Queensland Competition Authority

Final decision

Cost of debt estimation methodology

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EXECUTIVE SUMMARY

The Queensland Competition Authority (the QCA) has reviewed its cost of capital methodology, including its cost of debt estimation methodology. This paper considers the appropriate data sources and method for estimating the benchmark cost of debt at a point in time.

Determining the benchmark cost of debt at a given point in time requires relevant data and an appropriate methodology. Consistent with other Australian regulators, the QCA has traditionally relied on estimates from proprietary data providers. However, this approach has become increasingly problematic since Australian domestic debt issues are limited, data providers' estimates are not transparent and auditable, and the reduced liquidity of the Australian bond market since the Global Financial Crisis (GFC) has meant that even less Australian data has been published.

As a result, Australian regulators have been investigating alternative methods for estimating the benchmark cost of debt. The QCA engaged PricewaterhouseCoopers (PwC) to provide advice on a cost of debt estimation methodology for regulated businesses (PwC 2013b). The QCA also requested PwC update the estimate of benchmark debt raising transaction costs on the basis of a 10-year benchmark term of debt.

The QCA released PwC's discussion paper which outlined its recommended cost of debt methodology for consultation in October 2013. The QCA has received formal submissions from stakeholders in response to PwC's recommended data sources and methodology. The PwC methodology was recognised as a reasonable one by several submissions, particularly given the availability problems with proprietary data estimates. There was no strong resistance to using the PwC methodology, in particular where it is used in conjunction with proprietary estimates where they are available.

The QCA proposes that the PwC econometric approach be used as the primary method for generating the benchmark debt risk premium estimates in future regulatory reviews. As recommended by PwC, the QCA considers that the linear form should be used in this estimation method unless there is strong evidence to the contrary. QCA notes that recent applications of this approach have applied the linear form and not assessed alternative functional forms. Although this is reasonable, given the research that was undertaken, this assumption should be reviewed on a periodic basis. Note that the econometric analysis required for this approach is reasonably straight-forward.

Given the limited use of the PwC econometric approach in previous regulatory reviews, the QCA proposes that reference be made to extrapolations of the Bloomberg valuation (BVAL) series and Reserve Bank of Australia (RBA) estimates, where they are available, as a 'cross-check' of the PwC econometric estimates. These data sources are low cost and provide an independent view. Key limitations of these third party data sources are that the Bloomberg methodology is not transparent and the RBA estimates only relate to the last day of the month.

The QCA proposes to provide a debt raising transaction cost allowance that is based on the methodology developed by PwC (2013b). PwC (2013b) estimated the standard benchmark debt-raising transaction costs for domestic corporate bonds as ranging from 9.9 to 10.8 basis points per annum depending on the size of the benchmark debt balance. The QCA intends to adopt a single estimate of benchmark debt financing costs of 10.8 basis points per annum for all regulated firms. This is consistent with past practice by the QCA in which the same allowance was provided to all firms regulated by the QCA. The QCA considers that providing a single allowance will ensure sufficient debt-raising costs are provided and avoid complexities with a specific estimate based on benchmark debt balance that will not result in a material difference in the transaction cost allowance.

THE ROLE OF THE QCA – TASK 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

This final decision paper provides an outline of the QCA's preferred approach to estimating the benchmark cost of debt.

This paper draws on submissions to the QCA on PwC's October 2013 discussion paper on a benchmark cost of debt estimation methodology and submissions to the QCA that relate to the cost of debt in response to other investigations.

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1 INTRODUCTION

The QCA has reviewed 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, while at the same time preventing excessive prices from being charged to customers.

As part of the review of the cost of capital methodology, the QCA has reviewed its cost of debt estimation methodology. This paper considers the appropriate data sources and method for measuring the benchmark cost of debt at a given point in time. A separate draft decision paper, *Trailing Average Cost of Debt* (QCA 2014b), considers whether the estimation of the regulatory cost of debt should be on the basis of an 'on the day' rate at the start of the regulatory cycle, or a trailing average of estimates over a specified historical period.

The estimation methodology for the benchmark cost of debt at a particular point in time 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.

Consistent with standard regulatory practice, the QCA has previously used 'fair value' yield curves estimated by third party data providers such as Bloomberg to determine the debt margin. However, this approach has been problematic since available data series are limited and data providers' estimates are not transparent and auditable.

As a result, Australian regulators have been investigating alternative methods for estimating the benchmark cost of debt. The QCA recently engaged PwC to provide advice on a cost of debt estimation methodology for regulated businesses (PwC 2013b). This advice covers the estimation of a cost of debt and associated transaction costs for a range of credit ratings and terms to maturity. The QCA received formal submissions from stakeholders in response to PwC's recommended data sources and methodology.

The purpose of this paper is to outline the QCA's final decision with respect to the estimation methodology for the benchmark cost of debt. The paper describes and responds to specific issues raised about the PwC's recommended approach to estimating the benchmark cost of debt. It draws primarily on submissions to the QCA on PwC's October 2013 discussion paper on a benchmark cost of debt estimation methodology. A list of the submissions in response to the PwC's Discussion Paper is provided in Appendix B.

2 ESTIMATING THE BENCHMARK COST OF DEBT

2.1 Background

2.1.1 Defining the cost of debt

Theoretically, the cost of debt can be estimated by using the capital asset pricing model (CAPM) which is a general model for estimating the return that investors (in this case debt holders) expect to receive. This expected return provides compensation for the time value of money (the risk-free rate) and the systematic risk of debt:

$$r_d = r_f + \beta_d . [E(r_m) - r_f]$$

where:

- r_d is the expected return on debt
- r_f is the risk-free rate, representing the opportunity cost of a risk-free investment
- β_d is the debt beta, representing the non-diversifiable (systematic) risk of debt as given by the CAPM
- $E(r_m)$ is the expected rate of return on the market portfolio of risky assets.

However, the QCA and other regulators do not presently employ the CAPM to calculate the cost of debt. This is due to the empirical difficulties in deriving an accurate estimate of the debt beta and also because the expected return in the standard CAPM under-compensates the firm for the cost of debt given its underlying assumptions.[1]

Instead, the promised yield is generally used to estimate the cost of debt as it is directly observable. The promised yield is the rate of return that discounts the promised payments on a bond back to the current market value of the bond. This rate compensates investors for the time value of money, systematic risk, expected default losses and a liquidity allowance reflecting the inferior liquidity of corporate bonds relative to government bonds.

Standard regulatory practice adopted by the QCA and other regulators in Australia is to estimate firm-specific regulatory parameters, including the cost of debt, using an industry benchmarking method. Under this method, the cost of debt is based on market data for private sector debt with a benchmark credit rating consistent with the risk profile of the regulated firm. An additional step in setting an allowed cost of debt involves subtracting the implicit risk-free rate from the yield to determine the debt risk premium. The resulting debt risk premium is then added to the risk-free rate that is relevant for regulatory purposes.[2]

The Australian Competition Tribunal has also emphasised that the cost of debt is an estimate and is not determined by the regulated entity's actual cost of debt. The Tribunal also prefers a transparent, reliable and objective approach that enables assumptions to be independently

[1] The expected return in the standard CAPM does not compensate for bankruptcy costs or for the illiquidity of corporate debt relative to government debt. It would, therefore, be necessary to include in the cash flows estimates of these allowances or make an equivalent adjustment to the allowed cost of debt. However, these allowances are not directly observable, and the empirical hurdles are similar to those of the debt beta.

[2] For instance, the risk-free rate under the QCA's existing cost of debt approach will have a term set equal to the term of the regulatory period.

verified. For instance, in its decision in the Dampier to Bunbury Natural Gas Pipeline (DBNGP) case the Tribunal stated:[3]

> *Neither the NGL nor the NGR prescribe a particular method that should be used to determine the DRP [debt risk premium]. And, as is the case with the MRP, there is no one single empirical method that is universally accepted as providing the "right" value for the DRP at any point of time or for any specific regulated firm. Consistent with the use of an expected, not historical, cost of equity, the DRP is an estimate. It is not determined by a regulated entity's actual cost of debt, as might be inferred from the arguments of some proponents of the use of market-based evidence to determine the DRP.*
>
> *The Tribunal rejects what may be called the "direct market evidence" approach of DBP [Dampier Bunbury Pipeline] that was based on its enquiries of "an experienced capital markets adviser" as to what would be charged for debt finance to a provider of the relevant reference services. As perceived by the Tribunal, the direct market evidence approach as proposed by DBP in this matter is not transparent and is highly firm-specific. Even if all the relevant assumptions on which the estimate was based were known, it would not be possible to easily replicate such an estimate, as different advisers take different views of market conditions and these conditions and opinions can change over quite short periods. A regulated entity seeking to advance a direct market evidence approach must be prepared to address what the Tribunal perceives as the deficiencies in DBP's approach in this matter. That is, an entity must be prepared to provide a reliable and objective estimate of the cost of debt which is forward-looking and which is commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services and which, most importantly, is verifiable by the regulator.*

Accordingly, a benchmark cost of debt is preferred to an entity's actual debt costs because:

(a) customers are protected if the firm is inefficient in its financing decisions

(b) the firm retains the benefit (if any) of adopting more efficient financing arrangements

(c) it simplifies the regulatory task as the regulator does not have to examine and understand the firm's financing arrangements in depth

(d) for government-owned entities, it reflects the principle of competitive neutrality.

2.1.2 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

[3] *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14 (26 July 2012)*.

adopted an extrapolation approach to adjust this estimate to the efficient term of debt. For example, the South East Queensland (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 (2013b, pp. 126-127) has 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 (2013b, pp. 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 (2013b, p. 72) describes the Bloomberg fair value curves (FVCs) as a relatively low cost alternative with the following advantages in estimating the benchmark cost of debt (PwC 2013b, p. 41):

> *(a) Reasonably straightforward to apply and objective;*
>
> *(b) Produced by a professional service;*
>
> *(c) Supported by the Tribunal;[4] 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 (2013b, pp. 41-42) acknowledged 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 that is required to match the 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 2013a, p. 21).

The lack of transparency associated with a proprietary algorithm is also an additional concern with using a third party data source, although Bloomberg is recognised for its strong reputation (PwC 2013b, p. 3). In PwC's opinion, Bloomberg fair value curves, extrapolated or not, are best used as a reference, rather than as the main method of estimation (PwC 2013b, p. 72).

The QCA understands that Bloomberg ceased publishing its fair value curves in May 2014. Bloomberg commenced publishing the BVAL data series in November 2013, with the data series backdated to mid-2010. The BVAL data series includes a 7-year BBB yield which could be used by the QCA to estimate the benchmark cost of debt in future regulatory reviews. However, the QCA understands that the BVAL data series uses a bond sampling criteria and estimation method that differs from the Bloomberg fair value curves.[5] In addition, the BVAL data series has not yet been used in an Australian regulatory context, although the AER (2014) is considering the BVAL series for estimating the return on debt proposed in their final rate of return guideline.

[4] The Australian Competition Tribunal (2012a; 2012b) 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.

[5] Since the BVAL data series also uses a proprietary algorithm, it is not clear how the bond sampling criteria and estimation method for this series differs from previously published Bloomberg FVC estimates.

As an alternative third party data source to Bloomberg, IPART (2013b, pp. 13-14; 2014a) and the AER (2014) flagged the potential use of the Reserve Bank of Australia's (RBA's) new monthly estimates of non-financial corporate yields.[6] 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+). However, unlike the Bloomberg estimates, the RBA yields are not published daily. Rather, the RBA yield estimates are published monthly, with each monthly estimate representing a daily yield as at the last day of a particular month.

Following consultation with stakeholders, IPART (2014b) decided to use this third party data source to estimate the regulatory cost of debt from 30 April 2014, with key purported advantages being the transparency of this method and closer match with their revised benchmark term of debt than their previous averaging method.[7,8] Under this new estimation approach, IPART (2014a, p. 4) will average the RBA's credit spreads over two monthly estimates to estimate the 'on the day' debt risk premium,[9] with a 10-year average of monthly RBA estimates used to estimate the long-term debt risk premium.[10] IPART (2014c, p. 164) implemented this approach in its June 2014 final decision on Essential Energy's water and sewerage services in Broken Hill.

The AER (2014) also mentioned this series as a possible data source for use in its trailing average cost of debt approach. A key implementation issue is that the RBA yield estimates reflect only the last business day of a particular month. As a result, this data series cannot adhere to the AER's rate of return guideline which requires the 'on the day' rate to be estimated as a simple average observed over a period of 10 or more consecutive days (up to a maximum of 12 months). The AER (2014, pp. 19-21) outlined possible approaches for interpolating between RBA month-end estimates to derive daily benchmark yield estimates.

Table 1 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 1 RBA Aggregate Measures - 10-year BBB-rated securities

RBA Aggregate Measures	***June 2014***
Yield (per cent) - 10-year	5.64
Spread to swap (basis points) - 10-year	173.09
Spread to CGS (basis points) - 10-year	209.99

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

[6] 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.

[7] 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.

[8] 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.

[9] Specifically, IPART has decided to average RBA's credit spreads over the last two months prior to their WACC decision to estimate the benchmark 'on the day' debt risk premium. IPART (2014a, p. 4) contended that this approximates a 40-day average which is used to estimate the benchmark 'on the day' risk-free rate.

[10] IPART (2014a, p. 4) has noted that the long-term average will initially be less than 10 years, since the RBA monthly estimates commence from January 2005.

Note that in addition to domestic bond market issues, the RBA 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 (2013b, 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)

(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).

2.1.3 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 (2011b) 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 five 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 decided to use RBA's new monthly estimates of non-financial corporate yields to ensure a closer match to its target bond term of 10 years (IPART 2014b).

PwC observed that cost of debt estimation methodologies based on an averaging approach can be highly inflexible (PwC 2013b, pp. 24-31). This type of approach will only provide an appropriate estimate for a specific term to maturity if the average term to maturity of bonds in the sample results in the term of debt actually required for the benchmark firm. 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 is likely to understate the cost of debt with such characteristics.

PwC (2013b, 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 (2013b, p. 72) recommended that the extrapolated Bloomberg methodology is best used as a reference, rather than the main method of estimation. PwC's recommended econometric approach is discussed in more detail in Appendix A.

2.2 Stakeholder submissions

In its cost of debt submission to the QCA in January 2014, QTC (2014a) considered the econometric methodology developed by PwC (2013b) was a sound and robust method for estimating the benchmark debt yield. QTC also claimed that econometric approaches have the potential to utilise more information compared to averaging approaches recently used by other regulators as an alternative to third party data providers.

QTC (2014a, p. 3) also believed that a key benefit of using the Bloomberg data source was its independence from the regulatory process. In its January 2014 submission, the QTC supported the use of the extrapolated Bloomberg fair value curve in conjunction with PwC estimates, possibly as a replacement to the paired bonds approach as a method for extrapolating the 7-year Bloomberg yield to the 10-year benchmark term of debt.

QTC also submitted that the newly developed RBA estimates of non-financial corporate yield may provide a useful reference check for the QCA when estimating its benchmark cost of debt (QTC 2014a, p. 3). In its more recent submission to the trailing average cost of debt issues paper, QTC (2014b, p. 5) also supported consideration of the RBA's new monthly estimates of non-financial corporate yields. However, QTC noted that these estimates relate to the last day of a given month and, as a result, do not allow the averaging of consecutive daily estimates to smooth short-term fluctuations in market observations.

QTC noted that the Reserve Bank of Australia is considering the future production of daily estimates of non-financial corporate yields and spreads. QTC also referred to a recent AER issues paper (AER 2014) that proposed a method for interpolating daily benchmark yield estimates from the RBA's month-end estimates. This proposed approach uses daily market observations of the risk-free rate published by the RBA, with linear interpolation of the debt risk premium between month-end estimates published by the RBA.

Anglo American (2014, p. 12) submitted that the Bloomberg fair value curve provided a very accurate estimate of recent bond issuance by Aurizon. However, Anglo American noted that the PwC econometric estimate may be more reliable in some instances, for example when there is a lack of data due to lack of market activity or in relation to a specific credit rating not covered by Bloomberg estimates.

2.3 Summary and conclusions

Table 2 below summarises the advantages and disadvantages of the possible estimation methodologies for the benchmark cost of debt.

While both third party provider sources have key benefits in terms of reduced costs, simplicity, credibility and regulatory precedence, key issues remain with their application in future regulatory reviews.

A key issue with the Bloomberg data service is the discontinuation of the fair value yield curves that have traditionally been used by the QCA and other Australian regulators in previous regulatory reviews. In October 2007, Bloomberg ceased publishing its 10-year BBB fair value yield curve. More recently, the Bloomberg fair value curves were discontinued in May 2014. A new Bloomberg BVAL data series commenced in late 2013 but has not yet been subject to detailed review by the QCA or other regulators at this point in time.

Table 2 Comparison of estimation methodologies

Estimation approaches	*Advantages*	*Disadvantages*
PwC recommended methodology	• Transparent method with data sources and estimation approach clearly outlined (PwC 2013b). • Can be applied to a range of debt terms and benchmark credit ratings. • This approach has been shown to be practicable and capable of producing comparable results to extrapolated Bloomberg estimates for SEQ water retailers (PwC 2013a) and Aurizon (Incenta 2013).	• More complex to implement than using index published by a third party data provider. • New approach that has so far had limited use in regulatory reviews by Australian regulators.
Extrapolated Bloomberg approach	• Relatively low cost and easy to apply. • Produced by credible organisation (traditionally used by regulators) that is independent of the regulatory process.	• Lack of transparency associated with a proprietary algorithm. • Available data series limited to combinations of broad credit rating bands (i.e. BBB, A, AA and AAA) by a single specified debt term. • Requires extrapolation due to lack of data series for 10-year term. • Potential discontinuation of series, with Bloomberg fair value curves recently replaced by new BVAL curves (not yet used in regulatory context).
RBA credit spread	• Easy to implement with no requirement to use extrapolation method for 10-year benchmark term of debt. • Transparent method with assumptions and estimation approach outlined in RBA Bulletin article in December 2013. • Produced by credible organisation independent of the regulatory process. • Estimates are publicly available.	• Available data series limited to combinations of broad credit rating bands (i.e. BBB, A) and debt terms (i.e. 3, 5, 7 or 10 years). • Monthly estimates represent the last business day of the month and therefore do not allow the averaging of consecutive daily estimates to smooth short-term variations. • New approach that has so far had limited use in regulatory reviews by Australian regulators.

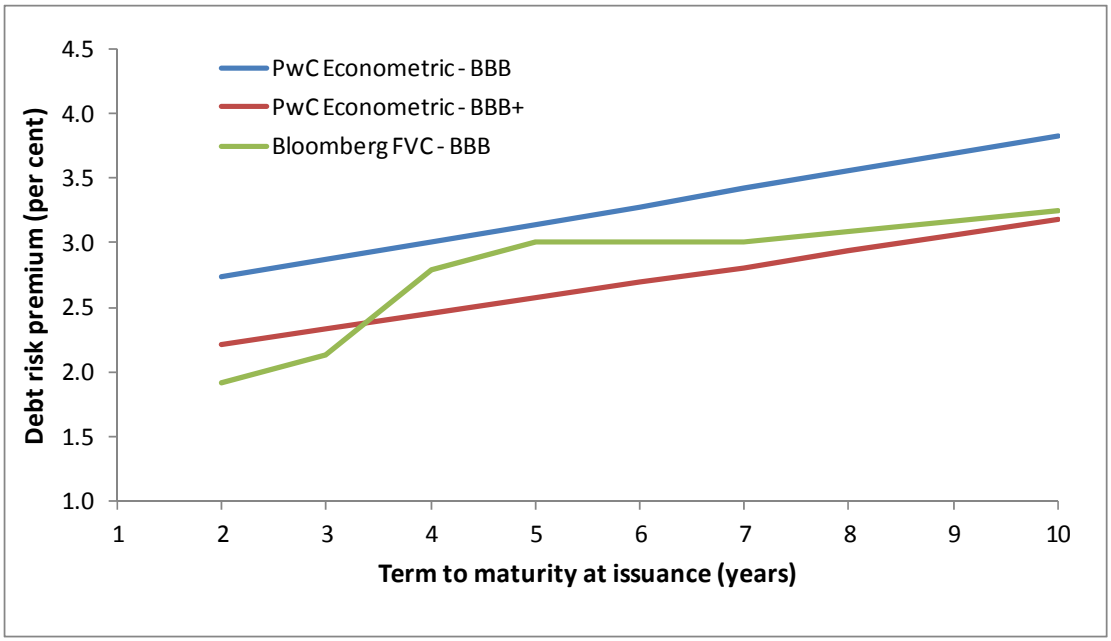
In addition, the key limitation of the RBA data series in the context of setting the benchmark cost of debt at a given point in time is the lack of consecutive daily estimates. As noted by the QTC (2014b, p. 5), the RBA monthly estimates of non-financial corporate yields relate only to the last day of a given month. While the AER (2014) has proposed the linear interpolation of month-end estimates to produce daily values, it is not clear that this type of approach will effectively address the impact of short-term market variations.

It is important to ensure that the benchmark cost of debt is estimated using a robust, transparent and replicable method. PwC's proposed approach includes recommended data sources, bond sample criteria and an econometric functional form that has been applied in setting the benchmark WACC for SEQ water and wastewater retail/distribution entities for the 2013-15 price monitoring period (QCA 2013a). Incenta Economic Consulting (2013) has also replicated this approach 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.

PwC recommended the adoption of a linear form for the relationship between the debt risk premium and the term to maturity. In the PwC's report, the debt risk premium estimates derived from its recommended methodology were compared to those derived by applying an extrapolation approach to Bloomberg fair value yield curve estimates.[11] Figure 1 compares these two approaches for BBB-rated corporate debt.

Figure 1 Debt risk premium: PwC recommended methodology and Bloomberg FVC for 20 days to 28 November 2012



Source: PwC (2013b, p. 67)

The QCA notes that there is limited data to compare the results of the PwC recommended methodology against the alternative third party data provider series. Table 3 below compares benchmark estimates of the debt risk premium from the different estimation approaches over three separate averaging periods.

The QCA proposes that the PwC econometric approach is used as the primary method for generating the benchmark debt risk premium estimates in future regulatory reviews. As recommended by the PwC, the QCA considers that the linear form should be used in this estimation method unless there is strong evidence to the contrary. QCA notes that recent applications of this approach (PwC 2013a; Incenta Economic Consulting 2013) have applied the linear form since these applications followed shortly after the PwC report, which recommended the use of the linear form. However, the assumption of a linear form should be reviewed on a periodic basis.

[11] Note, however, that the PwC report was completed and published prior to the commencement of the RBA credit spread series. Therefore, the PwC report does not have a comparison of its approach with the RBA estimation method.

Table 3 Comparison of different sources for estimating 10-year benchmark debt premium

Averaging Period	*PwC Approach*	*Extrapolated Bloomberg*[1]	*RBA credit spread*[23]
PwC analysis (2013b): • BBB+ rated • Averaging period: 20-days to 28 November 2012	3.18	3.25	3.39
SEQ Price Monitoring 2013-15 (PwC 2013a): • BBB+ rated • Averaging period: 20-days to 22 January 2013	3.09	3.20	3.24
Incenta Economic Consulting 2013 • BBB+ rated • Averaging period: 20-days to 31 October 2013	2.72	2.51	3.38

Notes: (1) Bloomberg's BBB FVC has generally been regarded as a BBB+ FVC by firms and regulators, in particular at the 10-year benchmark term of debt (PwC 2013b, p. 42). (2) For illustrative purposes, the RBA estimate has been derived as the average of the two month-end Spread to CGS estimates either side of the end of the 20-day averaging period. (3) The RBA estimates relate to a lower credit rating bond (i.e. BBB) and are therefore expected to be higher than estimates under the other two approaches.

Given the limited use of the PwC econometric approach in previous regulatory reviews, the QCA proposes that reference be made to extrapolations of the Bloomberg BVAL series and RBA estimates as a 'cross-check' on estimates from the PwC econometric approach. These data sources are low cost and provide an independent view.

3 BENCHMARK DEBT FINANCING TRANSACTION COSTS

3.1 Background

Regulated firms incur legitimate transaction costs to refinance their existing debt portfolios and to finance incremental capital expenditure.

The precedent for regulators providing an explicit allowance to regulated firms for such costs is the ESC's determination on the access arrangements for GasNet in 2002. In this decision, the ESC approved an annualised allowance of 5 basis points for debt 'establishment' costs in the debt risk premium of the WACC on the basis of a 10-year term of debt (ESC 2002a, p. 246). The ESC did not undertake its own analysis to determine this estimate.

In revisions to the access arrangements for GasNet's transmission network, the ACCC (2002, pp. 145-149) approved a debt transaction cost allowance of 12.5 basis points, based on empirical evidence it obtained from Westpac and subsequently verified against other sources. Since that time, it has been standard practice in Australia for regulators to provide the regulated firm with an allowance of 12.5 basis points for this transaction cost assuming a benchmark term of debt of 10 years.

The ACCC engaged the Allen Consulting Group (ACG) to review the benchmark debt transaction cost allowance of 12.5 basis points in 2004. In this analysis, ACG (2004, p. 52) estimated benchmark debt refinancing costs to range from 8.0 to 10.4 basis points per annum. ACG identified five categories of debt financing costs:

(a) gross underwriting fees

(b) legal and roadshow fees

(c) company credit rating fees

(d) issue credit rating fees

(e) registry fees and

(f) paying fees.

The ACG's review concluded that that the initial estimated allowance of 12.5 basis points is likely to have been overstated, as Westpac included a 5 basis points allowance (as part of the 12.5 basis points) for a dealer swap margin (ACG 2004, p. 28)). The swap margin is explicit compensation for swapping floating rate debt into fixed rate debt. If the regulator, however, provides a debt margin based on fixed interest bonds (which is typically the case), then adding a swap margin for converting is double-counting. As a result, ACG excluded the dealer swap margin from its estimation of debt financing costs.

Other Australian regulators, except for the AER and ACCC, have continued to use the estimate of 12.5 basis points per annum. Although it has now moved to a five-year term of debt, the ERA has retained an allowance of 12.5 basis points on the basis of advice that this provides regulatory certainty as it is standard practice by Australian regulators (ERA, 2011b, pp. 149-150). This estimate was also retained by ERA (2013, pp. 199-205) in its rate of return guidelines in response to the new National Gas Rules. Following its move to a 10-year term for the debt margin, IPART (2013b, pp. 14-15) reduced its debt-raising transaction cost allowance to 12.5 basis points on the basis of 10-yearly debt issues. This amount is the annualised equivalent (in net present value terms) of 20 basis points for five-yearly debt issues.

The AER updated its debt financing cost allowance based on PwC's (2011) analysis of debt-raising transaction costs. This method was initially used for Powerlink's revenue proposal to the AER for its 2013-2017 regulatory control period and has recently been used in other AER regulatory processes.[12]

Given that the ACCC should have excluded the swap margin, the allowance would have been 7.5 basis points (at that time) which was close to the estimates provided by the other banks from which the ACCC sourced its advice. Setting aside the likely over-estimation, the allowance was based on financing costs in 2002.

Reflecting these concerns, the QCA engaged PwC to update the estimate on the basis of a 10-year benchmark term of debt as part of its advice on a cost of debt estimation methodology for regulated businesses (PwC 2013b). PwC (2013b) found the standard benchmark debt-raising transaction costs for domestic corporate bonds were approximately 9.9 to 10.8 basis points per annum. This range reflects the impact of multiple debt issues on transaction costs, with the higher cost related to a single debt issue of $250 million and the lower cost attributable to 8 debt issues (totalling $2 billion). PwC's estimation method was based on cost categories consistent with the ACG 2004 study.

A secondary issue is whether or not the debt refinancing cost allowance should be included in the cost of debt in the WACC or in the regulatory cash flows. Lally favours the first option in that it ensures such costs are paid over the life of the debt and not at the time the debt is issued by the firm. Myers, however, prefers a cash flow adjustment where the allowance is amortised over the life of the debt issue (Franks et al., 2008, pp. 31-32). The AER provides a benchmark debt-raising cost allowance as part of operating costs, while ERA and IPART provide for these costs as an allowance (in terms of basis points per annum) within the regulatory cost of debt.

3.2 Stakeholder submissions

QTC (2014a) submitted that the allowance for benchmark debt-raising costs should include costs associated with the early issuance of new long-term debt to refinance borrowings prior to maturity. QTC (2014a, pp. 5-6) argued that this practice represented an efficient strategy for managing refinancing risk, and is widely used by regulated and unregulated infrastructure firms. QTC (2014a, p. 12) submitted that this cost should reflect the yield differential between long-term debt issued and the short-term investment over an assumed early issue period, amortised over the remaining benchmark term of debt.[13]

3.3 Summary and conclusions

The QCA's research has confirmed that the initial estimated allowance of 12.5 basis points is likely to be overstated and is now outdated. The PwC discussion paper (2013b) provides an alternative estimate that covers types of costs traditionally allowed by Australian regulators and is up-to-date based on recent debt-raising transaction cost estimates.

QTC argued that in addition to the cost items incorporated in the PwC's recommended estimates, the debt financing cost allowance should provide for indirect costs associated with

[12] For example, in AER's (2012, pp. 162-163) draft decision on ElectraNet for the 2013-2018 regulatory control period.

[13] Appendix A of the submission by QTC (2014a, p. 13) provided evidence of the use of this strategy by a range of regulated and unregulated infrastructure firms. QTC also noted that this is required under QTC's liquidity policy.

the early issuance of new long-term debt to refinance borrowings. The QCA considers that the benchmark debt refinancing cost allowance should only include the direct cost components recommended by PwC (2013b). These cost components are consistent with those traditionally allowed by Australian regulators, based on estimates developed by ACG (2004) and PwC's (2011) analysis of debt-raising transaction costs.

The QCA also considers that there are difficulties in estimating a benchmark cost associated with this refinancing strategy, as additional assumptions need to be made regarding the length of the early issue period and the characteristics of the short-term investment of the new funds raised.

The QCA proposes to provide a debt raising transaction cost allowance that is based on the estimates derived by PwC (2013b). As mentioned earlier, PwC (2013b) estimated the standard benchmark debt-raising transaction costs for domestic corporate bonds as ranging from 9.9 to 10.8 basis points per annum, depending on the size of the benchmark debt balance.

The QCA intends to adopt a single estimate of benchmark debt financing costs of 10.8 basis points per annum for all regulated firms. This is consistent with past practice by the QCA in which the same allowance was provided to all firms regulated by the QCA. The QCA considers that providing a single allowance will ensure sufficient debt-raising costs are provided and avoid complexities with a specific estimate based on benchmark debt balance that will not result in a material difference in the transaction cost allowance.

Consistent with previous practice, the QCA proposes to include this allowance (in terms of basis points per annum) within the regulatory cost of debt.

GLOSSARY

A	
ACCC	Australian Competition and Consumer Commission
ACG	Allen Consulting Group
AER	Australian Energy Regulator
B	
β_d	Debt beta
BVAL	Bloomberg Valuation
C	
CAPM	Capital Asset Pricing Model
CGS	Commonwealth Government Securities
D	
DBNGP	Dampier to Bunbury Natural Gas Pipeline
DBP	Dampier to Bunbury Pipeline
DRP	Debt Risk Premium
E	
ERA	Economic Regulation Authority Western Australia
ESC	Essential Services Commission
F	
FVC	Fair Value Curve
G	
GFC	Global Financial Crisis
I	
IPART	Independent Pricing and Regulatory Tribunal
M	
MRP	Market Risk Premium
N	
NGL	National Gas Law
NGR	National Gas Rules
P	
PwC	PricewaterhouseCoopers
Q	
QCA	Queensland Competition Authority
QTC	Queensland Treasury Corporation
R	
RBA	Reserve Bank of Australia

r_d	Expected rate of return on debt
r_f	Risk-free rate
r_m	Return on the market portfolio of risky assets
S	
SIC	Schwarz Information Criterion
U	
US	United States
W	
WA	Western Australia
WACC	Weighted Average Cost of Capital

APPENDIX A: PWC'S RECOMMENDED COST OF DEBT METHODOLOGY

In its report to the QCA, PwC (2013b) 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. In addition, PwC also provided an updated estimate of debt-raising transaction costs required to re-finance the benchmark firm's debt portfolio. PwC's report is summarised in this Appendix.

Data sources

In contrast to standard regulatory 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. Other data providers such as the Australian Financial Markets Association (AFMA) and Yield Broker (distributed by Thomson Reuters) were considered to have negligible marginal contribution if the two aforementioned sources were already being used.

The Inclusion of other debt data

PwC also considered whether to include bank debt and international bond data on top of domestic corporate bond data for benchmarking purposes. PwC (2013b, p. 6) referred to this as the complex portfolio approach, while the standard practice of benchmarking on domestic corporate bonds was called the simple portfolio approach.

Examining the debt portfolios of five listed Australian regulated energy transmission and distribution businesses, PwC (2013b, pp. 18-19) found that on average 50% of debt is sourced from domestic bonds, 27% from bank debt, and the remaining 23% from bonds issued overseas. As noted by PwC, domestic bank debt usually has a term of 3 to 5 years, with terms greater than 5 years being relatively rare. On the other hand, large volumes of long-term debt are being raised in international capital markets by Australian regulated businesses.

PwC recommended excluding bank debt and international bond data for estimation purposes, citing that such an approach suffers from multiple issues.[14] 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 in 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.

Comparators

PwC was supportive of the use of debt data from outside the infrastructure/essential services sector, as this would increase statistical precision. As pointed out by PwC, a huge part of the Australian regulated

[14] It should be noted that PwC (2013b) 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).

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 Australian Competition Tribunal (2012c) has raised similar concerns about the limited sample size.

In the report, PwC (2013b, 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.

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 (2013b, 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;[15]

(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

PwC's recommended methodology to estimating the benchmark debt risk premium is outlined in their report that is available on QCA's website (PwC 2013b, p. 66). This methodology has been applied in setting the benchmark WACC for SEQ water and wastewater retail/distribution entities for the 2013-15 price monitoring period (QCA 2013a). Incenta Economic Consulting (2013) has also used this approach in its review of the regulatory cost of debt for Aurizon Network.

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 fair value curves (FVCs) serve as a reference under this methodology.

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

It is 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 relevant issue. PwC (2013b, pp. 46-47) noted that different empirical studies have contrasting views on the functional form. To take account of the possibility of both linear and non-linear relationships between the two key parameters (i.e. the debt risk premium and the term to maturity), PwC (2013b, pp. 47-48) recommended that the following alternative functional forms be tested:

(a) linear

(b) quadratic

(c) exponential

(d) cubic

(e) logarithmic and

(f) power.

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 (2013b, 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.

In the PwC's report, the debt risk premium estimates derived from their recommended methodology were compared to those inferred by the Bloomberg FVCs. Table 4 illustrates the estimates for selected credit rating bands.

Table 4 Debt risk premiums (basis points) applying the PwC recommended methodology and Bloomberg FVCs (20 days to 28 November 2012)

Credit Rating	*2 yrs*	*3 yrs*	*4 yrs*	*5 yrs*	*6 yrs*	*7 yrs*	*8 yrs*	*9 yrs*	*10 yrs*
PwC's Approach									
BBB	273	287	300	314	328	342	356	369	383
BBB+	221	233	245	257	269	281	294	306	318
A	172	178	184	190	196	202	208	214	220
AA	151	157	163	169	175	181	188	194	200
AAA	120	126	132	138	144	150	156	162	168
Bloomberg FVC[1]									
BBB[2]	191	213	279	300	301	301	309	317	325
A	149	173	196	216	232	247	254	262	269
AA	84	121	148	172	183	194	202	209	217
AAA	51	80	97	104	112	119	126	134	141

Notes: (1) 'Paired bonds' extrapolation was applied to obtain the estimates for a range of terms to maturity where Bloomberg FVCs were not available. (2) Bloomberg's BBB FVC has generally been regarded as a BBB+ FVC by firms and regulators, in particular at the 10-year benchmark term of debt (PwC 2013b, p. 42).

Benchmarking debt-raising transaction costs

PwC (2013b, pp. 85-86) found the standard benchmark debt-raising transaction costs for domestic corporate bonds were approximately 9.9 to 10.8 basis points per annum. Based on analysis of debt issuance by network utility businesses over the period 2008 to 2013, PwC (2013b, pp. 21-22) determined that the average issuance size for domestic corporate bonds is $250 million. The range of transaction costs was dependent on the benchmark debt balance of the regulated business, with the higher cost (10.8 basis points per annum) related to a single debt issue of $250 million and the lower cost (9.9 basis points per annum) attributable to 8 debt issues of $250 million each.[16]

For domestic bond issues, PwC identified the following categories of debt-raising transaction fees:

(a) Arrangement fees

(b) Legal fees for the issuer and the agent

(c) Credit rating fees

(d) Registry costs

(e) Agent's out-of-pocket expenses.

These cost categories are consistent with PwC's (2011) analysis of debt-raising transaction costs for Powerlink's revenue proposal to the AER for its 2013-2017 regulatory control period. This method has been used recently in other AER regulatory processes.[17]

[16] The latter cost would be applicable for a regulated firm with a benchmark debt balance of around $2 billion.
[17] For example, in AER's (2012, pp. 162-163) draft decision of ElectraNet for the 2013-2018 regulatory control period.

The transaction costs for international bond issues and bank debt were found to be higher than for domestic bond issues. The transaction costs associated with international bond issues were approximately 12 to 14 basis points. For bank debt, PwC found that the transaction costs ranged from 26 to 28 basis points. Nevertheless, it is noted that in the case of bank debt, a majority of the higher transaction cost reflects a risk taking component, and therefore should be considered as part of the debt risk premium. If the complex portfolio approach is adopted, such that the benchmark debt portfolio includes bank debt, these additional fees associated with bank debt would need to be taken account of. However, as noted above, PwC recommended the use of the simple portfolio approach.

PwC (2013b, pp. 76-78) also found no significant relationship between arrangement fees and issuance size, term at issuance and credit rating. This conclusion was generally corroborated by the data of US companies. This implies that the transaction costs estimates above are applicable across different regulated firms.

PwC (2013b, p. 86) provided the QCA with the choice of either providing a single estimate of transaction costs for debt-raising for all regulated firms or providing a specific debt-raising transaction cost that is aligned with the firm's benchmark debt balance.

APPENDIX B: SUBMISSIONS

Participant	***Submission number***
Anglo American Metallurgical Coal Pty Ltd	1
Queensland Treasury Corporation	2
Unitywater	3

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