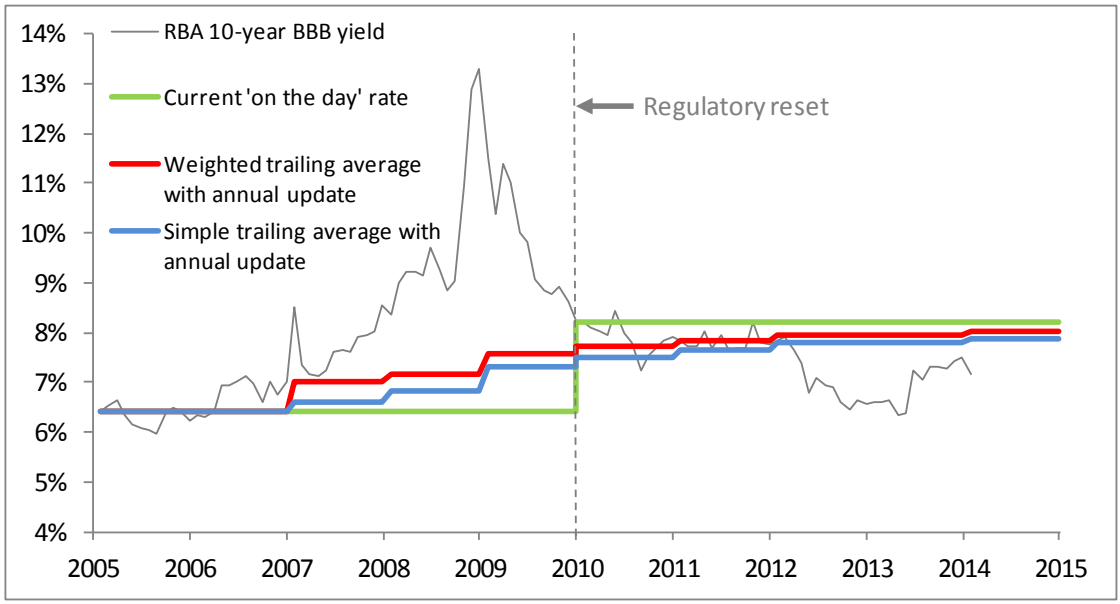
(a) at the start of the new trailing average approach, existing debt has a uniform maturity profile, i.e. 10% of existing debt will need to be refinanced in each of the first 10 years

(b) increases in the firm's debt balance each year are funded at the 10 year prevailing rate for a fixed 10 year term which increases the weight given to the prevailing rate for years where there are increases in the debt balance

(c) over time the dollar weighting in a particular year would reflect the amount of new and refinanced debt issued in the same year of the previous rolling cycle (e.g. ten years prior), adjusted for new (net) borrowings in the current year. This would lead to a pattern of weights that was difficult to readily understand.

To illustrate the potential differences between a simple and weighted trailing average approach, the example presented earlier is extended for a hypothetical firm with an increasing debt balance over time. In this example, it is assumed that the hypothetical firm undertakes a capital investment programme with no new (net) borrowings required over this ten year period except for that arising from a large investment in Year 3, resulting in the RAB increasing by 25% in this year[26]

Figure 3 Comparison of simple and weighted approaches for a hypothetical firm with increasing debt balances



Source: RBA Statistical Table F3 - Aggregate Measures of Australian Corporate Bond Spreads and Yields, QCA analysis

Figure 3 shows that while both the simple and weighted approaches reduce the size of the step change in the regulatory cost of debt between regulatory periods (as compared with the current approach), the weighted average approach will be more responsive to changes in the prevailing cost of debt affecting increasing debt balances. Assuming that the regulated firm has a debt strategy (i.e. staggered maturity profile) matching the weighted trailing average, Figure 3 shows that there is not much difference between the simple and weighted trailing average

[26] In this example, the firm's debt balance is derived as a constant proportion of the RAB (represented by the benchmark gearing level), so the same relative increase in debt is implicitly assumed.

approaches. However, the difference could be material if there is a sufficiently large increase in debt issuance in a particular year.

A limitation of the weighting approach outlined by ACCC's Regulatory Development Branch (2013, pp. 36-39) and previously by QTC (2012c) is its complexity, as the dollar weighting for a particular year will be influenced by changes in the RAB in that year as well as the corresponding year in previous rolling cycles (e.g. ten years prior). As a result, the assumed maturity profile over time will continue to be influenced by 'lumpy' capital expenditure that may have been rolled into the RAB in a specific year. This approach will not reflect that over time the regulated firm may seek to manage the refinancing risk associated with the large new investment by staggering its borrowing so that an approximately equal proportion of debt matures in any particular year.

As an illustration, assume that at the beginning of the regulatory period a regulated firm has an opening debt balance of $500.[27] Assuming a benchmark term of debt of 10 years, refinancing of existing debt in each of these ten years will be 10% of the opening debt balance in Year 1 (i.e. 10% of $500 = $50). If there were no new (net) borrowings required over this period, then the debt issuance profile of the hypothetical firm is outlined in the first row of Table 4 below. Now consider the situation where in year 3 there is new borrowing of $125. In the Year 10 calculation of the weighted average, the weights applied to the prevailing cost of debt in each of the previous 10 years would be derived as the total debt issued during the particular year divided by the debt outstanding at the end of Year 10. This would result in a weighting of 8% (i.e. $50 / $625) for all years except Year 3, and a weighting of 28% (i.e. $175 / $625) in Year 3.

Assuming new borrowings are relatively even in the future; this spike in the weights will remain in future updates of the regulatory cost of debt. For example, if there is no new (net) borrowings over the following 5 year regulatory period (i.e. Years 11-15), the corresponding data point (i.e. Year 13) will retain the comparatively large weighting. This will result in an uneven weighting pattern over time.

Table 4 Calculation of weight to be applied in trailing average calculated in Year 10

	Year 1	***Year 2***	***Year 3***	***Year 4***	***Years 5-10***
Refinancing of existing debt	$50	$50	$50	$50	$50
New borrowings	$0	$0	$125	$0	$0
Total debt issued during year (D_t)	$50	$50	$175	$50	$50
Debt balance at year end (DB_t)	$500	$500	$625	$625	$625
Weight in Year 10 (D_t / DB_{10})	8%	8%	28%	8%	8%

Convergence to an approximately uniform maturity profile over time could be achieved by initially compensating new capital expenditure at the prevailing cost of debt for the remainder of the current regulatory cycle (i.e. apply weights reflecting the new debt issuance), and then reverting to the historical 'simple' trailing average at the beginning of the next regulatory cycle. However this may result in the allowed cost of debt not reflecting the actual cost of debt for the remainder of the benchmark 'efficient' term to maturity.

A second possible weighting method was proposed by QTC (2013c, pp. 28-29) that incorporates a mechanism for converging to an approximately uniform maturity profile. Under this proposed

[27] For example, this could be derived from an opening RAB of $1,000 and a benchmark gearing ratio of 50%.

approach, new debt is initially compensated at the prevailing cost of debt and in subsequent years this rate of return converges to the simple (equally weighted) trailing average. This weighting approach is presented by QTC (2013c, pp. 28-29) in the form of adjustments to historical rates resulting from changes in the regulated firm's debt balance over time. Key assumptions of this alternative weighting scheme proposed by QTC are:

(a) consistent with the original QTC proposal, existing debt at the commencement of the trailing average scheme has a uniform maturity profile

(b) increases in the firm's debt balance each year are funded at the 10 year prevailing rate

(c) refinancing of existing debt each year is assumed to equal 10% of the opening debt balance (which includes both existing debt from the start of the new trailing average approach as well as increases to the debt balance since this point in time[28])

(d) the additional weight assigned to an increase in debt balance in a particular year diminishes by 10% each subsequent year (i.e. the portion that is assumed to be refinanced in (c)), resulting in this being gradually phased out of the 'trailing average' calculation, in effect resulting in a convergence to a uniform maturity profile.

Given this weighting approach implies a staggered refinancing of new (net) debt over the ten years following issuance, it is an approximation of the cost of issuing new debt for the benchmark (i.e. 10 year) term of debt. In addition, the presentation of this weighting method as an adjustment of historical rates is not readily intuitive and therefore not fully transparent in terms of how the weight applied to each time period is derived. However, this approach does have desirable features in terms of its simplicity and ability to update mechanically. It also results in a smoother refinancing profile over time that would be expected to align with the maturity profile that an efficient firm would converge towards in the longer term to minimise refinancing and interest rate risk.

All possible weighting methods entail firm-specific weights due to the different capital expenditure programs of the different regulated firms. This results in a regulatory cost of debt that is different for each regulated firm, even if other benchmark characteristics (i.e. credit rating, term of debt) are the same. There are also additional complexities that arise from any of the possible weighting methods if historical data is required at the commencement of a trailing average cost of debt approach.

4.3.6 Transitional arrangements

The adoption of a trailing average cost of debt approach requires consideration of whether transitional arrangements are required to ensure regulated firms or customers are not adversely affected. Possible considerations when designing transitional arrangements include:

(a) consideration of existing debt exposures of regulated firms that have been influenced by the existing 'on the day' cost of debt approach and may require restructuring as part of moving to a trailing average approach (Lally 2014, pp. 32-35)

(b) minimising the potential for gaming by regulated firms to lock in windfall gains (AER 2013c, p. 120)

(c) practical issues regarding the availability of historical cost of debt information (up to 10 years prior to the initial year of the trailing average approach) (Lally 2014, pp. 32-35)

[28] This implies that an increase in the debt balance in a particular year will become existing debt (for the purposes of calculating the refinancing portion of existing debt, i.e. 10%) from the following year.

(d) ensuring regulated firms are not exposed to unforeseen risks that may increase the regulatory risk perceived by investors (SFG Consulting 2012, p. 46).

Lally (2014, p. 44) believes that under the current 'on the day' approach, regulated firms have generally issued long-term debt with a staggered maturity profile and entered into interest rate swaps to align the risk-free rate component of borrowings with the regulatory period. The AER (2013c, pp. 103-107) also concluded that this debt management strategy was consistent with observed practice of regulated firms. Transitional arrangements could cater for the switch away from hedging the risk-free rate component over time, as this type of risk management practice may not be required under a trailing average cost of debt approach (if the trailing average is applied to the entire regulatory cost of debt).

Transitional arrangements proposed by QTC (2012c, p. 2) have been incorporated into the AER's proposed transition to a trailing average cost of debt approach (AER 2013c, p. 123). These proposed arrangements cover the length of the benchmark firm's efficient term of debt (e.g. 10 years), commencing with the prevailing 'on the day' cost of debt (i.e. at 100% weight) in the first year of the initial regulatory cycle. The weighting of this initial prevailing rate diminishes by 10% each year as the prevailing 10-year benchmark cost of debt each year is weight averaged (i.e. at 10% weight) into the calculation.

Alternative transitional arrangements were outlined in a recent working paper published by the ACCC's Regulatory Development Branch (ACCC 2013, pp. 45-48). In contrast to Lally's views on the existing debt strategy of regulated firms, these transitional arrangements are based on the premise that regulated firms under the current 'on the day' approach will tend to issue debt in alignment with their regulatory cycle. Proposed transitional arrangements assume a matching debt restructuring process whereby the regulated firm refinances its entire debt pool at the commencement of the new regulatory arrangements with various debt terms (ranging from one year up to the benchmark term of debt) to immediately create a staggered maturity profile. For a ten year benchmark term of debt, this transitional arrangement would assume equal proportions of debt (e.g. 10%) are issued at the commencement of the new approach with whole-year terms to maturities ranging from one to ten years. At the end of each subsequent year, maturing debt is refinanced with debt at the benchmark term so that the regulated firm has fully transitioned by the end of the benchmark term of debt.

Lally (2014, pp. 32-35) argues that the QTC's proposed transitional arrangement is preferable for a trailing average approach applied to the debt risk premium only. This is because the ACCC's approach assumes terms for the debt risk premium component that are lower than those that would be actually used by firms (assuming an existing debt profile with staggered maturities). For a trailing average approach applied to the entire cost of debt, additional transitional arrangements will be required for the risk-free rate component (since there is a change in the implied debt policy in relation to the risk-free rate). Lally claims that while the ACCC's approach will align with a debt strategy that can be employed for the risk-free rate component, the QTC's proposed arrangement will not match the transitional process for the regulated firm's debt policy.

Lally (2014, p. 34) notes that both approaches address the practical considerations regarding historical data that arise as part of implementing a trailing average cost of debt approach. Additionally, both approaches will ensure a gradual transition over the benchmark 'efficient' term of debt, minimising regulatory risk as firms are provided with sufficient time to restructure their debt exposures. In addition, Lally (2014, pp. 35-41) shows that QTC's proposed

arrangements minimise any possible windfall gains or losses[29] and therefore address concerns over possible gaming (QTC 2013a, p. 28).

4.3.7 Allowing the use of different approaches for different firms

The AEMC (2012) review, concluded that the 'best', or most 'efficient', cost of debt benchmark might not be the same across regulated firms, as they will have different ('efficient') debt management strategies depending on their firm-specific characteristics.

A single approach may lead to mismatches between the regulatory cost of debt and the actual debt servicing costs of those regulated firms that employ a debt strategy that does not closely aligned with the regulatory approach (AEMC 2012, p. 65). For example, a regulated firm with a large debt portfolio could stagger its debt so that its actual debt servicing costs closely aligned with a regulatory 'trailing average' cost of debt allowance. However, it may not be feasible for smaller firms to employ this type of financing practice, and they may only be able to replicate this regulatory approach for the risk-free rate component by entering into interest rate swaps each year (PwC 2013, p. 8).

A direct implication of this conclusion is that the regulatory approach for setting an 'efficient' cost of debt might differ from regulated firm to regulated firm, depending on each firm's characteristics. The AEMC's final rule allows for a three possible regulatory cost of debt approaches:

(a) applying a current 'on-the-day' rate or

(b) applying a benchmark trailing average to the total cost of debt or

(c) applying a benchmark trailing average to only the debt risk premium component of the total cost of debt (and using an 'on the day' rate for the risk-free rate component).

Lally (2014, pp. 31-32), the AER (2013c, pp. 100-102) and the ACCC's Regulatory Development Branch (2013, pp. 25-26) strongly believe that a single cost of debt approach should be applied to minimise incentives for regulated firms to choose an option (or switch between options over time) on the basis of revenue maximisation rather than actual debt management practices. Lally (2014, p. 32) also points out that even if the regulator had sole discretion, the possibility of reviews being sought will still remain in instances of a firm's revenue not being maximised by the chosen approach.

QTC (2013a, pp. 9-10) favours using different approaches for different firms to reduce potential mismatches between the regulatory cost of debt and actual interest rate exposures. QTC (2012b, p. 2) has proposed transitional arrangements to cater for both moving to a trailing average approach (see subsection 4.3.6) and separately for possible future switching back to an 'on the day' approach. These transitional arrangements aim to remove the potential for actions by the regulated firm being able to directly achieve windfall gains. The arrangements for transitioning back to an 'on the day' approach would occur over the length of the benchmark term of debt, with the 'on the day' cost of debt assigned a progressively higher weighting (i.e. increasing by 10% each year, assuming a 10 year benchmark term of debt) each year. Lally (2014, p. 32) and the ACCC's Regulatory Development Branch (2013, p. 25) contend though,

[29] Lally (2014, pp. 36-38) outlined a simple example where the windfall gain or loss was represented by the accumulation of annual profits/losses equal to the allowed debt premium minus the debt premium paid (assuming the firm adopted a staggered maturity profile). The results presented were for a trailing average approach applied to the debt risk premium only, but would be unchanged for the trailing average approach applied to the total cost of debt.

that transitional arrangements for future switching back to the 'on the day' approach add to the complexity of the regulatory approach.

To address the issue that may arise for some regulated firms which are not able to employ debt management strategies that closely align with trailing average assumptions, the QCA could decide to adopt the trailing average cost of approach with the provision for a particular firm to justify retaining the current 'on the day' approach in exceptional circumstances. This would place the onus on the regulated firm to demonstrate why the debt management strategy implicit in the trailing average cost of debt approach is not appropriate given the firm's characteristics. The QCA could then consider the benefits of the proposal to be satisfied that it is fully justified.

4.4 Consultation issues

The QCA seeks comments in relation to the possible methodological issues relating to a trailing average cost of debt approach.

Request for comments

4.1 Are there any issues that need to be considered in applying the PwC estimation methodology to derive the prevailing cost of debt for the benchmark firm each year under a trailing average cost of debt approach?

4.2 If the QCA were to adopt a trailing average approach, should the average apply to the entire benchmark cost of debt or to the debt risk premium component only?

4.3 Should the QCA consider making annual adjustments to the regulatory cost of debt? If so, how should the QCA address the issues relating to annual adjustments?

4.4 What are the advantages and disadvantages of applying a weighted, rather than simple, average under a trailing average cost of debt approach?

4.5 What is the most appropriate data source and weighting approach for minimising the potential mismatch between the allowed and actual cost of debt without distorting incentives for regulated firms to seek to achieve an efficient debt policy?

4.6 What are important considerations when developing transitional arrangements that ensure regulated firms and customers are not adversely affected?

4.7 Should the QCA apply a single cost of debt approach across all regulated firms, or should it determine the most 'efficient' benchmark for a given regulated firm on the basis of certain, firm-specific parameters?

4.8 Should the QCA consider allowing different regulated firms to choose the cost of debt benchmark approach that they prefer (subject to certain pre-specified limitations)?

GLOSSARY

A	
ACCC	Australian Competition and Consumer Commission
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
B	
C	
CAPM	Capital Asset Pricing Model
CGS	Commonwealth Government Securities
D	
DRP	Debt Risk Premium
E	
ERA	Economic Regulation Authority Western Australia
ESC	Essential Services Commission
F	
G	
GFC	Global Financial Crisis
H	
I	
IPART	Independent Pricing and Regulatory Tribunal
J	
K	
L	
M	
N	
NEL	National Electricity Law
NGL	National Gas Law
NER	National Electricity Rules
NGR	National Gas Rules

NPV	Net Present Value
O	
P	
PwC	PricewaterhouseCoopers
Q	
QCA	Queensland Competition Authority
QTC	Queensland Treasury Corporation
R	
RAB	Regulatory Asset Base
RBA	Reserve Bank of Australia
S	
SIC	Schwarz Information Criterion
T	
U	
UK	United Kingdom
US	United States
V	
W	
WACC	Weighted Average Cost of Capital
X	
Y	
Z	

APPENDIX A: PWC'S RECOMMENDED COST OF DEBT METHODOLOGY

In its report to the QCA, PwC (2013) considered a number of issues pertaining to benchmarking as well as data sources, and subsequently proposed a methodology for estimating the benchmark cost of debt, or more specifically, the debt risk premium.

Data sources

In contrast to the standard practice, PwC supported sourcing domestic bond yield data from both Bloomberg and UBS. While there is indeed a large overlap in coverage of bonds between the two data providers, PwC found that UBS offers data on many floating rate notes that are not available in the Bloomberg database. PwC also considered whether to include bank debt and international bond data on top of domestic corporate bond data for benchmarking purposes. PwC (2013, p. 6) referred this as the complex portfolio approach, while the standard practice of benchmarking on domestic corporate bonds is called the simple portfolio approach.

PwC recommended against the inclusion of bank debt and international bond data for estimation purposes, citing that such an approach suffers from multiple issues.[30] Firstly, using their proposed cost of debt methodology, PwC found that the inclusion of additional data did not have a material impact on their estimates when compared to the simple portfolio approach results. PwC also noted that due to a lack of transparency on the terms of domestic bank deals, as bank debt is not a traded financial instrument, the use of proxies would be required if bank debt data were included into the sample. Furthermore, PwC found that there are fewer observations on bonds issued overseas by Australian firms relative to domestic bond data. Lastly, it is more costly to adopt the complex portfolio approach since it requires more data.

PwC was supportive of the use of debt data from outside the infrastructure/essential services sector, in the view that this would maximise statistical precision. As pointed out by PwC, a huge part of the Australian regulated infrastructure sector is still under government ownership, where firms acquire their debt finance from central government borrowing agencies, and as a result there are relatively few bonds issued by regulated utilities for benchmarking purposes. The Tribunal has raised similar concerns about the limited sample size.

In the report, PwC (2013, pp. 8-12) examined various characteristics of a firm, and concluded that most characteristics are subsumed by the firm's credit rating or/and have a material impact on the term of its debts. For example, the risk of a pure-play business would already be taken account of when a credit rating is assigned to the company, and at the same time such a risk is important in determining the term of debt at issuance. PwC also found insufficient evidence to suggest that regulated infrastructure bonds should be treated differently from general corporate bonds. This means that the benchmark cost of debt can be estimated by using the largest sample of bonds and debt issues to increase statistical precision, focussing on the term of debt and credit rating for benchmarking purposes.

[30] It should be noted that PwC (2013) did not consider the inclusion of international bond data when estimating the benchmark debt risk premium to be inappropriate on theoretical grounds. According to PwC, as debt premia are observable, there is no need to refer to a specific asset pricing model (e.g. domestic CAPM) as is the case of cost of equity. They noted that their position was consistent with the views of the Tribunal and Professor Kevin Davis. PwC also developed a methodology for converting foreign bond yields into Australian equivalent yields (see Appendix D of the PwC's report).

This generalisation is not without exception. PwC raised the point that observations should be removed if they are driven by factors that cause a material and systematic difference in the cost of debt relative to what would be paid by an efficient firm. For instance, while industry membership is generally not important for estimating the debt risk premium, as such a factor would already be subsumed by a firm's credit rating, the bonds of banks and finance companies should be treated as exceptions as they are traded materially differently relative to bonds of non-financial businesses. Similarly, bonds close to their maturity date are also known to behave differently.

Overall, PwC (2013, pp. 93-94) recommended that the sample should include corporate bonds with the following characteristics:

(a) Australian issuance by an Australian entity;

(b) investment grade credit rating by Standard and Poor's[31] ;

(c) the issuing entity is not a financial entity;

(d) the corporate bond is senior (i.e. not subordinated);

(e) standard corporate bonds without special features such as call options attached;

(f) a term to maturity greater than one year; and

(g) yields reported by either Bloomberg or UBS.

Recommended methodology

Following consideration of issues above, PwC recommended an econometric approach based on pooled observations for the two adjacent credit rating bands. For a given credit rating band, the estimated regression line quantifies the relationship between the debt risk premium and the term to maturity. These regressions can be interpreted as the fair value curves for different credit rating bands. The observations are pooled in the sense that the regression for the BBB+ band is based on a sample of BBB, BBB+ and A- bonds, while for the A band this means inclusion of A-, A as well as A+ bonds. The Bloomberg FVCs serve as a reference under this methodology.

It is of PwC's view that the econometric approach is superior to other alternative approaches. The econometric approach has the ability to draw out the maximum amount of information from the available data, allowing one to estimate the debt risk premium for a specific term that may not be heavily populated with observations. As noted above, a regression line for a specific credit rating band provides market bond yield to maturity estimates over a range of terms to maturity. As noted the econometric approach is more transparent than the proprietary Bloomberg fair value curves.

The functional form of the relationship between the debt risk premium and the term to maturity is a controversial issue. PwC noted that Merton (1974), Helwege and Turner (1999), and etc. have contrasting views on the functional form. To take account of the possibility of both linear and non-linear relationship between the two key parameters (i.e. the debt risk premium and the term to maturity), PwC (2013, pp. 47-48) recommended that the following alternative functional forms be tested:

(a) linear;

(b) quadratic;

(c) exponential;

(d) cubic;

(e) logarithmic; and

[31] Investment grade refers to a credit rating of BBB- or above.

(f) power.

In the report, PwC applied the Schwarz Information Criterion (SIC) to rank alternative functional forms based on the efficiency of the goodness of fit to the data. The linear form was found to consistently rank highly in terms of the SIC test. As a result, PwC recommended that the linear form should be adopted unless there is strong evidence suggesting otherwise. In this context, PwC (2013, p. 95) stated:

> *The linear form has empirical backing, has been shown to perform well in tests, is easy to implement and interpret.*

As with any econometric regressions, the quality of estimates is highly reliant on data availability. PwC raised the point that there were insufficient observations to obtain a robust regression for A-, A+, AA and AAA credit rating bands. PwC suggested that the fair value curves for AA and AAA bands to be estimated by calculating the average vertical distance (in basis points) between the A credit rating band regression and the AA and AAA bonds in the sample. The average difference could then be added to the A regression line to form the AA and AAA fair value curves. Such an approach is based on the assumption that FVCs for A, AA and AAA credit rating bands share the same gradient (i.e. the change in the debt risk premium per unit change (year) in the term to maturity). FVCs for A- and A+ can simply be interpolated once other fair value curves between BBB and AAA are determined.

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