



APIA Response to AEMC Directions Paper

AEMC Rule Change GRC:0011

16 April 2012

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1. Executive Summary

APIA supports the AEMC's identified set of five attributes for a good rate of return and proposes two further attributes as necessary for a framework to deliver high quality rates of return decisions namely that a framework should:

- be guided by a clear overarching criterion to be met by a regulated rate of return; and
- take into account the specific risks of the regulated business and services.

In APIA's assessment, covered in section 3, the rate of return framework set out in the National Gas Rules (NGR) shows a high level of consistency with both the AEMC's identified attributes and the additional attributes proposed by APIA. This contrasts with the rate of return frameworks set out in Chapter 6 and Chapter 6A of the National Electricity Rules (NER) which show a substantially lower level of consistency. Given that the NGR meet the identified attributes of a good rate of return framework, there is no basis to consider significant change to the NGR as proposed by the AER.

APIA is of the view that if a Rate or Return framework that is to have the attributes identified by the Commission, it cannot include a five yearly review of WACC parameters in which they are any way locked in (either in relation to the methodology or the values for any parameter).

One area of the NGR that APIA believes could be modified to improve its ability to deliver high quality rate of returns is to include a requirement in 87(2)(b) for the use of multiple well accepted financial models to be used in determining the rate of return. To achieve a high quality rate of return it is necessary to recognise that no single financial model is perfect and that the best result is achieved from considering a wide range of evidence. In requiring the use of multiple models it will be necessary to provide better guidance of their acceptability. APIA has sought to do this in section 9 of the submission.

In regards to the establishment of a common framework for the electricity and gas sectors it is clear the policy rationale is straightforward and the framework of the NGR provides a sound basis for a good rate of return framework. Consistent with our views about a common framework and the effectiveness of the NGR, APIA does not see a need to prescribe the treatment of tax, treatment of inflation, WACC formulas, and cost of debt methodology or model in the Rules. APIA's views on these matters are covered in section 5 and 6 of the submission.

APIA accepts that moving to a common framework based on rule 87 of the NGR may be difficult for other parts of the energy infrastructure industry. Investors in electricity infrastructure place a considerable value on predictability in rate of return determinations, an attribute that neither the AEMC nor APIA has identified as necessary. This difference between electricity and gas (particularly pipeline) assets are a reflection of significant

uniformity of electricity markets when compared with the significant variation in conditions across the range of gas infrastructure assets, as identified in APIA's 8 December submission.

In light of this it may be preferable to continue with two separate frameworks with some common key features. The common features would be:

- Availability of merits review
- The primacy of overarching principles that are the same as or adequately reflect NGR 87(1)
- The requirement to consider a range of financial models

Features that could be treated differently would be:

- The treatment of taxation in the WACC formula
- The treatment of inflation in the WACC formula
- Prescriptions around particular financial models
- A five yearly review of WACC models, parameters and methodologies.

2. Introduction

The Australian Pipeline Industry Association (APIA) welcomes the opportunity to respond to the Commission's Directions Paper released on 2 March 2012 (**Directions Paper**) setting out its initial consideration of the Rule Change proposals made by the AER and the EURCC.

APIA is the peak industry body representing Australian gas transmission industry. The views expressed in this submission are the agreed position of the owners of regulated gas transmission infrastructure in Australia.

APIA acknowledges the assistance of Mr Chris Harvey of Chris Harvey Consulting in preparing this submission and Dr Tom Hird of Competition Economists Group in preparing the supporting report at Attachment 1.

APIA recognises that in addition to dealing with the regulated rate of return these Rule change proposals cover matters surrounding capex incentives, capex and opex forecast and regulatory processes. While APIA is interested in the non rate of return matters, because of the potential to flow on to the NGR, it notes that the Commission has not indicated in the Directions Paper, a preference to change any of the provisions in the NGR relating to these non rate of return matters.

Accordingly, this submission will focus on the matters directly related to the NGR, namely the rate of return. In particular, our comments will be directed to Sections 5 and 6 and Questions 20 to 34 inclusive of the Directions Paper.

Non Rate of Return Matters

Notwithstanding the focus of this submission on the rate of return matters in the Directions Paper, one observation APIA would make about the consideration of the matters of capex incentives and forecast opex and capex is that the approach adopted in the NGR and its predecessor Gas Code has proven to be very workable and have been tested through their operation since 1998. The NGR and the Gas Code approach is to adopt clear economic principles and criteria as the basis of determining forecast capex and opex without additional prescription about how to undertake the task. The NGR assumes the regulator and the service provider have the capability to gather sound evidence, undertake necessary analysis and seek any expert advice as is needed to develop and review expenditure forecasts in line with the criteria and principles in the NGR.

In addition, the NGR allow for incentives for efficient capital expenditure through the *ex poste* assessment of capex and the availability of the application of actual depreciation rather than forecast depreciation. These simple mechanisms should prove effective as incentives to seek capex efficiencies.

In APIA's view the approach of using clear principles and criteria and clear identification of the regulator's discretion in the NGR, without prescription about how a regulator should assess such matters, but coupled with a merits review regime as an appropriate "check and

balance” to the discretion afforded to the regulator, is a preferable approach. APIA commends to the Commission the consideration of the approach in the NGR in the Commission’s deliberations on the non rate of return rule changes for the NER.

3. The best framework for setting a rate of return

3.1 Commission’s Attributes

The Commission sets out its preliminary thinking about five attributes of a good rate of return framework in page 91 of the Directions Paper. These are that the framework:

1. is based around estimating a rate of return for benchmark efficient firms;
2. allows methodologies for parameters to be driven by principles and reflect current best practice;
3. allows flexibility to deal with changing market conditions;
4. recognises the inter-relationships between some parameter values; and
5. creates a framework of accountability for both the regulator and the NSP/gas service provider in determining an appropriate rate of return.

These attributes appear to reflect SFG Consulting’s advice that high quality WACC estimates will come from a process that:

- reflects current market circumstances;
- utilises all of the relevant data;
- considers all relevant estimation methods;
- ensures internal consistency;
- is open and transparent;
- has been subject to scrutiny; and
- can be cross-checked for reasonableness.

APIA considers that these attributes are essential to the determination of a Rate of Return that will be consistent with the National Gas Objective (NGO) and the Revenue and Pricing Principles of the NGL (RPP) or, as SFG expresses it, a high-quality WACC estimate.

As outlined in APIA's initial submission to the Commission¹ investors in gas transmission pipelines require certainty that regimes will deliver estimates that reflect market conditions.

The following table sets out APIA's analysis of the relationship between each attribute and the NGO and the RPP.

Attribute	Relationship to NGO & RPP
Is based around estimating a rate of return for benchmark efficient firms	Promotes efficient investment and funding behaviour of service providers, by providing the opportunity for a sufficient return to meet the cost of capital of efficient service providers
Allows methodologies for parameters to be driven by principles and reflect current best practice	Provides the opportunity for the highest quality (ie most commensurate) estimate of the cost of capital to be established as the Rate of Return. That is, one that takes into account all relevant evidence about the cost of capital
Allows flexibility to deal with changing market conditions	Ensures that the rate of return relates to the relevant regulatory period not to one earlier, which would be of lower quality and therefore less likely to be consistent with the NGO and the RPP
Recognises the inter-relationships between some parameter values	Ensures a high quality, accurate Rate of Return through proper application of economic theory rather than a mechanistic application of formulae, producing the best estimate arrived at on a reasonable basis.
Creates a framework of accountability for both the regulator and the NSP/gas service provider in determining an appropriate rate of return	Reduces the likelihood of any errors that arise in determining the Rate of Return, and where they occur they are corrected. This leads to high quality Rates of Return determinations that are consistent with the NGO and RPP

¹ Response to AEMC Consultation Paper: National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2011, APIA, 8 December 2011, page 44

3.2 Proposed Additional Attributes

While APIA is fully supportive of the attributes of the attributes identified by the Commission, APIA is of the view that two more attributes require recognition, namely that the framework should:

1. be guided by a clear overarching criterion to be met by a regulated rate of return; and
2. take into account the specific risks of the regulated business/services.

These are not new matters, but are considered and appear to be given support in the Directions Paper.

In respect of APIA's first additional attribute, APIA notes that the Commission has itself identified this attribute as one of the positive features of the NGR. At Section 5.6.3 of the Directions Paper it notes, *"Indeed, this is precisely what is required from the criteria in Rule 87(1) of the NGR that requires that the rate of return to be commensurate with prevailing conditions in the market for funds and the risk involved in providing the reference services"*². This particular clear overarching criterion, based on sound economics that are consistent with the NGO and the RPP, is the key to creating a framework that is flexible and responsive to the timing of an access arrangement and use of the most current data and research. In APIA's view it is a critical feature to which other matters of process and guidance about the determination of the rate of return must respond.

In making this recommendation, APIA submits that there should only be a limited number of principles or criteria for the regulator to adhere to. It should be noted that this was one of the key differences between the NGR and the Gas Code, where both the Productivity Commission and the then Ministerial Council on Energy concluded that the number of criteria and principles that the regulator had to have regard to under the Gas Code (as outlined in sections 2.24, 8.1 and (in the case of the capital base) 8.10 of the Gas Code) made it very difficult for the regulator to exercise its discretion and apply the law because of the number of, and at times competing, objectives.

In respect of APIA's second additional attribute APIA notes the Commission's acknowledgement of the need to recognise the different non-diversifiable risks applicable to an appropriate rate of return in Section 5.6.4 of the Directions Paper. The Commission notes that factors that may affect the level of risk of a business include a variety of elements. As APIA demonstrated in its December submission there is considerable scope for different levels of risk between gas and electricity, gas distribution and gas transmission and between individual pipelines. It is essential that one of the attributes of a rate of return framework that is best able to be applied in a way so as to meet the RPPs and the NGO be the clear requirement to consider the specific non-diversifiable risks of individual businesses.

² Directions Paper, National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012, National Gas Amendment Price and Revenue Regulation of Gas Services) Rule 2012, AEMC, 2 March 2012, page 87

The table below analyses these attributes against the NGO and RPP.

Attribute	Relationship to NGO & RPP
be guided by a clear overarching criterion to be met by a regulated rate of return	Ensures that the Rate of Return decision is guided by a criterion that is strongly linked to the NGO and RPP rather than formulae or other factors that may constrain or distort the decision
takes into account the specific risks of the regulated business/services	Ensures that the Rate of Return properly reflects the efficient cost of capital of the business and services being provided. This avoids investment distortions that would arise from applying a cost of capital that is relevant to one business, but not another. A Rate of Return which does not account for the non-diversifiable risks would not be consistent with the NGO and RPP

3.3 Comparison between the NGR and NER in relation to the attributes

In APIA's assessment the NGR show a high level of consistency with the both the Commission's proposed attributes and the additional attributes proposed by APIA, whereas both Chapters 6 and 6A of the NER show a substantially lower level of consistency as shown in the following table.

Attribute	NGR	NER
Is based around estimating a rate of return for benchmark efficient firms	Consistent as set out in NGR 87(2)(a)	Consistent as set out in NER 6.5..2 (b) and 6.5.4(e)(4) and NER 6A.6.2(b) & 6A.6.2(j)(3)
Allows methodologies for parameters to be driven by principles and reflect current best practice	Largely consistent as set out in NGR 87(1) and 87(2)(b). Guidance on use of models could be enhanced. Guidance in Rule 74 could be enhanced to reinforce the use of best practice	Inconsistent. Both Chapter 6 and 6A lock in the Sharpe-Lintner CAPM and values and methods for five years Inconsistent. Rules 6.5.4(d) and 6A.6.2(i) (in particular) restrict the scope of the 5-yearly WACC review to the review of particular parameters under the SLCAPM.
Allows flexibility to deal with changing market conditions	Consistent. The rate of return is determined at the time of an access	Inconsistent or partially consistent. The locking in of the SL CAPM and parameters and methods for five

Attribute	NGR	NER
	<p>arrangement decision using the data that relates to the regulatory period and using the most recent information</p> <p>Rule 87(1) requires the rate of return to be commensurate with prevailing conditions in the market for funds</p>	<p>years means that current market conditions are not considered at all under Chapter 6A and on a constrained basis under Chapter 6 through the availability of selecting different values or methods to those determined in the SORI where there is “persuasive evidence” for change.</p>
<p>Recognises the inter-relationships between some parameter values</p>	<p>Consistent. Overarching criterion in NGR 87(1) and inherent flexibility affords the ability to correctly consider inter-relationships</p> <p>Rule 74 requires forecasts of rate of return to be best estimates arrived at on a reasonable basis, but it is noted that NGR 87(2) already requires the rate of return to reflect best practice</p>	<p>Partially consistent. Proper application of the WACC formula in the NER should recognise relationships between gearing and Beta and credit ratings. However, the use of a locked in value for the MRP does not allow for the inverse relationship between the MRP and the risk free rate to be taken into account</p>
<p>Creates a framework of accountability for both the regulator and the NSP/gas service provider in determining an appropriate rate of return</p>	<p>Consistent. The access arrangement process provides for the service provider to submit proposed rate of return with evidence supporting its proposal. The regulator must determine a Rate of Return that meets the requirements of the NGR and NGL. The regulator has “full discretion” in setting the rate of return, but if the regulator makes an error the Service Provider and any party who made a submission can have this remedied through merits review</p>	<p>Inconsistent or partially consistent. The AER makes a determination of WACC parameter values and methods at its five yearly review. There is no recourse at this time for any error. Under NER Chapter 6A there is no recourse to correct the regulator’s decision in relation to the five yearly review or at the time of the regulatory review. Under NER Chapter 6 there is recourse to merits review where the DNSP proposes values that differ from the five yearly review where it can demonstrate there is persuasive evidence for it to do so.</p>
<p>Be guided by a clear</p>	<p>Consistent. NGR 87(1) sets</p>	<p>Inconsistent. Chapter 6A.6.2(b) and</p>

Attribute	NGR	NER
overarching criterion to be met by a regulated rate of return	out the clear criterion to be achieved in setting the Rate of Return.	6.5.2(b) provide and overarching criterion that is then truncated by the requirement to apply the Sharpe-Lintner CAPM and values and methods determined at a five yearly review taking into account a number of factors which may or may not be consistent with the overarching criterion
Takes into account the specific risks of the regulated business/services	Consistent. The requirement to take into account the specific risks of the service provider is set out in NGR 87(1) and section 24(5) NGL	Partially Consistent. While Chapter 6A.6.2(b) and 6A.6.2(j)(1) and Chapter 6.5.2(b) and 6.5.4(e)(1) allude to this requirement, in practice a single set of values have been applied to both electricity transmission and distribution businesses for the key risk variables: Beta and credit rating. There has been little attempt to consider if the risk characteristics for transmission and distribution and not at all for specific businesses.

In APIA's view, the NGR's high level of consistency with identified attributes makes it a more desirable framework in terms of achieving the NGO and RPP and therefore represents a better starting place for deriving a rate of return framework.

APIA notes that the AER has identified certainty about the derivation of the rate of return through the locking in of the Sharpe-Lintner CAPM and the WACC parameters methodologies and values as a benefit. APIA notes that electricity transmission and distribution businesses consider such certainty or predictability as being important to their investors. As identified in our 8 December submission³, pipeline investors do not consider such predictability about rate of return models, parameters and methods are of a particular value, when compared to confidence that the rate of return determined by the regulator is more likely to arrive at one which reflects the efficient cost of capital of a particular business at the time of its access arrangement review as required by NGR 87(1). APIA attributes

³ Response to AEMC Consultation Paper: National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2011, APIA, 8 December 2011, pages 23 -30, 44

these different perspectives on the need for predictability to the nature of the markets and risks that affect electricity infrastructure when compared to gas. APIA's 8 December 2012 submission provided a range of evidence about the differences across the whole of the gas sector and particularly between pipelines. Pipeline investors are comfortable that a flexible, principle-based framework with suitable guidance is more likely to deliver regulated rates of return that reflect the actual cost of capital of an efficient business.

It is important to note that the one place that APIA has identified some potential for refinement in the NGR is in respect of use of financial models in NGR 87(2)(b). However, while the proposed guidance (see Section 9 below) facilitates a more comprehensive consideration of a range of financial models to overcome the current reluctance of the AER to apply the level of flexibility already afforded by NGR 87, it also includes matters of clarification in relation to the application of NGR 87(2)(b). APIA's view is that using a rigorous approach to NGR 87 as it is, coupled with a more realistic interpretation of "well-accepted model", would deliver proper consideration of the relevant financial models with the consequence being a higher quality WACC estimate and a Rate of Return more likely to be consistent with the NGO and the RPP.

It is worth noting that the issue of whether the existing provisions of the NGR already require the regulator to have regard to all relevant evidence as to what is a rate of return that meets the requirements of Rule 87(1) is currently the subject of two applications for merits review before the Australian Competition Tribunal⁴. The Commission may therefore benefit from the results of those merits reviews in determining whether changes to 87(2)(b) are required and, if so the extent of them.

4. Is a common framework for gas and electricity desirable?

4.1 History of the interaction between the NER processes and the application of the NGR

In considering the benefits of moving to a common framework for gas and electricity the Commission has identified the issue of the interaction between the rate of return provisions of the NER and the NGR and the extent to which one framework has impinged on the other. In particular it has sought to better understand how the NGR framework has worked alongside the NER, in particular the prescribed approach to post-tax nominal WACC and the use of CAPM in the NER.

It has become clear to APIA that the AER has felt constrained both by the requirement to use the post tax (ie 'vanilla') nominal WACC, the Sharpe-Lintner CAPM and the outcomes of its five yearly WACC parameter reviews in electricity in respect of gas access arrangement reviews under the NGR.

⁴ Applications by DBP in respect of the DBNGP Access Arrangement and ATCO in respect of the WAGN Access Arrangement

This is evidenced by its adoption of the nominal vanilla WACC in concert with a gas version of the post-tax revenue model (PTRM) and the universal use of the Sharpe-Lintner CAPM as the financial model to be used to estimate the cost of equity for the purposes of Rule 87 of the NGR, despite there being a considerable weight of evidence about the weaknesses of the model and proposals to use other models.

In particular, in the case of access arrangements assessed by the AER - the use of the Fama-French model by Jemena for its 2009 Access Arrangement Review⁵ and Envestra's adoption of four cost of equity models⁶, namely the Sharpe-Lintner CAPM, the Black CAPM, the Fama-French model and the Dividend Growth model.

In contrast the ERA, which it does not regulate electricity transmission and distribution under the NER, has not adopted a common WACC approach to the pipelines it regulates. In particular for:

- the DBNGP it accepts a pre-tax real WACC approach;
- the GGP it adopts a pre-tax nominal WACC approach; and
- the WAGN distribution network accepted a pre-tax real WACC approach.

However, the ERA has also:

- exclusively adopted the Sharpe-Lintner CAPM for all access arrangements; and
- relied heavily on the regulatory precedent of the electricity WACC parameter reviews in electricity in justifying the values it has set in each of the access arrangement reviews under both the NGR and its predecessor, the Gas Code.

In the case of access arrangements assessed by the ERA –in both the DBNGP and the WAGN distribution system 2010 access arrangement reviews, submissions were made by both service providers as to the need to have regard to multiple capital asset pricing models and other evidence pointing to what were the prevailing conditions in the market for equity funds and how a single financial model such as CAPM was not able to be used exclusively to estimate the cost of equity for the purposes of Rule 87 of the NGR.

In all of these cases, the AER and the ERA ostensibly excluded the evidence submitted by the service providers as to these models and applied the Sharpe-Lintner CAPM alone on the basis that the other models are not well accepted.

In addition, in considering the parameters proposed by the businesses in relation to the CAPM, the AER not surprisingly landed on values and methodologies that were consistent with those delivered by the 2009 WACC Review, except for the MRP and gamma, for which it applied a value of 6.0% and 0.25 respectively. The MRP reflected the AER's reassessed value

⁵ Access Arrangement Proposal, Jemena Gas Networks, June 2009

⁶ Access Arrangement proposal, Envestra, October 2010

applied in electricity distribution decisions and the gamma value adopted was based on the decision of the Australian Competition Tribunal on the Queensland and SA electricity distribution regulatory determinations.

It is understandable that the AER would seek to deliver consistency in its decisions about the Rate of Return for both gas and electricity. However, it also means that the NGR must be interpreted and applied in a manner that is highly constrained and does not avail itself of the opportunities to properly consider all of the available evidence.

Perhaps the one positive outcome of the AER applying the same approach to gas businesses as to electricity businesses is that rate of return decisions have been transparent in terms of the AER's decision making process.

In APIA's view the NGR may well be applied differently by the AER absent the NER rate of Return provisions sitting alongside the NGR.

4.2 Application of the NGR should not be constrained by the NER

APIA considers that the constraint on the application of the NGR in respect of the Rate of Return is a significant problem that needs to be overcome. The Commission's attributes, which are consistent with the advice from SFG, if applied in the Rules will deliver high quality estimates of the WACC and therefore be consistent with the NGO and the RPP. As demonstrated above the existing provisions of the NGR already provide a framework that is substantially aligned to the Commission's proposed attributes, while both Chapters 6 and 6A of the NER are very poorly aligned. Given this, it is clear that a full and unconstrained application of the NGR would deliver a superior quality Rate of Return than one that is fettered by the regulator's perceived need to align the Rate of Return decisions under the NGR to those in the NER.

If the NGR were to be considered on its own, that is there was no Rule change proposed for the NER, the rate of return framework in the NGR would benefit from being amended so that the regulator was required to apply the full flexibility available in the NGR, guided by the primacy of NGR 87(1).

4.3 A consistent framework – beneficial but not essential

It is clear from the discussion above that the frameworks across gas and electricity would benefit from being common or at least having key common features, as long as they have the attributes proposed by the Commission and augmented by APIA.

The SFG and the Commission have rightly identified that a common framework, that has the attributes identified by it (and augmented by APIA), does not mean that the same rate of return will be estimated for all businesses. Such a framework can accommodate regulated businesses with distinctly different risk profiles and therefore consequently different rates of

return as well as taking into account the time variation in the parameters that are used for a WACC estimate.

The policy rationale for a common framework (or at least key common features in each framework) is straightforward. In this regard APIA has already demonstrated that the NGR 87 is consistent with the Commission's and APIA's attributes and provides a sound basis for a common framework. However, APIA accepts that moving to a common framework using NGR 87 as its starting point may not be acceptable to other parts of the energy infrastructure industry. In this regard as noted above APIA notes that investors in electricity infrastructure place a considerable value on predictability in rate or return determinations that result from the five yearly review processes, whereas investors in pipelines do not place much value on this and are more concerned that the rate or return determined by the regulator is the WACC estimate which best meets the requirements of NGR 87(1). In fact, APIA refers the Commission to its 8 December 2011 submission where it expressed concern that a framework that allows the regulator to set a rate of return without being required to take into account the specific circumstances of a business and the prevailing conditions of the market for funds at the time that the tariffs are set is at risk of not being consistent with the NGO and RPP.

These differences reflect the significant uniformity of electricity markets when compared with the significant variation in conditions across the range of gas infrastructure assets, as identified in APIA's 8 December submission.

Given this, and the fact that a move from the current highly prescriptive provisions based around five yearly reviews would represent a significant shift for the electricity transmission and distribution businesses, it may be preferable to continue with two separate frameworks but with some common key features.

The common features would be:

- Availability of merits review;
- The primacy of overarching principles that are the same as or adequately reflect NGR 87(1); and
- The requirement to consider a range of financial models and other evidence as to what is a rate of return that achieves the overarching principles.

Features that could be treated differently would be:

- The treatment of taxation in the WACC formula;
- The treatment of inflation in the WACC formula;
- Prescriptions around particular financial models and other evidence that the regulator should have regard to in assessing whether the overarching principles are being met; and
- A five yearly review of WACC models, parameters and methodologies.

In any event, in APIA's view the analysis provided in Section 3 above, about the preferred attributes of a rate of return framework, and the NGR's high level of consistency with those attributes provide ample evidence that there would be no basis for a move from the NGR 87, apart than some minor enhancements to NGR 87(2)(b) providing guidance about the use of financial models. Section 9 of this submission provides some proposed principles that could be used in designing these minor amendments.

5. Treatment of Tax and Inflation (or choice of WACC)

One of the issues raised by the Commission is the use of a particular version of the WACC, namely the nominal "vanilla" WACC. APIA has adopted this terminology, rather than the nominal post tax WACC formula used by the Commission, because the formula is a hybrid, comprising the post tax cost of equity and the pre tax cost of debt – it is strictly not a weighted average cost of capital.

In effect, this form of the WACC locks in two matters that are not about the cost of capital *per se*, but matters of financial modelling (ie the use of the post tax revenue model (**PTRM**)). These are the treatment of tax and the treatment of inflation. As a consequence in APIA's view they are peripheral to the debate about a WACC framework.

5.1 Post Tax vs Pre Tax WACC

The cost of tax can be included in the building blocks calculation in two ways: either through an explicit tax calculation or as an inclusion in the cost of capital where the cost of capital is uplifted to account for tax. In the former tax is included in the cash flows; in the latter it is included in the Rate of Return.

In APIA's view there is no need to specify a particular treatment of tax as this is a matter for the discretion of the regulator under the NGR. The ability to use a pre-tax definition or a post-tax definition allows continuity of past practice and can reasonably be left to the regulator to balance the merits of tax calculation transparency versus modelling simplicity.

In this regard APIA is surprised by the ERA's comments about use of a pre-tax WACC and pre-tax modelling. Until the ERA's submission made in response to the Commission's issues paper, the ERA had not disclosed to APIA's WA members the ERA's concerns raised in the ERA's submission, even during access arrangement reviews for the GGP and the DBNGP. This has not been a point of contention between the businesses and the ERA.

5.2 Nominal vs Real WACC

Inflation can be treated several ways in deriving the regulated revenues and prices. The cash flows (i.e. building blocks) can be expressed in real terms or in nominal terms. That is in constant dollar terms or in dollars of the day. These matters are simply matters for modelling and the economic principles are well known.

There are advantages and disadvantages to using real or nominal rates for return. For similar reasons to the treatment of tax APIA sees no need to specify the treatment of inflation. NGR 73 provides for the use of either real or nominal and this decision is at the discretion of the applicant.

5.3 No need to prescribe a WACC formula

Given APIA's view about the treatment of tax and inflation the logical conclusion is that there is no need to specify a WACC formula. The meaning of WACC as the weighted average of the cost of debt and equity has a universal of acceptance across the finance community and in regulatory practice. The decision about which actual formula applies will then depend on the treatment of tax and inflation proposed to the regulator.

6. DRP Issues

Consistent with its view about a common framework and the effectiveness of the NGR, APIA does not see a need to prescribe a cost of debt methodology or model in the Rules. The current NGR, with the additional guidance identified in Section 9 below, should provide sufficient clarity to guide decisions about methodologies used to determine the cost of debt.

However, APIA wishes to add its contribution to the debate about the cost of debt methodologies that has resulted from the proposed Rule changes, with the intention of seeing sound understanding of the matters raised by the AER and the EURCC. To this end APIA has sought the advice of CEG in developing its views set out below and supported by CEG's report in Attachment 1⁷.

6.1 Has there been a structural change in debt funding

As indicated in CEG's report⁸ during the height of the global financial crisis the yield curve between five and ten years was steep and there was great difficulty in raising bonds of ten year maturity. This was a market reality at the time, which meant those firms that needed to refinance did so with debt of five year maturity. However, there was an undoubted increase in the cost of equity, associated with the adoption of refinancing risk, that flowed from the inability to raise ten year bonds.

APIA notes that this steep rise in the cost of debt between five and ten years is now past and the yield curve between five and ten years has only a gentle upwards slope.

Another important observation is that even during the crisis the cost of issuing five year debt was only lower than the cost of issuing 10 year debt for businesses that had previously

⁷ Response to AEMC Questions on DRP, CEG-AP, 16 April, 2012.

⁸ Response to AEMC Questions on DRP, CEG-AP, 16 April, 2012, p29ff and p 32ff

issued 10 year debt. Where businesses that had an average maturity profile of debt equal to 2.5 years (i.e. based on issuing five year debt in the past) their cost of new five year debt would have been well above that applicable to businesses with substantially longer average term and their credit rating would have been downgraded. This has been borne out by numerous case studies of firms which had substantial debt to refinance in 08/09⁹.

In considering whether a five year cost of debt is more reflective of the efficient cost of debt it is essential to consider the overall allocation of risk to debt and equity holders. It is a fundamental principle of finance that differences in interest rates between five and ten years (or any other maturity) reflect differences in risks passed onto the lender. If a lower interest rate results by issuing shorter term debt, it is only because more risk is retained within the business and there must be a consequent higher cost of equity to cover the increased risk to shareholders.

As a result the first order effect of any change in the assumed maturity of debt issued should have very little effect on the WACC. However, a second order effect of shifting from 10 to 5 years would be positive given expected bankruptcy costs.

In APIA's view, the evidence continues to support the use of ten year debt as the efficient benchmark for pipelines, and probably for all energy infrastructure, given the long lives of the assets and the strong long term pattern of using debt of ten year terms for which the GFC provided a brief hiatus.

6.2 Alternative approaches to estimating the DRP – IPART and ERA

CEG¹⁰ has provided very useful insights into various approaches used by regulators to estimate the cost of debt using a range of bond samples to determine the cost of debt. In addition to its report at Attachment 1, its report for Victorian Gas Distributors as part of their Access Arrangement Proposals CEG¹¹ (Attachment 2) provides detailed analysis about how to properly use the available market data about the cost of debt. CEG demonstrate that:

- Other things being equal, the best answer is one that takes an independent estimate. That is, use of an expert market service to estimate of the cost of debt has significant advantages over “do-it-yourself” estimates, including the fact that such a service is being provided all the time and has been provided for many years, employs professional expertise, uses a wide source of market data, has wide market

⁹ Gopalan, Radhakrishnan, Song, Fenghua and Yerramilli, Vijay, Debt Maturity Structure and Credit Quality (August 17, 2010). Available at SSRN: <http://ssrn.com/abstract=1495849> or <http://dx.doi.org/10.2139/ssrn.1495849>

¹⁰ Response to AEMC Questions on DRP, CEG-AP, 16 April, 2012, Response to Q31

¹¹ CEG, Estimating the regulatory debt risk premium for Victorian gas businesses, March 2012

acceptance the service. The validity of the estimates from such services can be tested;

- To undertake a rigorous “do-it-yourself” estimate requires the use all the available data to which statistically valid curve fitting can be applied. Taking a sample limited to around 5 - 10 years throws away relevant data and runs the risk of the sample not being reflective of the wider information;
- If a methodology involves taking the average of a sample, it must be unbiased and apply an econometrically sound approach. In undertaking their own “do-it-yourself” estimate of the cost of debt using bond samples AER and ERA decisions apply neither of these principles.

CEG demonstrates very clearly that applying rigorous financial theory, a sound estimate of the cost of debt based on a ten year bench mark is possible. However, at least in the case of the AER, IPART and the ERA where this has been attempted, the methodologies have not been rigorous in their application of analytical techniques. In fact the Australian Competition Tribunal found that the AER had incorrectly selected a sample of bonds from the market portfolio to test the reasonableness of the Bloomberg curve. By far the better choice would be to apply a well accepted market service, such as Bloomberg and, where necessary, apply valid extrapolation techniques.

6.3 EURCC Proposals

The EURCC’s proposal is not wholly clear. That is, while the Commission has interpreted that the use of bonds yields should be interpolated/extrapolated to five year maturity, it is not clear from the EURCC’s proposal as to whether it is for five year maturity or maturity of the bonds is not considered at all.

If the Commission is correct in respect of bond yields being interpolated/extrapolated to five year maturity then the result is as follows:

- at the date of the access arrangement a default rate of return – presumably the most recent five yearly average bond yield would be applied for the five years of the access arrangement in calculating revenues and prices;
- for each year of an access arrangement the most recent five yearly average of bond rates would be applied for the new year and for the out turn years of the access arrangement period;
- the five yearly average would be for five years prior to the year for which it would be applied. Consequently each year’s rolling average would have both forward looking components and historic components, with bond rates applicable to the years closest to the applicable year having the most forward looking character; and

- the five yearly average would be a simple average across a range of credit ratings with no consideration being given to whether the credit rating is applicable to the business for which the cost of debt is being determined.

In summary, the EURCC applies a hybrid of forward and backward looking cost of debt to be reapplied in every year of an access arrangement. CEG's notes¹² that the EURCC's proposal is not, strictly speaking, consistent with establishing a forward-looking rate of return.

EURCC's approach suffers from the following problems, even if it is to be used as a model to estimate the cost of debt for a benchmark efficient service provider:

- it is based on a suite of bonds for which the methodology aggregating the results in determining the applicable yield is unclear;
- it applies a method for aggregating a range of credit ratings in a way that is not rigorous in determining the cost of debt for a particular business with a particular efficient credit rating;
- it moves away from the use of the ten year benchmark;
- it is not forward looking, but the trailing average is a hybrid of historic and forward looking debt rates;
- it must be re-evaluated each year and revenues and prices be updated;
- because it will need to be re-evaluated on an annual basis, this is likely to lead to significant additional administrative costs to all stakeholders in regulatory processes, given it will more than likely need to be the subject of a public consultation process by the regulator; and
- there is significant scope for dispute about inclusion and exclusion of bonds from year to year.

In APIA's view it is essential that the cost of debt not depart from the economic principles of using a forward looking cost of capital. The rate of return is forward looking for three reasons:

- because economically efficient investment is served by a determining a rate of return, including the return on debt, that best reflects the cost of capital at the time when the investment will occur and not that which applied in the past;
- because the regulatory review is about setting prices for the next five (or more) years. This means by nature that every cost determined by an access arrangement review or a pricing and revenue determination is a forecast. Therefore all of the

¹² Response to AEMC Questions on DRP, CEG-AP, 16 April, 2012, p80

variables including the rate of return are a forecast for the next five years. A historical trailing average can not substitute as a better forecast than market derived forecasts evidenced by the yield curves for appropriately graded debt; and

- investors require a forward looking rate of return that includes a forward looking return on debt.

CEG suggests that a trailing average approach could in the alternative be conceived of as providing the prevailing cost of debt in the sense that debt liabilities applicable to an access arrangement period are actually determined at times leading up to the access arrangement period and then updated for each year of the access arrangement period. However, as CEG notes the trailing average approach would impact adversely on the incentives for efficient investment, as the cost of debt calculated would not reflect that applicable at the time of investment (except by sheer coincidence), where as the forward looking cost of debt determined at the commencement of the access arrangement period would provide the best forecast of for the access arrangement period.

A historic trailing average should only be considered if it is likely to be a better forecast than the cost of debt at the time of the regulatory decision. This is necessary to be consistent with all of the Pricing and Revenue Principles, but most especially 24(2) and 24(5). For the reasons identified above APIA is of the view that there is a low likelihood that the EURCC proposal will achieve this.

7. The Place of Merits Review

7.1 The importance of merits review

As identified in APIA's December submission one of the consequences of the AER's proposed Rule change is the elimination of the opportunity for review of the AER's decisions, either following a five yearly WACC review or following an Access Arrangement Final Decision. APIA made the point strongly that merits review of a regulator's decision about the Rate of Return is essential to good decision making and to sustaining an environment of confidence to invest.

The Commission has recognised the straightforwardness of arguments put by APIA and others about the importance of merits review, noting that the return on assets building block represents a very significant proportion of the total regulated revenue and ought therefore be subject to merits review. APIA notes and agrees with the Commission's comment:

In any event, the Commission is more concerned about the effect of removing NSP's and gas service provider's access to merits review. The rate of return contributes to a significant portion of NSPs revenues. It is appropriate that there is sufficient regulatory accountability to ensure the errors potentially made by the regulator are corrected. Ultimately, it is in consumers' interests that NSP's be provided with a return that reflects efficient financing costs required to maintain investment in electricity and gas networks.

7.2 The flexibility and discretion of the AER in merits review

APIA does not see the need to reiterate points that it has made and have been accepted by the Commission. However, it does want to underscore a point that seems not to have been recognised so far in any discussion about merits review in relation to the claim of cherry picking and the inability of the AER to deal with consequential matters or related matters if an application for merits review is only about a particular element of the WACC.

In this respect APIA wishes to draw the attention of the Commission to S258 of the NGL which is as follows:

258—Matters that parties to a review may and may not raise in a review

- (1) An original decision maker whose decision is the reviewable regulatory decision being reviewed under this Division may, in the review, raise—
 - (a) a matter not raised by the applicant or an intervener that relates to a ground for review, or a matter raised in support of a ground for review, raised by the applicant or an intervener;
 - (b) a possible outcome or effect on the reviewable regulatory decision being reviewed that the original decision maker considers may occur as a consequence of the Tribunal making a determination setting aside or varying the reviewable regulatory decision.

If an application for merits review is made, it is clear from s258(1)(a) the regulator, who will be the original decision maker, can raise matters that have not been raised by the service provider in its application for review. It would seem that this would provide the opportunity for the regulator to raise the existence of a more favourable part of its decision in making its case to the Australian Competition Tribunal. However, as the Commission has noted, this raises the question of why the regulator has not simply produced best estimates for all WACC parameters.

It is also clear from s258(1)(b) that where there are consequential effects from a change to a regulator's decision it is open to the regulator to raise the matter.

Together, these provisions should provide the regulator with considerable scope to address any concerns that in anyway related to cherry picking of WACC parameters. To date, APIA is not aware of the AER seeking recourse to section 258.

APIA also notes that the NGL includes generous provisions to applications for merits review and applications to be included as an intervener. Non-service provider applicants do not have the same thresholds for being granted leave as service providers do. They also have opportunity to raise new grounds for review. These provisions provide ample opportunity for parties to also address the claimed cherry picking in addition to the regulator.

As suggested by the SFG's analysis and the Directions Paper the argument about cherry picking lacks intellectual rigour and should be dismissed. In addition, APIA notes that the

businesses can only raise a ground for review where the AER has erred. In order to not be accused of cherry picking, the businesses would presumably be required to raise a ground for review in areas in which the AER has not erred. The administrative law framework for review of administrative decisions does not lend itself to application for appeal in cases where the applicant submits that the decision-maker has not erred. The alternative is a *de novo* review of the whole decision.

Such a possibility would be completely unworkable for a complex process, such as an access arrangement review or a price and revenue determination, and would be wasteful and pointless.

8. Should there be a regular, industry-wide review?

The Commission has raised the question of whether a periodic industry-wide WACC review should occur, and if it should what should it seek to achieve¹³. APIA is of the view that if a Rate or Return framework that is to have the attributes identified by the Commission, it cannot include a five yearly review of WACC parameters in which they are any way locked in (either in relation to the methodology or the values for any parameter). Further, the review would have to also consider other models than the Sharpe-Lintner CAPM and other models such as the Black CAPM, the Fama-French model and the Dividend Growth model would also have to be included.

It is critical to achieving two of the Commission's attributes:

1. allows methodologies for parameters to be driven by principles and reflect current best practice;
2. allows flexibility to deal with changing market conditions;

that if a five yearly review were to be required, that the review not lock in any component of the Rate of Return decision-making process. The Commission has asked if a five yearly review might reasonably lock-in any parameters. For reasons set out in our answers to question 20 below, APIA is of the view that only two parameters may be considered as "stable": the equity beta and gamma. However, these parameters suffer from significant problems of statistical uncertainty and the utilisation of any new data can assist in deriving a higher quality estimate.

¹³ While WACC review is a requirement of the NER, it is not a current requirement of the NGR. This means the introduction of a WACC review would introduce a new process for gas businesses. Having said that, the WACC review for electricity has had the impact of drawing in the gas businesses, because the gas businesses recognised that the AER would feel compelled to apply the outcomes of the WACC review to gas access arrangement decisions. This suggests that if there is to continue to be a periodical review it will be moot as to whether NGR include a requirement for such a review.

It might be possible to lock-in these parameters and apply a persuasive evidence test as is currently available for electricity distribution. However, APIA sees no benefit from doing so. It is clear from the market variations that have been since the 2009 WACC review that a lot can change over a five year period and locking in parameters creates a resistance to accepting change.

If APIA's view that a periodic review should not lock in parameters or models, it raises the question about what a periodic WACC review might achieve. At best APIA could see it as an opportunity for regulators and the industry to step back and assess the financial markets environment and the state of financial theory and practice outside the focus on any particular regulatory decision and the concerns about a particular regulatory outcome. The lack of a need for the AER to determine a particular parameter or model may open up discussion to find areas of common ground between the AER and industry.

One possible component of such a review could be a conference in which experts are invited to bring updates from research and financial practitioners are invited to discuss the state of the financial markets. The final outcome of such a review might be a guideline which sets out the AER's thinking about the process of estimating the Rates of Return for energy infrastructure businesses. Critically, any such guideline should be considered to be informative, but not determinative, to any future WACC decisions. Such a guideline could assist businesses in deriving some confidence about how the AER would exercise its discretion in setting regulated rates of return in upcoming regulatory reviews. But it must be recognised that the further regulator's decisions were from the publishing of the guideline the greater the likelihood that the guideline will be superseded by new information. This conference approach may still be useful should the AER and industry wish to jointly commission major research on particular cost of capital approaches.

It is not clear to APIA whether such a review and related guideline would be beneficial. An alternative perspective is that, given that the AER makes eight regulatory decisions on average each year, the issuing of a guideline may be unnecessary. Consultations on each regulatory decision are public and the AER's approach will be transparent, as will any new information and approaches developed by service providers. It may well be that being in "incremental WACC review mode" (rather than "constant WACC review mode") may be a healthier and more mature way to air developing knowledge about the WACC.

9. The Solution

Taking the above discussion together APIA would support the following common features in both the NER and NGR frameworks:

- a. A right to merits review (of the limited type currently in the NGL)
- b. The Regulator should be guided by a criterion or guiding principles to estimate the rate of return that mirror the objectives in Rule 87(1) of the NGR
- c. The Regulator's process for achieving an outcome that meets these principles must require it to:

- i. Assess the rate of return for each service provider on a case by case basis and at the time that the tariffs are set.
- ii. Assess the return based on an efficient firm benchmark
- iii. Use the WACC approach
- iv. Have regard to all relevant evidence (including relevant financial models) that will give stakeholders the greatest certainty that a rate of return has been determined that meets the criterion or guiding principles

This framework would be achieved simply through the application of NGR 87 to both gas and electricity with the following suggested principles around guidance on the use of financial models. Suggested changes to NGR 87(2)(b) would include the following principles:

Requirement to consider models

- Wherever models that meet the following criteria are available they should be considered.
- For a model to be considered it should:
 - Be well-accepted – in the finance industry and/or in regulatory practice;
 - and/or**
 - Have a significant level of acceptance and recognition by finance academics;
 - and**
 - Be likely to be informative in estimating a Rate of Return that meets principles like those in NGR 87 (1).

Guidance in considering the models and their results

- Weight should be given to results from each model based on:
 - The strengths and weaknesses of the version of the model being applied in achieving the overarching criterion in NGR 78(1); and
 - The quality of the data; and
 - The statistical validity and level of statistical uncertainty attributable to any model estimate.

Clear reason for final RoR determined

The reasoning behind the regulator's decision about the value of the final Rate of Return should clearly explain:

- how the models have been applied;

- how the estimates from the various models weighed up to arrive at the final estimate; and
- how the estimate best achieves the requirements of NGR 87(1).

10. Answers to the Commission's Questions

Qn No.

- 20 **Are some WACC parameter values more stable than others, and sufficiently stable to be fixed with a high degree of confidence for a number of years into the future? Would it be practical for periodic WACC reviews to cover only some parameters that are considered relatively stable in value, and require others to be determined at the time of each regulatory determination?**

In developing a view about the stability of WACC parameters and the practicality of periodic WACC reviews to cover a limited set of parameters, APIA has sought the advice of CEG. The following is a summary of CEG's detailed advice¹⁴.

All WACC parameters are variable and interdependent. In particular:

- MRP and risk free rate are both unstable and inversely related.
- Regulated utility betas are affected by the same factors that influence MRP and the risk free rate.
- The value of the CAPM equity beta depends on the benchmark level and benchmark type of debt funding assumed in the WACC calculation.

APIA also observes that beta estimates are subject to considerable statistical uncertainty, so that it is not always clear changes in estimates from one period reflect an actual change in beta or simply the variability in the mean estimate due to wide standard deviations from the mean.

Given these interdependencies it will be problematic to fix any one parameter or approach that is not constant through time. The one parameter that would be less problematic to set would be the benchmark debt financing assumptions as there are good reasons that long term efficient financing strategy is likely to be very stable.

The current framework under the NGR along with merits review provides a suitable environment for evolution of parameters over time and to be properly recognised as that evolution occurs.

•

- 21 **Would it be useful if the AER periodically published guidelines on its proposed methodologies on certain WACC parameters as opposed undertaking periodic WACC reviews that locks in parameter values for future revenue/pricing determinations?**

If periodic review did not lock in parameters or models, it raises the question about what might a

¹⁴ Response to AEMC Questions on DRP, CEG-AP, 16 April, 2012, p14ff

periodic WACC review might achieve. At best APIA could see it as an opportunity for regulators and the industry to step back and assess the financial markets environment and the state of financial theory and practice outside the focus on any particular regulatory decision and the concerns about a particular regulatory outcome. The lack of a need for the AER to determine a particular parameter or model may open up discussion to find areas of common ground between the AER and industry. One possible component of such a review could be a conference in which experts are invited to bring updates from research and financial practitioners are invited to discuss the state of the financial markets.

The final outcome of such a review might be a guideline, which sets out the AER's thinking about the process of estimating the Rates of Return for energy infrastructure businesses. Critically, any such guideline should be considered to be informative, but not determinative, to any future WACC decisions. Such a guideline could assist businesses in deriving some confidence about how the AER would exercise its discretion in setting regulated rates of return in upcoming regulatory reviews. But it must be recognised that the further regulator's decisions were from the publishing of the guideline the greater the likelihood that the guideline will be superseded by new information.

It is not clear to APIA whether such a review and related guideline would be beneficial. An alternative perspective is that, given that the AER makes eight regulatory decisions on average each year, the issuing of a guideline may be unnecessary. Consultations on each regulatory decision are public and the AER's approach will be transparent, as will any new information and approaches developed by service providers. It may well be that being in "incremental WACC review mode" (rather than "constant WACC review mode") may be a healthier and more mature way to air developing knowledge about the WACC.

22 Given the uncertainty in estimating certain parameters, should the AER be required to produce the best possible values for all parameters or adopt a range from which it can choose a preferred estimate? Which WACC parameters are inter-related and should the rules recognise the inter-relationships of these WACC parameters?

The approach of adopting a range of values for parameters is econometrically and practically sound. This approach is likely to drive a higher level of rigour in the estimation of parameters, because the determination of the ranges would need to be derived using statistical principles. It is also likely to allow all participants in regulatory processes to adopt a more realistic perspective on the task by recognising those parameters that are more uncertain and those that are less uncertain and the resulting uncertainty in the final WACC. The process for combining ranges can readily be performed rigorously using Monte Carlo analysis. Use of the Excel add-on @RISK makes this quite accessible, but does require a sound understanding of statistics.

The Rules should not need to prescribe these relationships. Application of sound and accepted financial theory about the relationships should be sufficient.

The parameters which are related are well known as follows:

- Beta will vary with gearing as required by the Modigliani-Miller theorem. A variety

of re-levering formulae have been used in both financial and regulatory settings

- Credit rating will also vary with gearing. There is no simple formula for calculating changes in credit rating associated with changes in gearing
- The relationship between the risk free rate and the MRP will also need to be considered. CEG has demonstrated an inverse relationship that would need to be considered.
- Similarly there is a inverse relationship between the DRP and the risk free rate
- CEG has also advised that beta is affected by the same factors that influence MRP and the risk free rate.

In APIA's view such matters do not need to be prescribed in the Rules because they are a matter of application of sound statistical and financial theory.

23

How do the outcomes with the persuasive evidence test applying at the time of the regulatory determinations in Chapter 6 of the NER differ from the NGR rate of return framework? Does the persuasive evidence test make it less likely that values of WACC parameters will be updated as quickly as under the NGR framework, or vice versa?

The outcomes under the NER with the persuasive evidence test are very similar to those under the NGR. This is in part because the persuasive evidence test allows for variation from the SORI as has been seen in respect of gamma and the MRP. However the similarity of results is also a function of the existence of the SORI. In the current situation the AER understandably applies the outcomes of the SORI as its default position under the NGR as well as under the NER.

This is largely because the AER feels bound to deliver consistency between the gas and electricity regimes. It is notable that the merits reviews have been sought in both the gas and electricity regimes despite the frameworks being different. The results for gas may have been different if a proper consideration of cost of equity models other than the Sharpe-Lintner CAPM. However, because Sharpe-Lintner CAPM is locked in by the NER there is no scope for application of the persuasive evidence test to the cost of equity model.

Absent the NER, under the NGR each aspect of the rate of return will be considered with the latest information on conditions in financial markets, updates to data that are used to estimate the parameters and any new evidence and research. Accordingly, the persuasive evidence test almost certainly will have the effect of delaying updates to parameters for five years. In APIA's view the tendency for the AER will be to not maintain the same level of watching brief on parameters and the most current research, because it will rely on the SORI and will accordingly tend to focus resources and efforts to considering the WACC at its five yearly review. Because of the need for consistency between gas and electricity the tendency under the NGR will be to *de facto* adopt the SORI for gas even though there is freedom to do otherwise.

Perhaps the one positive outcome of the AER applying the same approach to gas businesses as to electricity businesses is that rate of return decisions have been transparent in terms of the AER's

decision making process.

Absent the constraint created by WACC reviews for electricity transmission and distribution the AER would be more likely to update parameters and methods as new information and research comes to hand and would be more likely to entertain the consideration of cost of equity models other than the Sharpe-Lintner CAPM.

24 How has the rate of return framework under the NGR worked alongside the NER frameworks?

As discussed above the AER has tended to adopt the outcomes of the SORI for gas, even though it is not legally bound to. This is understandable as it seeks to adopt a consistent approach to estimating the cost of capital. As a result, despite the freedom to do so it has not been willing to entertain other cost of equity models such as the Fama-French model or evidence from Dividend Growth Model estimates. This has the effect of stifling the debate about the WACC beyond the SORI process or willingness to update parameters determined under the SORI.

25 Are there any concerns about the lack of guidance in the NGR on how the AER and ERA will approach the rate of return decision? To what extent is the rate of return framework under the NGR influenced by the WACC approach adopted for the electricity sector by these regulators?

While APIA considers the level of guidance in the NGR is about right, there is some room for fine tuning. This is because the NGR establishes a clear objective for determining the rate of return in R87(1) based on economic principles with all of the necessary considerations. It also provides the benchmark framework for to clarify any issues around efficiency of financing in R87(2)(a). However, guidance on what are acceptable approaches, methods and models in 87(2)(b) and how to apply them is inadequate.

This inadequacy about the guidance on the uses of financial models was not apparent until around 2008 when service providers became aware of inadequacies in the Sharpe-Lintner CAPM and began to seek to apply other financial models such as the Black CAPM, the Fama-French model and the Dividend Growth Model. The AER has universally rejected the use of these models because it considered them not to be “well accepted”. As discussed above this has at least in part been because the NER solely allow for the use of the Sharpe-Lintner CAPM.

Some further guidance in R87(2)(b) is called for in relation to methods/financial models.

It is almost universally accepted that the Black CAPM is a more accurate model than the Sharpe-Lintner CAPM; however, there has been little if any commercial application of the Black CAPM because of the complexities in its application compared with the relative simplicity of the Sharpe-Lintner CAPM. Because it is easier to apply use of the Sharpe-Lintner CAPM has become widespread to the point that it is just called the CAPM. The Fama-French model (or variants of it) is known to be used in the superannuation industry, but because it is not widely used the AER has not considered it to be well accepted.

Similarly the Dividend Growth Model is a well accepted model in the US and is used by US

regulators to determine the regulatory rate of return for electricity and gas transmission and distribution businesses. It has not been applied in Australia largely because of lack of familiarity, a history of use of the Sharpe Lintner CAPM and because the data set available is limited, whereas in the US the data set is quite large giving confidence about the results. Even with this data limitation the DGM can be informative in establishing a cost of equity.

As identified above the rate of return framework under the NGR is heavily influenced by the WACC approach adopted in the electricity sector. The result has been the flexibility and discretion that the NGR provide has effectively been constrained by locking in of the Sharpe-Lintner CAPM and the WACC review process. That is, the benefits of regulatory discretion in the NGR have been fettered by the existence of the highly prescriptive approach to the WACC and the five yearly locking in process. In APIA's view this is undesirable and indicates the benefits of a common framework, but one which is substantially the same as that in the NGR.

APIA proposes that the be guidance in NGR 87(2)(b) as follows:

- For a model to be considered it should:
 - Be well-accepted – in the finance industry and/or in regulatory practice;

and/or

 - Have a significant level of acceptance and recognition by finance academics;

and

 - Be likely to be informative in estimating a Rate of Return that meets principles like those in NGR 87 (1).

Guidance in considering the models and their results

- Weight should be given to results from each model based on:
 - The strengths and weaknesses of the version of the model being applied in achieving the overarching criterion in NGR 78(1); and
 - The quality of the data; and
 - The statistical validity and level of statistical uncertainty attributable to any model estimate.

Clear reason for final RoR determined

The reasoning behind the regulator's decision about the value of the final Rate of Return should clearly explain:

- how the models have been applied;
- how the estimates from the various models weighed up to arrive at the final estimate; and

- how the estimate best achieves the requirements of NGR 87(1).

26 Are there reasons to adopt a WACC definition other than the vanilla post-tax nominal definition that is used under the NER? Alternative proposals should explain why that alternative is likely to result in a better WACC estimate.

In effect, this form of the WACC locks in two matters that are not about the cost of capital *per se*, but matters of financial modelling. These are the treatment of tax and the treatment of inflation. As a consequence in APIA's view they are peripheral to the debate about a WACC framework.

Post Tax vs Pre Tax WACC

The cost of tax can be included in the building blocks calculation in two ways: either through an explicit tax calculation or as an inclusion in the cost of capital where the cost of capital is uplifted to account for tax. In the former tax is included in the cash flows; in the latter it is included in the Rate of Return.

In APIA's view there is no need to specify a particular treatment of tax as this is a matter for the discretion of the regulator under the NGR. The ability to use a pre-tax definition or a post-tax definition allows continuity of past practice and can reasonably be left to the regulator to balance the merits of tax calculation transparency versus modelling simplicity.

Nominal vs Real WACC

Inflation can be treated several ways in deriving the regulated revenues and prices. The cash flows (i.e. building blocks) can be expressed in real terms or in nominal terms. That is in constant dollar terms or in dollars of the day.

There are advantages and disadvantages to using real or nominal rates for return. For similar reasons to the treatment of tax APIA sees no need to specify the treatment of inflation. NGR 73 provides for the use of either real or nominal and this decision is at the discretion of the applicant.

No need to prescribe a WACC formula

Given APIA's view about the treatment of tax and inflation the logical conclusion is that there is no need to specify a WACC formula. The meaning of WACC as the weighted average of the cost of debt and equity has a universal of acceptance across the finance community and in regulatory practice. The decision about which actual formula applies will then depend on the treatment.

27 Should the AER/ERA be given discretion to consider models other than the CAPM when estimating the required return on equity under the NGR? What prescription or principles could the rules contain to guide the way in which information from other models might be used to

produce a better WACC estimate?

As identified by SFG Consulting obtaining the best estimate of the WACC can only be assisted by consideration of cost of equity models other than the Sharpe-Lintner CAPM. There has been ample evidence that is widely accepted by financial academics and theoretically literate practitioners that the Sharpe-Lintner CAPM is a poor estimator of the cost of equity and that at very least the Black CAPM should be given consideration, as should a statistically valid Fama-French model and statistically useful estimates from the DGM. Of course, this requires a willingness on the part of businesses and the regulators to apply sound financial and statistical rigour.

The Rules should provide that methods other than the Sharpe-Lintner CAPM should be considered where they provide insight into the cost of equity that may correct for weaknesses in the Sharpe-Lintner CAPM. The weight given to each method should depend on the statistical validity and confidence that can be given the estimates from each method and an understanding of the circumstances under which each model is more likely to provide an accurate estimate than others.

Consistent with the response to Question 25 APIA's view high levels of prescription are undesirable and can create distortions. What is required are clear principles and criteria that are to be achieved, allowing rigorous analysis of data and market evidence to be the basis of the regulator's decision. Our response to Question 25 provides suggests principles could be applied for guidance about use of financial models.

28

Are there any reasons why an appropriate WACC estimate cannot be provided to NSPs and gas service providers from a common WACC framework, without necessarily requiring the same parameter values to be adopted across the electricity transmission, electricity distribution and gas sectors?

The SFG and the Commission have rightly determined that a common framework, featuring the identified (and augmented by APIA), key attributes does not mean that the same rate of return will be estimated for all businesses. Such a framework can accommodate regulated businesses with distinctly different risk profiles and therefore consequently different rates of return as well as taking into account the time variation in the parameters that are used for a WACC estimate.

What is noticeable is that the current NGR provide a framework consistent with the key attributes that could be applied across all energy infrastructure businesses, allowing consistency through the AER's consistent application of it and allowing variations between businesses to be recognised through variation in business specific parameters. However, APIA accepts that moving to a common framework using NGR 87 as its starting point may not be acceptable to other parts of the energy infrastructure industry. In this regard APIA notes that investors in electricity infrastructure place a considerable value on predictability in rate or return determinations that result from the five yearly review processes, whereas investors in pipelines do not place much value on this and are more concerned that the rate or return determined by the regulator is the WACC estimate which best meets the requirements of NGR 87(1). In fact, APIA refers the

Commission to its 8 December 2011 submission where it expressed concern that a framework that allows the regulator to set a rate of return without being required to take into account the specific circumstances of a business and the prevailing conditions of the market for funds at the time that the tariffs are set is at risk of not being consistent with the NGO and RPP.

These differences reflect the significant uniformity of electricity markets when compared with the significant variation in conditions across the range of gas infrastructure assets, as identified in APIA's 8 December submission.

Given this, and the fact that a move from the current highly prescriptive provisions based around five yearly reviews would represent a significant shift for the electricity transmission and distribution businesses, it may be preferable to continue with two separate frameworks but with some common key features.

29 Which rate of return framework would best meet the key attributes identified? Are there any other attributes that should be considered?

The Commission identifies the following key attributes that are desirable in a rate of return framework:

- is based around estimating a rate of return for benchmark efficient firms;
- allows methodologies for parameters to be driven by principles and reflect current best practice;
- allows flexibility to deal with changing market conditions;
- recognises the inter-relationships between some parameter values; and
- creates a framework of accountability for both the regulator and the NSP/gas service provider in determining an appropriate rate of return.

In APIA's view the NGR meets all of these attributes. It is clear that the NER fails in respect of all but one.

Other attributes that could be included are:

- be guided by a clear overarching criterion to be met by a regulated rate of return; and
- takes into account the specific risks of the regulated business/services.

The NGR are also consistent with these attributes, but the NER are not.

30 Is the benchmark DRP approach likely to overstate the prevailing cost of debt, having regard to the suggestion that the overstatement may be a reflection of shorter maturity debt leading to a higher refinancing risk for NSPs? What weight should be placed on the views of market

analysts on the ability of stock market listed NSPs to out-perform their cost of debt allowances?

In its report CEG¹⁵ demonstrate that the 10 year benchmark BBB+ will not overstate the cost of debt noting that some energy infrastructure businesses had raised five year debt during the period following the GFC when ten year debt was not available. Moreover CEG demonstrate that it is only because businesses had long term debt that they were able to continue to raise new debt, albeit for five year maturity.

CEG summarise their findings as follows:

- Firms issue 10+ year debt on average. While there was a temporary shift towards the issue of shorter maturities in the wake of the GFC and the effective closure of long term debt markets, there is no basis for assuming that this will be sustained. Indeed, the evidence is that this is not the case. The average maturity at issue of outstanding debt for both Australian and foreign regulated firms remains in excess of 10 years.
- The closure of the long term bond market is over and there are a large number of long term bonds that have been issued over the last two years.
- The fact that firms issue 10+ year debt on average suggests that this is the lowest cost (most efficient) financing strategy. This is true even though for any given firm, the interest rate on a short term bond will tend to be lower than the interest rate on a long term bond.
- Not only was it true that short term debt had a lower interest rate than long term debt over the period the AER's gathered the data in Table 7.5 of its submission to the AEMC.¹⁶ It was always true – including over the extended period we have witnessed regulated utilities in all countries issue long term debt.
- The evidence that regulated utilities are issuing *some* debt at around 5 years and paying lower interest rates than the regulatory cost of debt is not a sound basis for the conclusion the AER and others draw because:
 - it does not demonstrate that a firm issuing all debt at 5 years could achieve those same rates (which is the implicit assumption in the AER's analysis of the data in Table 7.5). In reality, an important reason why the firms in the AER's Table 7.5 could issue low interest 5 year debt is because they have previously prudently built a buffer of long term debt; and
 - it does not capture the higher cost of equity that results from issuing all 5 year debt.

¹⁵ Response to AEMC Questions on DRP, CEG-AP, 16 April, 2012, p29ff

¹⁶ <http://www.aemc.gov.au/Media/docs/AER%20Proposal%20on%20National%20Electricity%20Rules%20-%20Part%20A%20and%20B-d7c78aba-0788-45dd-b2b3-8296acf237ad-0.PDF>

CEG also makes the following points in respect of the weight to be given to market analysts reports about listed NSPs ability to outperform their cost of debt allowances:

- It is relevant to consider the views of market analysts, but these should be placed in their proper context. Overall, the weight that should be given to the views of market analysts is limited.
- Market analysts are not regulatory experts and do not always have a detailed understanding of the nature of the regulatory regime.
- Analyst reports are more focused on what costs could possibly be achieved by a business in debt raising and not necessarily:
 - whether this estimate is consistent with the benchmark debt assumption;
 - why the benchmark debt assumption is made; and
 - the inter-relationship between the benchmark debt assumption and estimates of the cost of debt and equity parameters.
- This different focus can lead to mistakes in the interpretation of analyst reports.
- Unless analyst reports deal with issues such as:
 - spread to CGS rather than spread to swap;
 - term to maturity; and
 - timing of regulatory decisions

relevant to an internally consistent WACC estimate, analyst reports should not have a strong bearing on setting the allowed cost of debt.

31 What are the pros and cons of the recent approaches taken by IPART and the ERA in estimating the DRP?

CEG¹⁷ has provided very useful insights into various approaches used by regulators to estimate the cost of debt using a range of bond samples to determine the cost of debt. CEG demonstrate that IPART, the ERA and the AER applied flawed approaches to using samples of bonds and that:

- Other things being equal, the best answer is one that takes an independent estimate. That is, use of an expert market service to estimate of the cost of debt has significant advantages over “do-it-yourself” estimates, including the fact that such a service is being provided all the time and has been provided for many years, employs professional expertise, uses a wide source of market data, has wide market acceptance the service. The validity of the estimates from such services can be tested;

¹⁷ Response to AEMC Questions on DRP, CEG-AP, 16 April, 2012, Response to Q31

- To undertake a rigorous “do-it-yourself” estimate requires the use all the available data to which statistically valid curve fitting can be applied. Taking a sample limited to around 5 - 10 years throws away relevant data and runs the risk of the sample not being reflective of the wider information;
- If a methodology involves taking the average of a sample, it must be unbiased and apply an econometrically sound approach. In undertaking their own “do-it-yourself” estimate of the cost of debt using bond samples AER and ERA decisions apply neither of these principles.

CEG demonstrates very clearly that by applying rigorous financial theory a sound estimate of the cost of debt based on a ten year bench mark is possible. However, in the case of the IPART, the ERA and also the AER, where this has been attempted the methodologies have not been rigorous in their application of analytical techniques. In fact the Australian Competition Tribunal found that the AER had incorrectly selected a sample of bonds from the market portfolio to test the reasonableness of the Bloomberg curve. By far the better choice would be to apply a well accepted market service, such as Bloomberg and, where necessary, apply valid extrapolation techniques.

32 What evidence is there that the DRP benchmark in the NER may have changed? Would it be appropriate for the regulator to specify the DRP benchmark in any periodic reviews or would it be more appropriate to specify it at the time of the determinations?

In its report CEG demonstrate clearly that the 10 year bond benchmark has not changed and should continue to be the basis of determining the DRP. In particular, CEG notes:

The empirical evidence confirms that, on average, regulated infrastructure businesses do issue long term (on average 10+ year) debt. The average term to maturity from issuance of debt is still around 10 years and there is no basis to believe that a year or two of issuing short term debt is evidence that businesses are likely to materially reduce the average term to maturity of debt that they issue.

As identified in its advice in response to question 20, CEG takes the view that of all the WACC parameters the cost of debt benchmark is most amenable to the possibility of being fixed for a period of time. However, it goes to argue for an evolving approach to all WACC parameters including the cost of debt benchmark.

33 Is the EURCC’s proposal of establishing the cost of debt using historical trailing average compatible with the overall framework for estimating a forward-looking rate of return? What are the potential benefits of using a trailing average and do they outweigh the potential costs if the estimate is less reflective of the prevailing cost of debt for NSPs?

No, the EURCC’s proposal is not compatible with estimating a forward looking rate of return.

In APIA's view it is essential that the cost of debt not depart from the economic principles of using a forward looking cost of capital. The rate of return is forward looking for three reasons:

- because economically efficient investment is served by a determining a rate of return, including the return on debt, that best reflects the cost of capital at the time when the investment will occur and not that which applied in the past;
- because the regulatory review is about setting prices for the next five (or more) years. This means by nature that every cost determined by an access arrangement review or a pricing and revenue determination is a forecast. Therefore all of the variables including the rate of return are a forecast for the next five years. A historical trailing average can not substitute as a better forecast than market derived forecasts evidenced by the yield curves for appropriately graded debt; and
- investors require a forward looking rate of return that includes a forward looking return on debt.

CEG suggests that a trailing average approach could, in the alternative, be conceived of as providing the prevailing cost of debt in the sense that debt liabilities applicable to an access arrangement period are actually determined at times leading up to the access arrangement period and then updated for each year of the access arrangement period. However, as CEG notes the trailing average approach would impact adversely on the incentives for efficient investment, as the cost of debt calculated would not reflect that applicable at the time of investment (except by sheer coincidence), whereas the forward looking cost of debt determined at the commencement of the access arrangement period would provide the best forecast of for the access arrangement period.

A historic trailing average should only be considered if it is likely to be a better forecast than the cost of debt at the time of the regulatory decision. This is necessary to be consistent with all of the Pricing and Revenue Principles, but most especially 24(2) and 24(5). For the reasons identified above APIA is of the view that there is a low likelihood that the EURCC proposal will achieve this.

34 What possible changes would be required in the NER to implement the EURCC's trailing average approach?

APIA notes CEG's advice that the NGR would not need to be change to allow a five year trailing average approach as long as the view was accepted that this approach would reflect the prevailing cost of debt. However, in APIA's view the Rules, the trailing average approach does not meet either the letter or the spirit of either NGR 87(1). In particular, investors require a forward looking rate of return that includes a forward looking return on debt and the trailing average approach does not meet this need.

Accordingly the NGR would have to be changed to allow the use of a backward looking method,

where it could be demonstrated that method provided an estimate of the cost of debt that better achieved the Revenue and Pricing Principles than a forward looking method in determining the cost of debt for the five years of the regulatory period.

Attachments

Attachment 1 - Response to AEMC Questions on DRP, CEG-AP, 16 April, 2012

**Attachment 2 - Estimating the regulatory debt risk premium for
Victorian gas businesses, CEG-AP, March, 2012**



Response to AEMC Questions on DRP

Dr. Tom Hird

April 2012



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1. Executive summary

1. The questions I have been asked to answer can be broadly summarised as:
 - Is there a role for the NGR to be altered to provide more guidance in relation to how to estimate the cost of debt and/or stability in WACC parameters?
 - Has the cost of debt been overestimated due to the benchmark financing assumptions (i.e. 10 year BBB+ debt) and, if so, what might be a better way to estimate the cost of debt?

1.1. Role for guidance/stability in the NER

1.1.1. Guidance on how to estimate the cost of debt

2. I have been asked by the Australian Pipeline Industry Association (APIA) the following question (which is not a question directly asked by the AEMC):

To what extent should Rule 87(2)(b) be amended to introduce guidance about the models or methodologies used to estimate the cost of debt?

3. Rule 87(2)(b) states that in determining a rate of return on capital:

(b) a well accepted approach that incorporates the cost of equity and debt, such as the Weighted Average Cost of Capital, is to be used; and a well accepted financial model, such as the Capital Asset Pricing Model, is to be used.

4. High level principles that I consider should be adopted when making a WACC decision are that:
 - the WACC should be developed using well accepted financial principles including those embodied in specific models such as the CAPM and also well established empirical results/regularities (noting that there is a divergence of opinion between my view of which models are “well established” and the view of the AER);
 - all components of the WACC should be determined in an internally consistent manner. For example and as discussed in answer to Question 20:
 - the benchmark financing assumptions used to estimate the cost of debt need to be determined consistent with the manner in which the equity beta has been estimated;
 - the assumed benchmark credit rating (to the extent one is used) should be consistent with the benchmark financing assumptions (i.e., amount and type of debt issued (e.g. average term to maturity, use of callable debt etc.);

- widely accepted and used estimates of the cost of debt derived independently of the regulatory process, such as Bloomberg's fair value, should be given weight that reflects this status. .
 - all relevant information should be given weight in proportion to its relevance and robustness. As noted above, the AER's use of the guidance in 87(2)(b) to employ a well accepted financial model has resulted in it giving zero weight to some relevant robust information and giving high weight to less relevant and robust information;
 - other things equal, estimates of the cost of debt derived independently of the regulatory process should be given more weight than estimates developed by interested stakeholders. For example, Bloomberg's estimates of the fair value cost of debt for a given credit rating would fall into the former category.
5. Whether these principles can be enshrined as guidance in the Rules in a way that does more good than harm is, in my view, an open question.
 6. As noted in response to the AEMC's question 20 below, the elements of the WACC are all closely interdependent, market conditions are unstable and the best methodology used to estimate both the cost of debt and the cost of equity can vary with market conditions. For this reason, introducing prescription on how this is to be done is dangerous because it risks 'locking in' a methodology or approach that is not best suited to the market conditions at the time the decision is being made.
 7. The potential problem with providing more guidance than already exists is that there is no bright line between 'guidance' and 'prescription'. The more detailed the guidance the greater the risks that this becomes *de facto* prescription.

1.1.2. Stability in parameters/methodology (AEMC Question 20)

8. The primary objective should be for the Rules to give rise to an accurate estimate of the WACC. Imposing stability of approach and/or parameters has little value above and beyond that associated with accurately estimating the WACC. The CAPM WACC parameters and the benchmark assumptions around debt financing are heavily interdependent. Moreover, not only are the CAPM parameters interdependent - they are not stable. This is true not just of market risk premium (MRP) and the risk-free rate but also beta.
9. Given these interdependencies it will be problematic to attempt to fix any one parameter/approach where this parameter/approach is not constant through time. Moreover, doing so can potentially lead to perverse outcomes in the presence of negative relationships between the parameters.
10. For these reasons I do not consider that it would be appropriate to allow for the Rules to fix any single CAPM parameter whilst at the same time allowing the other parameters to vary. In addition, I note that my previous report for the APIA discussed the problems with prescribing the sole use of the CAPM under the Rules. To the



extent that fixing a CAPM parameter is associated with also prescribing the use of the CAPM, I would consider this to be problematic for the reasons already discussed in that report.

11. Similarly, it is important to note that the assumed credit rating should not be determined independently of the allowed cost of equity. The credit rating of the benchmark firm will depend on its cash-flows. A critical component of a regulated businesses cash-flows, and therefore credit rating, will be the allowed compensation for the cost of equity. In this context it would be a serious error (one that has recently been committed by the ERA in its Western Power Draft Decision¹) to leave the credit rating unchanged in the face of material change in the compensation for the cost of equity. Fixing the credit rating but leaving the cost of equity free to vary has the potential to lead to such an error.
12. I consider that it would be less problematic for the benchmark debt financing assumptions to be periodically fixed under the Rules. In my view, the benchmark debt financing assumptions should be based on what is the long term most efficient debt financing strategy – which is best estimated based on the level and type of debt that businesses have historically raised.
13. Notwithstanding the above, I consider that the Rules should not periodically fix even the benchmark financing assumptions. To the extent that stability of an assumption/methodology is likely to promote the NGO/NEO then the Rules should establish a framework for that stability to evolve overtime.
14. The current NGR, along with merits reviews of decisions, provides a framework for precisely that evolution to occur. This should lead to regulatory stability of assumption/method where that promotes the NGO and not elsewhere. In my view, it is likely that this will lead to stability in assumptions regarding benchmark financing without this needing to be imposed by the AEMC.

1.2. Is there a problem with the current benchmark financing assumptions?

15. The AER and others have pointed to the ability of regulated businesses to issue debt at shorter maturities and at a lower rate than the regulatory debt risk premium (DRP) based on issuing 10-year debt. It has been argued that this implies that the DRP has been overestimated and the correct benchmark financing assumption should be a shorter maturity.

¹ The ERA increased the assumed credit rating from BBB+ to A- (as it happens this change was motivated by data error as explained in answer to the AEMC's question 31). At the same time, the ERA has set a record low allowance for the cost of equity for an Australian energy network business (reflecting historically low risk-free rates in addition to a reduction in the term of the risk-free rate (from 10 to 5 years) and a reduction in the equity beta from 0.8 to 0.65). The resulting real post-tax return on equity is 4.89% (see page 206 of the draft decision).



16. However, this fails to account for the fact that, other things equal, the more short-term debt a business issues the riskier investing in that firm becomes – for both debt and equity investors.

1.2.1. The more short-term debt issued the higher the cost of debt at any term

17. By way of example, imagine “scenario 1” where a 60% geared firm has a stable asset base and has only ever previously issued 20-year debt. This means that every 5 years only 25% of their debt ‘rolls over’. Suppose that this firm decides to issue a new bond but at 5 years maturity instead of 20. The investor in the new 5-year debt will know that 75% of the firm’s existing debt will come due *after* their 5-year debt comes due.
18. Contrast this with “scenario 2” where the same firm has historically only ever issued 5-year debt instead of 20-year debt. Now consider the risk a new 5-year bond investor faces. Instead of having 75% of the firm’s debt fall due *after* his/her bond matures, 100% of the firm’s debt will fall due *before* his/her debt matures. This gives the investor in a new 5-year bond much greater exposure to risks to the company within five years than under scenario 1. Consequently, the investor in a new 5-year bond in scenario 2 would demand a higher interest than the investor in scenario 1 – even though the term of the debt is 5 years in both cases.²
19. This is relevant because in having regard to debt issuances by owners of regulated energy network businesses, the AER has not observed the interest rates on 5-year debt for businesses who have historically issued 5-year debt (which would be the relevant benchmark interest rate at 5 years). The AER has only observed the interest rates when a business who has historically issued 10-year debt has issued *some* 5-year debt.

1.2.2. The more short-term debt issued the higher the cost of equity

20. Modigliani and Miller (1958) demonstrated that the level of risk in a firm is like the amount of air in a balloon. If one squeezes risk out of one area (e.g. debt) then the risk simply moves to another (i.e. equity). Issuing short-term debt may lower the cost of debt³ but it does so precisely because it lowers the amount of risk that debt providers have to bear. The corollary of this, however, is that the equity providers have to bear higher risk (i.e. the risk that was previously passed onto debt providers is now retained in the business for equity holders).
21. It follows that, as a first order approximation, any lowering of the cost of debt as a result of issuing shorter term debt will raise the cost of equity (via the equity beta in the

² This is an obvious relationship at a theoretical level. It has also been tested empirically,. For example, see Gopalan, Radhakrishnan, Song, Fenghua and Yerramilli, Vijay, Debt Maturity Structure and Credit Quality (August 17, 2010). Available at SSRN: <http://ssrn.com/abstract=1495849> or <http://dx.doi.org/10.2139/ssrn.1495849>

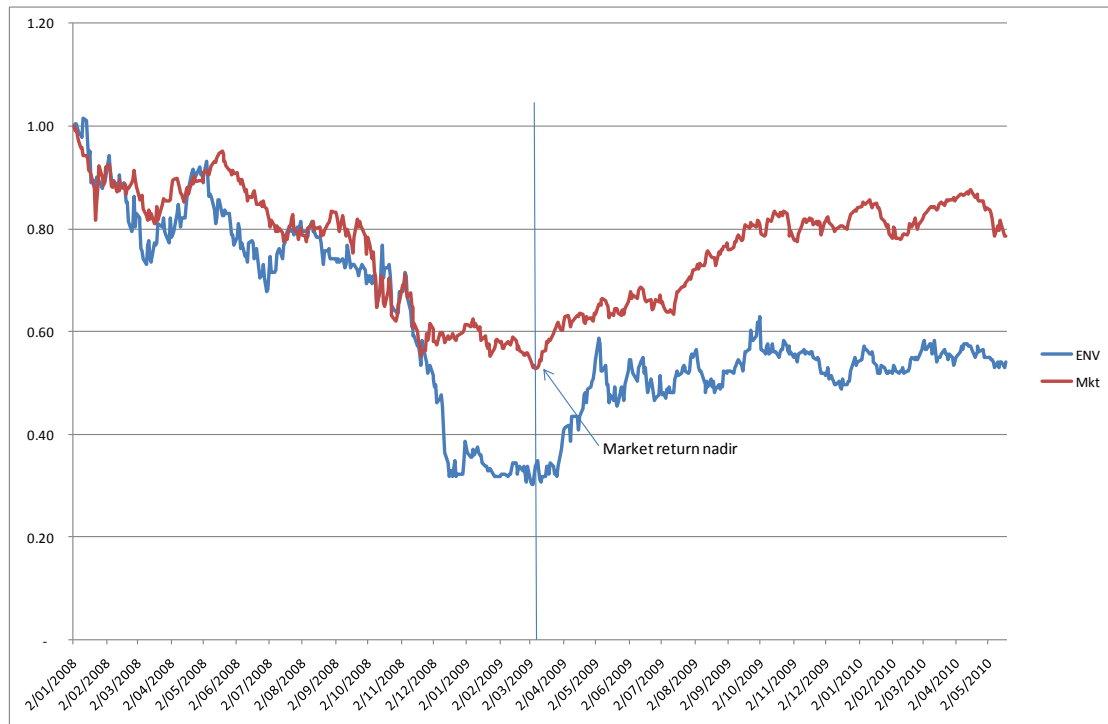
³ Although, as noted above, the evidence relied on by the AER does not demonstrate that this is actually true if a business issued 100% short term debt.



CAPM) by an offsetting amount. That is, even if a business could lower debt costs by issuing all debt short term; this would not be expected to lower the WACC.

22. In order to illustrate that these are not idle theoretical issues consider Figure 1 below.

Figure 1: Envestra and market returns from 2 January 2008



Source: Bloomberg and CEG analysis

23. Envestra's share price fell during the GFC much further than the market (ASX200) based primarily on refinancing fears. This is despite Envestra having a very long average maturity at issue (well in excess of 10 years). If Envestra had, instead, an average maturity at issue of 5 years (leading to an average remaining maturity of around 2.5 years) then it must be a realistic possibility that Envestra would not have been able to refinance its debt during the GFC – with potentially disastrous results for investors and, ultimately, customers.

1.2.3. Conclusion

24. There is no evidence to support a view that the 10-year benchmark assumption is likely to overstate the cost of debt (in response to the AEMC's question 30) or, more relevantly, lead to an overestimate of the WACC. The fact that some businesses have recently issued *some* debt at lower maturities and lower interest rates than the 10 year BBB+ benchmark interest rate (as noted by the AER and in some broker reports) provides no basis for altering the 10-year term benchmark. In order to justify a shortening of the term to, say, 5 years it would be necessary to demonstrate that:



- businesses can issue *all* of their debt at 5 years at a materially lower interest rate than the 10-year benchmark interest rate; and
 - that any lower interest rate achieved (if it could be achieved) would not be fully (or more than fully) offset by a higher cost of equity.
25. No analysis has been supplied to suggest that this is the case. Indeed, those who imply that there is some regulatory failure because businesses have issued *some* debt at a lower term/interest rate than 10 years have not even acknowledged the issues I raise above let alone attempt to address them in any systematic way.
26. In my view, the only compelling evidence for a change in the benchmark term assumption would be the outstanding debt portfolios for regulated businesses average term to maturity of debt fell materially and permanently below 10 years. We have not observed this and the empirical evidence that I present in the next section strongly suggests that this is not happening.

1.3. Are businesses debt maturity profiles falling in a sustained fashion?

27. Section 5.3 (in response to the AEMC's question 32) surveys the empirical evidence on whether businesses have reduced the average maturity at issue in their debt portfolios to below 10 years. I have examined Australian, UK and US regulated energy businesses and find that they continue to have debt portfolios with in excess of 10 years maturity at issue.
28. I have also examined the evidence on long term debt issues by Australian companies in general. While it is true that there were very few long term bonds issued in the wake of the GFC, since 2010 there have been a large number of such bonds issued as outlined in section 5.3.

1.4. Are IPART/ERA/AER approaches to estimating the cost of debt from bond data robust?

29. IPART, the ERA and the AER have all adopted somewhat similar approaches to estimating the benchmark cost of debt from bond data. In my view, all of these approaches have serious flaws – both methodological and in terms of the data used. My detailed reasons are set out in section 6 (in response to the AEMC's question 31).
30. Perhaps the most troubling aspect of each approach is the failure to use a great deal of relevant information. Each approach lands on an artificially small sample and then takes some sort of average of that sample. This essentially throws out the available information in relation to the relationship between maturity and yield.
31. If regulators are not going to use Bloomberg's fair value curves then in my opinion they should, at a minimum, attempt to derive a relationship between maturity and yield themselves. I have done so in my recent report for Victorian gas businesses and I



have estimated a curve that gives very similar yields at long maturities to Bloomberg's fair value curve.

1.5. EURCC's approach

32. The rationale for setting a forward-looking rate of return is to ensure that a business has the incentive to efficiently invest in essential infrastructure. The EURCC's proposal uses a historical trailing average estimate of the cost of debt. This is not, strictly speaking, consistent with establishing a fully forward-looking rate of return.
33. That said, a case can be made that this approach would be consistent with the NGR as it stands. This is provided one took the view that the existing average cost of debt on a prudently financed business' books reflected 'prevailing conditions in the market for funds'. If one accepted such an interpretation then a version the EURCC's approach could be proposed by a gas business under the NGR (or argued for by the AER).



2. Contextual question

34. I have been asked by the APIA to respond to questions 20 and 30 to 34 from the AEMC's directions paper on the AER proposed rule change. I have also been asked a more general 'contextual question' by the APIA (as set out below).

To what extent should Rule 87(2)(b) be amended to introduce guidance about the models or methodologies used to estimate the cost of debt?

35. This answer to this contextual question overlaps with my responses to the AEMC's questions, which themselves involve considerable overlapping material. In answering this contextual question I also attempt to summarise my answers to the other AEMC questions to the extent that they are relevant to this question.

36. Rule 87 states

(1) The rate of return on capital is to be commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services.

(2) In determining a rate of return on capital:

(a) it will be assumed that the service provider:

(i) meets benchmark levels of efficiency; and

(ii) uses a financing structure that meets benchmark standards as to gearing and other financial parameters for a going concern and reflects in other respects best practice; and

(b) a well accepted approach that incorporates the cost of equity and debt, such as the Weighted Average Cost of Capital, is to be used; and a well accepted financial model, such as the Capital Asset Pricing Model, is to be used.

37. Rule 87(2)(b) provides guidance that the rate of return on capital must have regard to the cost of both debt and equity. It also states that a well accepted financial model must be used such as the capital asset pricing model. This latter direction has been interpreted as applying to the cost of equity and not the cost of debt. This is presumably on the grounds that, while one can use the CAPM or another model to estimate the cost of equity, it is likely to be more accurate to directly observe market yields and set the cost of debt by reference to that.

38. In my view, it is reasonable to provide high level guidance on how the cost of equity and debt should be estimated provided that the guidance does not become prescriptive. In this regard, I note that the AER has previously taken the guidance provided in 87(2)(b) in relation to the use of the CAPM to be, in effect, a prescription



that the CAPM be used. In fact, the AER has taken this guidance to be a prescription that a particular form of the CPAM be used.⁴

39. As noted in response to the AEMC's question 20 below, the elements of the WACC are all closely interdependent. Moreover, market conditions change and this can change the best methodology used to estimate both the cost of debt and the cost of equity. For this reason, introducing prescription on how this is to be done is dangerous because it risks 'locking in' a methodology or approach that is not best suited to the market conditions at the time the decision is being made. Given that there is no bright line between 'guidance' and 'prescription' then the more detailed the guidance the greater the risks described above.
40. That said, there are some high level principles that I consider should be adopted when making a WACC decision. These are that:
- the WACC should be developed using well accepted financial principles including those embodied in specific models such as the CAPM and also well established empirical results/regularities;
 - all components of the WACC should be made in an internally consistent manner. For example and as discussed in answer to question 20:
 - the benchmark financing assumptions used to estimate the cost of debt need to be determined consistent with the manner in which the equity beta has been estimated;
 - the assumed benchmark credit rating (to the extent one is used) should be consistent with the benchmark financing assumptions (i.e., amount and type of debt issued (e.g. average term to maturity, use of callable debt etc.);
 - the assumed benchmark credit rating (to the extent one is used) should be consistent with the allowed cost of equity (noting that the lower the allowed cost of equity the lower the credit rating other things being equal).
 - all relevant information should be given weight in proportion to its relative level of robustness. As noted above, the AER's use of the guidance in 87(2)(b) to employ a well accepted financial model has resulted in it giving zero weight to robust information and giving high weight to less robust information;
 - widely accepted and used estimates of the cost of debt derived independently of the regulatory process, such as Bloomberg's fair value, should be given weight that reflects this status.
41. Whether these principles can be enshrined as guidance in the Rules in a way that does more good than harm is, in my view, an open question. Specifically, there is a risk that attempting to do so may have unintended consequences. By way of example

⁴ See my December 2011 report for the APIA, Proposed Changes to the National Gas Rules, sections 3 and 4 (especially section 3.2.2).



it is conceivable to me that a simple statement that “the WACC should be estimated in an internally consistent manner” (the second principle above) could potentially be inappropriately interpreted in a manner that restricts the amount of information that is had regard to (in contravention of the second principle set out above).

42. In answering question 20 below, I set out why I believe that neither the CAPM nor any specific CAPM parameters should be prescribed in the Rules or periodically fixed under the Rules. I also conclude that the benchmark financing assumptions (level and type of debt issued) should not be periodically fixed under the Rules. However, these assumptions are the assumptions that, if fixed periodically, would be least likely to become inappropriate over the period that they were fixed.



3. AEMC question 20

43. Question 20 of the AEMC Directions paper asks:

Are some WACC parameter values more stable than others, and sufficiently stable to be fixed with a high degree of confidence for a number of years into the future? Would it be practical for periodic WACC reviews to cover only some parameters that are considered relatively stable in value, and require others to be determined at the time of each regulatory determination?

3.1. Summary answer

44. The primary objective should be for the Rules to give rise to an accurate estimate of the WACC. Imposing stability of approach and/or parameters may have some value above and beyond that associated with accurately estimating the WACC. However, these are likely to be of a second order magnitude and would not justify adopting an approach that makes WACC estimation less accurate.
45. The CAPM WACC parameters and the benchmark assumptions around debt financing are heavily interdependent. Moreover, not only are the CAPM parameters interdependent - they are not stable. In particular:
- MRP and risk-free rate are both unstable and inversely related;
 - equity beta for a regulated utility is affected by the same factors that influence MRP and risk-free rate. For example:
 - if investors perceive a heightened probability of large shocks from the financial sector then this will tend to affect all three parameters on a forward-looking basis. In this market circumstance investors' perception of MRP/beta will be driven by the perceived potential impact of financial shocks on the market portfolio volatility (influencing MRP) and how well holding utility stocks provide insurance against such (beta); and
 - if investors perceive a heightened probability of large shocks from commodity prices, then this will affect all three parameters on a forward-looking basis. In this market circumstance investors' perception of MRP/beta will be driven by the perceived potential impact of commodity price shocks on the market portfolio volatility (influencing MRP) and how well holding utility stocks provide insurance against such volatility (beta).
 - the value of the CAPM equity beta depends critically on both the benchmark level and benchmark type of debt funding assumed in the WACC calculation. For example:
 - higher levels of gearing imply a higher equity beta; and
 - stronger reliance on issuance of short-term low risk debt implies a higher beta.

46. Given these interdependencies it will be problematic to fix any one parameter/approach that is not constant through time. Moreover, doing so can potentially lead to perverse outcomes in the presence of negative relationships between the parameters. Two potential examples of such perverse outcomes are provided below. One is in relation to an negative relationship between MRP and the risk-free rate (such that fixing MRP but letting the risk-free rate vary causes the estimated WACC to move in the opposite direction to the true WACC). The other is the negative relationship between MRP and beta during a commodity boom which means that:
- fixing beta but allowing MRP to vary may lead to an overestimate of the WACC; and
 - symmetrically, fixing MRP but allowing beta to vary may result in an underestimate of the WACC.
47. For these reasons I do not consider that it would be appropriate allow for the Rules to fix any single CAPM parameter whilst at the same time allowing the other parameters to vary. In addition, I note that my previous report for the APIA discussed the problems with prescribing the sole use of the CAPM under the Rules. To the extent that fixing a CAPM parameter was associated with also prescribing the use of the CAPM, I would consider this to be problematic for the reasons already discussed in that report.
48. Similarly, it is important to note that the assumed credit rating should not be determined independently of the allowed cost of equity. The credit rating of the benchmark firm will depend on its cash-flows. A critical component of a regulated business' cash-flows, and therefore credit rating, will be the allowed compensation for the cost of equity. It would be a serious error in this context to leave the credit rating unchanged in the face of material change in the compensation for the cost of equity. Fixing the credit rating but leaving the cost of equity free to vary has the potential to lead to such an error.
49. I consider that it would be less problematic for the benchmark debt financing assumptions to be periodically fixed under the Rules. In my view, the benchmark debt financing assumptions should be based on what is the long-term most efficient debt financing strategy – which is best estimated based on the level and type of debt that businesses have historically raised.
50. The long-term efficient debt financing strategy is, in my view, likely to be very stable and will certainly not change dramatically over short periods of time (see my answer to question 32). It is therefore a potential candidate for a 'parameter' or 'assumption' that could be fixed between periodic reviews.
51. Moreover, consistency in benchmark debt financing assumptions over time and across regulatory decisions would mean that this important determinant of the beta estimate would be stable. This would mean that, at least as far as this causal factor was concerned, the regulatory approach to estimating beta could be stable as well.

52. Notwithstanding the above, I consider that the Rules should not periodically fix even the benchmark financing assumptions. To the extent that stability of an assumption/methodology is likely to promote the NGO/NEO then the Rules should establish a framework for that stability to evolve overtime.
53. The current NGR, along with merits reviews of decisions, provides a framework for precisely that evolution to occur. This should lead to regulatory stability of assumptions/methods where that promotes the NGO and not elsewhere. In my view, it is likely that this will lead to stability in assumptions regarding benchmark financing without this needing to be imposed by the AEMC.

3.2. Stability in WACC parameters/methodologies vs. accuracy of the WACC estimate

54. In my view the only intrinsic value of stability in WACC parameters/methodologies is that resources do not have to be spent on revisiting and reviewing particular issues multiple times. That is, if the CAPM is a prescribed methodology and a particular CAPM parameter is fixed then there may be some resource savings from stakeholders not having to prepare and present evidence in relation to this parameter in each regulatory determination.
55. However, it is also my view that this form of intrinsic value of stability is of a second order magnitude when compared to the value that results from accurately estimating the WACC. Consequently, to the extent that stability comes at a cost in terms of accuracy then one should invariably sacrifice stability of parameter/methodology for accuracy of the parameter/methodology.

3.3. Evolution of stability versus top-down enforcement of stability

56. This does not mean that, absent any fixing of parameters/methodologies in the Rules, regulatory precedent would evolve in an unstable or unpredictable manner. That is, it is not necessary for the Rules to prescribe stability in parameters/methods in order for stability to assert itself.
57. On the contrary, it is to be expected that the Rules, operating in conjunction with a merits review process, will force the evolution of regulatory stability on matters where stability assists in the accurate estimation of the WACC (or at least does not hamper it). It is also to be expected that even if the value of a particular parameter does not stabilise, the methodology used to update that parameter may well tend to stabilise.
58. Moreover, the potential resource savings from attempting to enforce stability, rather than letting it evolve, are likely to be illusory. Enforcing stability through prescription of parameter/methodology will, if it gives rise to an inaccurate WACC, inevitably result in resources being deployed to change that prescription. By way of illustration, fixing the MRP in the AER SoRI may well have led to greater resource costs being expended on this and other parameters and not less.



59. As set out in the following subsections, I consider that there are some important methodological issues where stability of approach will aid in securing accuracy of outcomes. However, I do not believe that it would be beneficial to attempt to codify and prescribe these in the Rules or to require the AER to codify and prescribe them on an intermittent basis under the Rules.
60. Rather, I consider that the Rules should establish a framework where stability of parameters/methodologies evolve based on the ultimate test of whether this improves the accuracy of the regulatory WACC in reflecting prevailing conditions in the market for funds for a firm with the same risk profile as the regulated business in question.

3.4. Does stability of parameters require a single financial model to be used?

61. Before one can answer the AEMC's question directly it is necessary to ask: to what model do the parameters considered belong? It may be implicit in the question that the parameters in question are those relevant to the CAPM (see section 3.2.2 of that report). As discussed in that section, the AER has used the fact that the NGR and NER both make reference to the CAPM to exclude information from consideration on the basis that having regard to that information would amount to the de facto adoption of a model other than the CAPM.
62. In my view this has led to the artificial and inappropriate restriction of the information that the AER is prepared to have regard to. This is an important reason why I argued that the Rules should not prescribe the use of the CAPM (neither the NGR nor the NER). For this same reason I am concerned about any proposal to have:

...periodic WACC reviews to cover only some parameters that are considered relatively stable in value, and require others to be determined at the time of each regulatory determination...

63. If doing so requires advance prescription to use a particular model, such as the CAPM, then this will exacerbate the types of problems discussed in my December 2011 report.
64. Of course, it should be possible to write the Rules in a manner that allows for multiple models to be used simultaneously but which nonetheless allows some parameters in one or model to be fixed in a periodic review. By way of illustration, the Rules may state that:
- if the Sharpe Lintner CAPM is to be used the AER should periodically review and fix the value for beta;
 - if the Black CAPM is to be used the AER should periodically review and fix the value for beta and for the excess of the zero beta return over the government bond rate;



- if the Inter-temporal CAPM is to be used then the AER should periodically review and fix the value for beta and theta (the covariance of the stock's returns with the reinvestment opportunities set);
- if the dividend growth model is to be used then the AER should periodically review and fix the rate of growth assumed for dividends beyond the forecast horizon; or
- if the Fama and French 3 factor model is to be used then the AER should periodically review and fix the value of (some or all) of the 3 coefficients for the three parameters; or
- etc.

65. Alternatively, the Rules may simply state that the value for beta used in the Sharp-Lintner CAPM formula should be periodically reviewed and fixed but that this should not be interpreted as implying the exclusion/irrelevance of other well accepted models (noting that there is divergence between my view of what is a well accepted model and the views of the AER).

3.5. Should CAPM parameters be fixed?

66. As described in answer to the contextual question in section 2 above, all elements of the WACC are interlinked. If one assumes that the Sharpe-Lintner CAPM holds true, then:

- the value of the forward-looking MRP is heavily influenced by the same set of factors that determine the risk-free rate – namely the probabilistically expected type and magnitude of shocks to hit the stock market;
- the value of the forward-looking beta, depends critically on the same factors;
- the value for the forward-looking beta depends on debt strategy (gearing and maturity profile) of a firm;
- the forward-looking value of beta depends on the composition of the market which, in turn, influences the MRP; and
- etc

67. In what follows I provide an illustration of these issues and explain why this “interconnectedness” means that it is not a sensible approach to attempt to fix one or more parameters while allowing the other parameters to vary.

68. The basic problem is that of the forward looking CAPM parameters (beta, MRP and the risk-free rate) are all affected in one way or another by the types of shocks investors perceive as important/likely in the future. This expectation changes as market circumstances change. Allowing some parameters to vary reflecting those changed market circumstances but not others has the potential to lead to error.



3.5.1. MRP and risk-free rate

69. In section 3.2.1 of my December 2011 report for the APIA I argued that it was inappropriate to fix parameters between reviews. I illustrated the reasons why I held this view in relation to the MRP. The MRP was chosen for illustration because, in my view, recent market circumstances clearly demonstrated an error that resulted from fixing this parameter at an estimate of its long run historical average level while allowing the risk-free rate to be reset based on prevailing market conditions.
70. I have further expanded on this error in a report for Victorian gas businesses⁵ and from which the immediately discussion draws. Applying an approach that fixed the MRP at an estimate of its historical long run average value would have resulted in a fifty year low estimate of the cost of equity during a period when the cost of equity was, if anything, heightened relative to its long run average.
71. The dividend yield on listed equities can be used to arrive at a direct estimate of the prevailing cost of equity using the dividend growth model. In what follows I use the method used by AMP Capital Investors.⁶ This methodology has previously been relied on by the AER in support of a position that the then MRP of 6.0% was generous:

A more recent estimate is from AMP Capital Investors (2006), who base the growth rate on the expected long-run GDP growth rate, similar to Davis (1998). AMP Capital Investors (2006) estimate the forward looking Australian MRP for the next 5-10 years to be 'around 3.5 per cent' (specifically 3.8 per cent), 1.9 per cent for the US and 2.4 per cent for the 'world'. AMP Capital Investors (2006) considers an extra 1 to 1.5 per cent could be added for imputation credits resulting in a 'grossed-up' Australian MRP of around 4.5 to 5.0 per cent.⁷

72. The AMP methodology involves approximating a cost of equity by adding the long term average nominal growth in GDP (as a proxy for long term average nominal growth in dividends) to the prevailing dividend yield for the market as a whole. This gives a 'cash' cost of equity. To convert this into a cost of equity including the value of imputation credits the cost of equity needs to be scaled up by the relevant factor. In the figure below I have used 6.6% per annum as the long run growth path for nominal GDP (based on average real growth in GDP from 1959 until 2011 plus inflation of 2.5%) and a scaling factor of 1.1125 to capture the value of imputation credits.⁸

⁵ CEG, Internal consistency of risk free rate and MRP in the CAPM, March 2012.

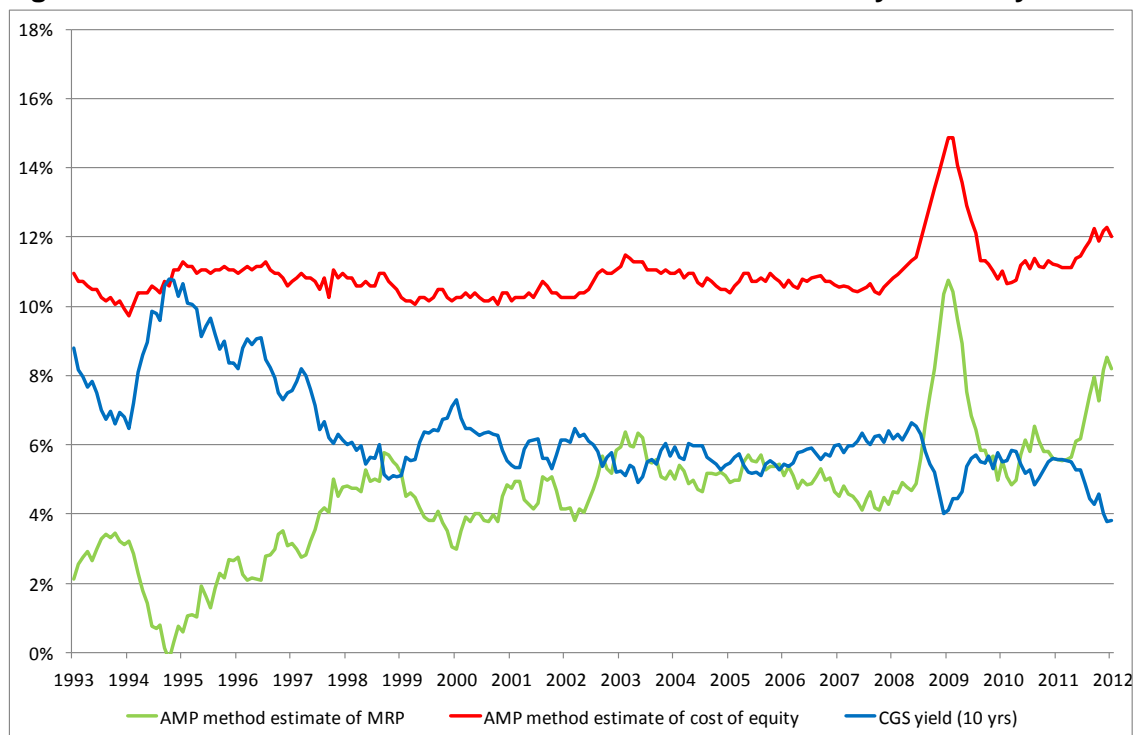
⁶ AMP Capital Investors (2006), *The equity risk premium – is it enough?* Oliver's insights, Ed.13, 4.

⁷ AER, *Electricity transmission and distribution network service providers Review of the weighted average cost of capital (WACC) parameters*, December 2008, p. 173

⁸ This is based on the assumption of a corporate tax rate of 30%, that the value of imputation credits distributed is 35% of their face value, consistent with Australian Competition Tribunal precedent, and the proportion of dividends that are franked is 75% (consistent with Brailsford, T., J. Handley and K. Maheswaran, Re-examination of the historical equity risk premium in Australia, Accounting and Finance 48, 2008, page 85). The value of 1.1125 is calculated as $1 + .30 \cdot .35 \cdot .75 / (1 - .3)$

73. When I use this method consistently through time (using a time series for dividend yields from the RBA), I derive a time series for the prevailing cost of equity, 10 year CGS yields and MRP (measured relative to 10 year CGS yields) shown in Figure 2 below.
74. Notably, the most recent fall in CGS yields has been associated with a more than offsetting rise in MRP – such that the cost of equity has risen materially since mid-2011. I note that the path of these parameters over time is similar to those recently estimated and presented by Capital Research.⁹

Figure 2: AMP method estimate of RoE and MRP relative to 10 year CGS yields



Source: RBA and CEG analysis

75. This figure shows a clear negative relationship between the prevailing MRP and the prevailing risk-free rate. Notably, the market cost of equity, being the sum of the CGS and MRP is much more stable than either of these two time series.
76. Based on this figure, there is a very weak rationale for fixing either the MRP or the risk-free rate independent of the other. There is, however, a stronger rationale for fixing the aggregate market return on equity – although this is clearly not stable as can be seen by the peaks in 2009 and 2012. Of course, there is nothing stopping a relatively stable estimate of the cost of market equity evolving based on evidence such as that

⁹ Capital Research, *Forward Estimate of the Market Risk Premium: Update*, February 2012, Figure 8.



presented above. As already noted, there is no need to prescribe that the AER periodically fixes an estimate of this value.

3.5.2. Beta

77. CAPM beta is a measure of the risk of a firm measured *relative to* the risk of the market portfolio. If the absolute level of risk for a firm is constant the value of beta will be inversely related to the value of the MRP and will have the same proportionate level of variability (i.e. doubling of the MRP will result in a halving of the beta) This is a mathematical truism associated with the CAPM formula

$$\text{Required return on equity} = \text{RoE} = \text{risk free rate} + \beta \times \text{MRP}$$

$$\text{Risk of equity} = \text{RoE} - \text{risk free rate} = \beta \times \text{MRP}$$

78. Clearly, if the risk of equity is constant then $\beta \times \text{MRP}$ must also be constant and, therefore, beta must be inversely related to the MRP. Alternatively, if beta is constant then it must be the case that the absolute risk of equity in the firm varies in the same proportion as the MRP.
79. In reality, there will be some market circumstances where one of these assumptions is true and some market circumstances where the other assumption is true. For example, it is reasonable to assume that the heightened weight given to mining stocks in the ASX200 due to the commodities boom is increasing the risk of the market portfolio and increasing the MRP. However, it is less obvious that this same effect is increasing the absolute risk associated with investing in utilities. That is, the heightened MRP resulting from the commodities boom may be associated with an offsetting lower equity beta because the commodities boom has not similarly increased the absolute risk of utility stocks.
80. What this highlights is that market circumstances that influence the MRP may also influence the value of the beta. If a commodities boom means that investors perceive a heightened probability of large shocks from commodity prices, then investors' perception of MRP/beta will be influenced by this. The perceived potential impact of commodity price shocks on the market portfolio volatility will likely push MRP higher and will likely push the relative risk of utility stocks (beta) lower.
81. The following two subsections provide a further discussion of these issues using the commodity boom and the financial crisis to illustrate the interrelationship between MRP, beta and risk-free rate.

3.5.2.1. Beta and the commodities boom

82. Another important set of shocks that may affect MRP and regulated utility beta values are those associated with the impact of a commodity boom. The current commodity boom has dramatically increased the weight of resource stocks in the ASX200.



Resource stock prices are very sensitive to global commodity prices which, arguably, have little to do with factors that might affect a domestic regulated utility.

83. Given this increase in the weight for resource stocks in the ASX200 and the likelihood that resource stocks have a low covariance with regulated utility stocks it is reasonable to assume that forward looking beta of regulated utilities will be depressed by the commodities boom.
84. This does not necessarily imply that the cost of equity will be lower for utilities, because the increased weight of resource stocks in the market portfolio will tend to increase the MRP (because resource stocks are generally regarded as high risk). It may well be that two effects (higher MRP and lower regulated utility beta) exactly cancel out.
85. However, the regulatory regime will tend to overestimate the cost of equity if it:
 - fixes the value of beta at level that does not reflect the prevailing impact of the commodity boom; but
 - captures the effect of the commodity boom on the MRP.
86. Similarly, the regulatory regime will tend to underestimate the cost of equity if it:
 - fixes the value of beta at a level that reflects the prevailing impact of the commodity boom; but
 - does not capture the effect of the commodity boom on the MRP.
87. Both of the above errors have their genesis in the same mistake: they assume that beta and MRP are independent of each other and attempt to fix one without having sufficient regard to the level of the other.

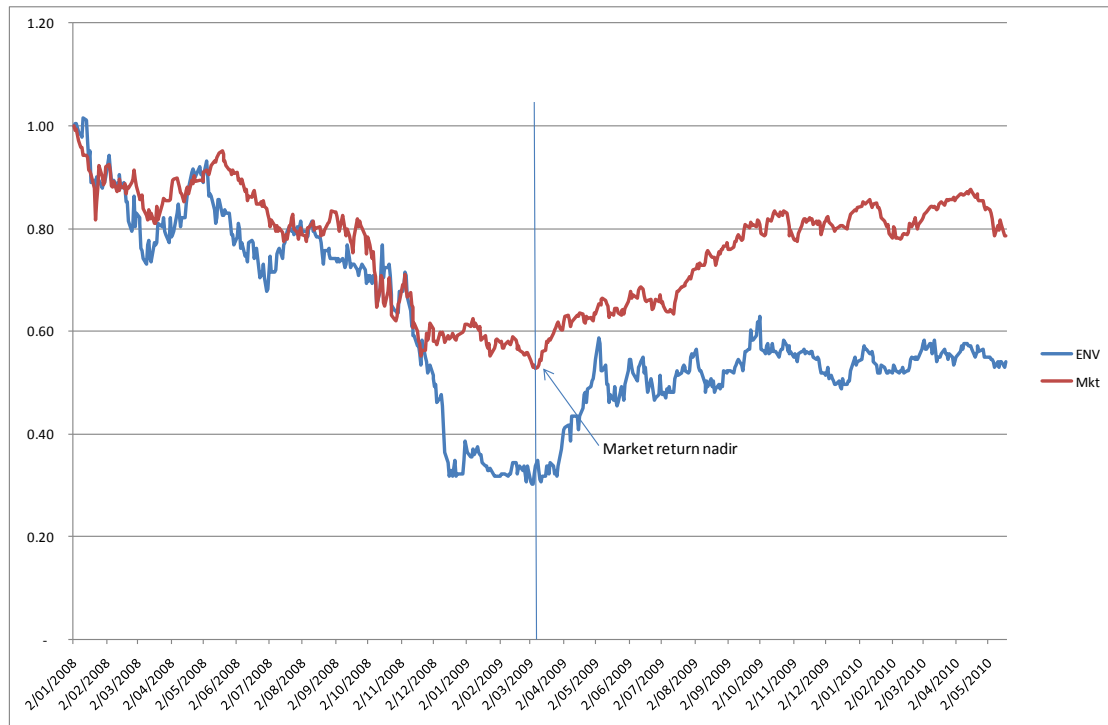
3.5.2.2. Beta and financial crises

88. If one examines the Figure 2 above it is possible to discern clear increases in the market cost of equity in 2009 and late 2011. This is associated with even more dramatic increases/decreases in the MRP/risk-free rate. The factors driving this were the global financial crisis of 2009 and the (not unrelated) European sovereign debt crisis of 2011.
89. One might reasonably ask whether the value of the forward-looking beta for a firm would also be affected by these events in predictable ways. The answer is that it almost certainly would. For example, take the beta of financial stocks. In a period of financial crisis it is financial stocks that tend to have the largest swings in value. Moreover, in a financial crisis these swings in value have a high correlation with the market portfolio (in a financial crisis good/bad news for the financial sector is generally good/bad news for the market).



90. It follows that we expect financial stocks to have higher betas in a financial crisis than in normal periods. This is intuitively obvious. In a financial crisis financial stocks are particularly high risk relative to the market. However, if we were regulating financial stocks and adopted a prescribed value for beta then we would be unable to reflect that higher risk in a higher allowed return.
91. This example illustrates the general principle that relative risk (beta) is not constant and depends on prevailing conditions in the market for funds. There remains the specific consideration of the beta for regulated energy infrastructure monopolies. Can this be expected to vary in a predictable manner?
92. The answer is clearly that it can. Take the above example of a financial crisis. A financial crisis involves a market circumstance where particular kinds of shocks are more likely than normal. One such shock is a reduction in liquidity in credit markets 'freezing of credit markets'.
93. Regulated energy businesses are, and are modelled by the AER to be, highly geared in order to take advantage of relatively stable business cash-flows and tax advantages associated with gearing. However, this high level of gearing exposes these businesses to refinancing risks associated with a reduction in liquidity in credit markets. If it is feared that the regulated businesses will be unable to refinance debt on reasonable terms then they can quickly become insolvent – with the effect that debtors take control of the company and equity holders see a material destruction in, potential elimination of, the value of their claims.
94. By way of illustration, consider Figure 3 below showing Envestra's (a pure gas distribution owner) stock price performance relative to the market over the worst of the global financial crisis (GFC). Envestra's stock price performed materially worse than the overall market in the lead up to the worst of the crisis and then rebounded better than the overall market as the crisis eased (Envestra's share price more than doubled between its lowest level on 4 March 2009 and 1 October 2009 before falling below this peak again). Rather than protecting an investor against the systemic shock element of the GFC, holding Envestra stock would actually have amplified the shock.

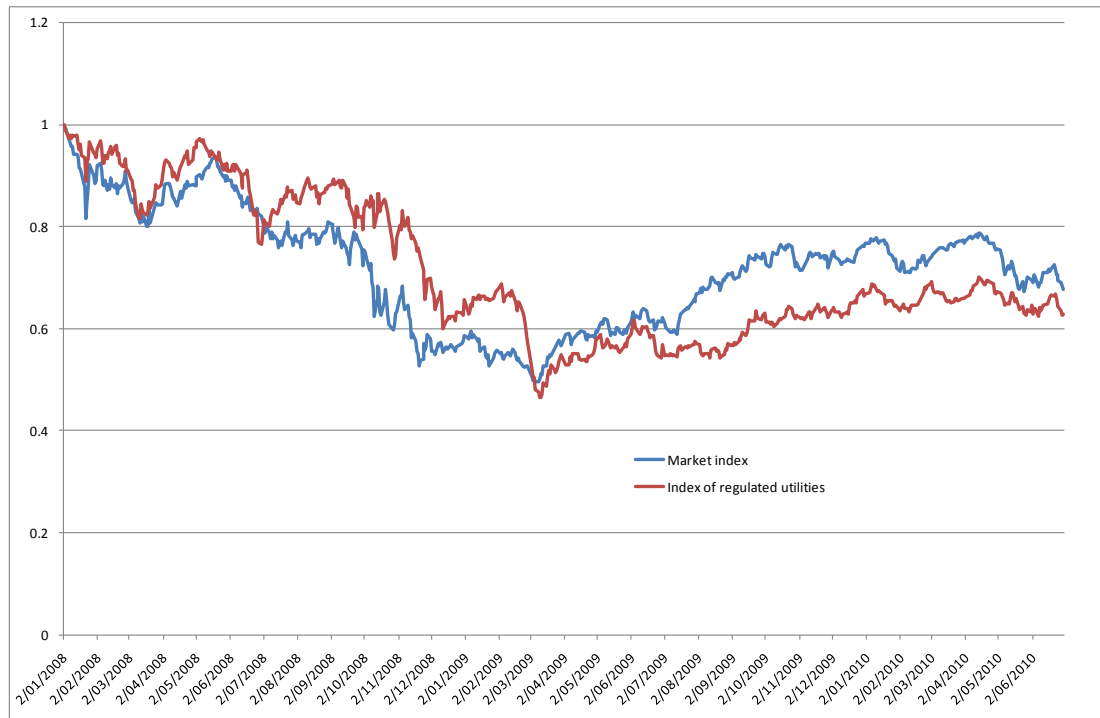
Figure 3: Envestra and market returns from 2 January 2008



Source: Bloomberg and CEG analysis

95. The experience described and illustrated above was not unique to Envestra. The chart below compares the return on an index of regulated utilities versus the return on the ASX 200. It can be seen that the regulated utilities, on average, perform worse over the crisis than the ASX200.

Figure 4: Aus regulated utility stocks vs. ASX200 from 2 January 2008



Source: Bloomberg and CEG analysis. The 6 Australian stocks included in the index of regulated businesses are ENV, HDF, APA, DUET, SKI and SPN.

96. Even if the evidence presented above does not demonstrate unambiguously heightened relative risk (beta) for regulated utilities in the context of the GFC, it certainly does demonstrate the practical potential for this.

3.5.3. Conclusion

97. There is clear evidence that the MRP, risk-free rate and beta depend on prevailing conditions in the market for funds and, in particular, the types and magnitudes of shocks that investors perceive as most likely to affect stock markets in the future. Given the unstable and interdependent nature of these parameters there is a significant risk that prescribing a value for one or more of them will give rise to inaccurate and perverse results by:

- failing to reflect relevant information in the estimate of the fixed parameter; or
- updating the other parameters with the effect that the estimated cost of equity moves in the wrong direction, e.g., as could be the case with:
 - a fixed MRP and falling risk-free rates during a financial crisis; or
 - a fixed beta and a rising MRP during a commodities boom.



3.6. Should other assumptions be fixed

98. In addition to the parameters of the CAPM the other assumptions that feed into the WACC estimate are:

- the assumed benchmark percentage of assets financed by debt (gearing);
- the assumed benchmark composition of the debt portfolio (e.g. average maturity, fixed versus floating debt, use of callable debt, domestic versus foreign issued debt etc.);
- the assumed credit rating – which should be dependent on the above and the cost of equity allowance provided; and
- other assumptions used in estimating the cost of debt based on these benchmark assumptions (as discussed in answer to section 31).

3.6.1. Interactions with the estimation of equity beta

99. The benchmark assumptions regarding gearing and composition of debt portfolio are critical to the assumed value of the equity beta and, therefore, the cost of equity.

100. In order to understand why this is the case, note that the total (fundamental or asset beta) amount of risk in a firm is fixed at any point in time. Financing decisions cannot alter this fundamental risk - they can only package up the risk in different ways to different investors. To the extent that those financing decisions offer low risk investments to one class of investors then it must be the case that the average risk exposure of other investors is raised.

101. This is why higher levels of debt funding raise the cost of equity. Debt investors require a lower return than equity investors because debt is lower risk than equity. However, issuing more low risk debt does not reduce the WACC – it simply concentrates the fundamental risk associated with the remaining equity. This is why higher gearing is associated with a higher cost of equity.

102. Precisely the same logic applies to issuing different types of debt. Short maturity debt investors require a lower return than long maturity debt investors because short maturity debt is lower risk than long maturity debt. However, issuing more low risk short term debt does not reduce the WACC – it simply concentrates the fundamental risk associated with the remaining equity.

103. By the same token, issuing other kinds of more expensive debt will tend to lower the cost of equity. For example, callable debt gives the issuer the option to retire debt early at predetermined prices if market conditions or firm specific conditions make this favourable to the equity holders. Having such an option on issued debt tends to raise interest rates to compensate the debt investors for the cost to them of the debt being called. However, the *quid pro quo* is that equity holders retain less risk than if the debt had no callable option.



104. These interactions between the benchmark assumptions in relation to debt strategy and the cost of equity mean that both must be determined jointly. In particular, one cannot alter the assumed benchmark debt strategy without simultaneously altering the estimate of the CAPM equity beta. This means that if the value of beta was to be fixed but the benchmark assumptions in relation to debt strategy were allowed to vary then it is likely that these would become internally inconsistent. This would be true unless, by coincidence, there were other offsetting changes in market circumstances that meant that beta was actually stable despite a change in the benchmark debt financing assumptions.

3.6.2. Stability of debt financing assumptions

105. I consider that it would be less problematic for the benchmark debt financing assumptions to be periodically fixed under the Rules. In my view, the benchmark debt financing assumptions should be based on what is the long-term most efficient debt financing strategy – which is best estimated based on the level and type of debt that businesses have historically raised.
106. The long-term efficient debt financing strategy is, in my view, likely to be very stable and will certainly not change dramatically over short periods of time. It is therefore a potential candidate for a ‘parameter’ or ‘assumption’ that could be fixed between periodic reviews. (I discuss this in more detail in answer to question 32 below.)
107. Moreover, consistency in benchmark debt financing assumptions over time and across regulatory decisions would mean that this important determinant of the beta estimate would be stable. This would mean that, at least as far as this causal factor was concerned, the regulatory approach to estimating beta could be stable as well.
108. Notwithstanding the above, I consider that the Rules should not periodically fix even the benchmark financing assumptions. To the extent that stability of an assumption/methodology is likely to promote the NGO/NEO then the Rules should establish a framework for that stability to evolve overtime.
109. The current NGR, along with merits reviews of decisions, provides a framework for precisely that evolution to occur. This should lead to regulatory stability of assumption/method where that promotes the NGO and not elsewhere. In my view, it is likely that this will lead to stability in assumptions regarding benchmark financing without this needing to be imposed by the AEMC.

3.6.3. Credit rating depends on cost of equity allowed

110. It is important to note that the assumed credit rating should not be determined independently of the allowed cost of equity. The credit rating of the benchmark firm will depend on its cash-flows. A critical component of a regulated businesses cash-flows, and therefore credit rating, will be the allowed compensation for the cost of equity.



111. By way of example, imagine that a regulator determines that the cost of equity for a business has fallen by 25% due to a fall in the risk-free rate and/or a fall in the equity beta. Lowering the compensation for the cost of equity will lower the equity buffer that protects debt investors, other things equal, lower the company's credit rating.
112. It would be a serious error in this context to leave the credit rating unchanged in the face of such a radical change in the compensation for the cost of equity. Fixing the credit rating but leaving the cost of equity free to vary has the potential to lead to such an error.



4. AEMC question 30

Is the benchmark DRP approach likely to overstate the prevailing cost of debt, having regard to the suggestion that the overstatement may be a reflection of shorter maturity debt leading to a higher refinancing risk for NSPs? What weight should be placed on the views of market analysts on the ability of stock market listed NSPs to out-perform their cost of debt allowances?

113. My answers to questions 32 (and, to a lesser extent, questions 31 and 20) already describe why the answer to the first part of this question is “no”, the adoption of a benchmark 10-year term is not overstating the prevailing cost of debt. Summarising the points made in answer to those other questions but which are relevant to answering this question:
- a. Regulated energy network businesses issue debt at maturities of 10 or more years on average. While there was a temporary shift towards the issue of shorter maturities in the wake of the GFC and the effective closure of long-term debt markets, there is no basis for assuming that this will be sustained. Indeed, the evidence is that this is not the case. The average maturity at issue of outstanding debt for both Australian and foreign regulated firms remains in excess of 10 years.
 - b. The closure of the long term bond market is over and there are a large number of long term bonds that have been issued over the last two years.
 - c. The fact that firms issue debt at maturities of 10 or more years on average suggests that this is the lowest cost (most efficient) financing strategy. This is true even though for any given firm, the interest rate on a short-term bond will tend to be lower than the interest rate on a long term bond.
 - d. Short-term debt had a lower interest rate than long-term debt over the period the AER’s gathered the data in Table 7.5 of its submission to the AEMC.¹⁰ This is also true over the extended period we have witnessed regulated utilities in all countries issue long-term debt.
 - e. The evidence that regulated utilities are issuing *some* debt at around 5 years and paying lower interest rates than the regulatory cost of debt is not a sound basis for the conclusion the AER and others draw because:
 - i. it does not demonstrate that a firm issuing all debt at 5 years could achieve those same rates (which is the implicit assumption in the AER’s analysis of the data in Table 7.5). In reality, an important reason why the firms in the AER’s Table 7.5 could issue low interest 5-year debt is because they have previously prudently built a buffer of long-term debt; and
 - ii. it does not capture the higher cost of equity that results from issuing all 5-year debt;

¹⁰ <http://www.aemc.gov.au/Media/docs/AER%20Proposal%20on%20National%20Electricity%20Rules%20-%20Part%20A%20and%20B-d7c78aba-0788-45dd-b2b3-8296acf237ad-0.PDF>



114. In the second part of its question, the AEMC asks what weight should be given to the views of market analysts on the ability of listed NSPs to outperform their cost of debt allowances.
115. In my opinion, it is relevant to consider the views of market analysts, but these should be placed in their proper context. Overall, I consider that the weight that should be given to the views of market analysts is limited.
116. Market analysts provide investment recommendations to clients based on their understanding and predictions of current and future events important to individual firms and the sectors in which they operate. Analysts may be better informed than many investors and may be influential in determining the price on individual stocks. However, market analysts are not regulatory experts nor are they generally experts in finance. Nor are they necessarily expert in collating, processing and understanding debt market information, although their organisations may contain people who have these skills.
117. As such, the views of market analysts need to be considered carefully. Their views on what is (or is not) achievable is not expert advice and cannot always be interpreted as a precise prediction. Analyst reports are more focused on what costs could possibly be achieved by a business in debt raising and not necessarily:
- whether this estimate is consistent with the benchmark debt assumption;
 - why the benchmark debt assumption is made; and
 - the inter-relationship between the benchmark debt assumption and estimates of the cost of debt and equity parameters.
118. This different focus can lead to mistakes in the interpretation of analyst reports. For example, in its recent draft decisions for Aurora and Powerlink, the AER validated its estimates of the DRP using analysts' views about recently achieved debt raisings. However, as I set out in my report for the Victorian gas distribution businesses,¹¹ in using this information it omitted to adjust for either:
- the analyst-reported spreads being expressed as spread to swap, rather than spread to CGS; and
 - the difference in maturity between these reported debt raisings and the benchmark term of 10 years.

¹¹ CEG, Estimating the regulatory debt risk premium for Victorian gas businesses, March 2012.



119. Another example of the different focus of analyst reports is given by a Credit Suisse report issued on 4 November 2011, which notes the increased DRP allowed by the AER, stating that a methodology relying on Bloomberg would have forced it to:¹²

... grant debt margins to the regulated utilities of 469bp versus levels achieved by some BBB-band rated utilities of more like 300bp.

120. However, the figure referred to of 469 basis points was based on analysis in May 2011. At approximately the time of the Credit Suisse report, reliance on Bloomberg resulted in a considerably lower DRP, by my estimate 392 basis points over the period 21 November 2011 to 16 December 2011.¹³ Similarly the comparison point of “more like” 300 basis points is clearly not intended as a firm prediction of the DRP for a 10-year bond issue and may not necessarily be the outcome of a comprehensive survey of bond yields, as I conducted to arrive at my estimate.¹⁴
121. Moreover, I discuss in my response to question 32, just because a business issues *some* debt at lower maturity and a lower interest rate than the regulatory benchmark does not mean that it could issue all of their debt at that maturity and interest rate. Moreover, it does not imply that if it did so, its cost of equity would not be raised by an offsetting amount.
122. Unless analyst reports deal with these issues, relevant to an internally consistent WACC estimate, I do not consider that analyst reports should have a strong bearing on setting the allowed cost of debt. In addition, these reports do not normally provide the type of expert and precise advice that is necessary to inform such an estimate. However, I believe that analyst reports provide information of broad market perceptions that may be informative of general debt market conditions if interpreted in the relevant context.

¹² Credit Suisse, *Regulated Utilities: Sector Review*, 4 November 2011, p. 2

¹³ CEG, *Estimating the regulatory debt risk premium for Victorian gas businesses*, March 2012, section 8.

¹⁴ CEG, *Estimating the regulatory debt risk premium for Victorian gas businesses*, March 2012.



5. AEMC question 32

What evidence is there that the DRP benchmark in the NER may have changed? Would it be appropriate for the regulator to specify the DRP benchmark in any periodic reviews or would it be more appropriate to specify it at the time of the determinations?

123. In my view the correct benchmark financing assumptions should involve the assumption that a benchmark efficient firm issues, on average, debt at maturities of 10 years or more.
124. The empirical evidence confirms that, on average, regulated infrastructure businesses do issue long-term debt (on average at maturities of 10 years or more). It appears true that issues since the GFC have been shorter than 10 years on average and several regulators' have departed from a 10-year benchmark to a shorter term benchmark in light of this. However, this is an inappropriate response to the data. The average term to maturity from issuance of debt is still around 10 years and there is no basis to believe that a year or two of issuing short term debt is evidence that businesses are likely to materially reduce the average term to maturity of debt that they issue. This is discussed in more detail in section 5.1 below.
125. I have not conducted any extensive analysis to assess a potential change to the benchmark credit rating of BBB+. However, in my view this must be determined at the time of each regulatory determination.
126. This is because the assumed credit rating cannot be determined independently of the allowed cost of equity. The credit rating of the benchmark firm will depend on its cash-flows. A critical component of a regulated business' cash-flows, and therefore credit rating, will be the allowed compensation for the cost of equity.
127. By way of example, imagine that a regulator determines that the cost of equity for a business has fallen by 25% due to a fall in the risk-free rate and/or a fall in the equity beta. Lowering the compensation for the cost of equity will lower the equity buffer that protects debt investors, other things equal, lower the company's credit rating.
128. It would be a serious error in this context to leave the credit rating unchanged in the face of such a radical change in the compensation for the cost of equity. Fixing the credit rating but leaving the cost of equity free to vary has the potential to lead to such an error.
129. With respect to the time at which the other benchmark debt financing assumptions should be specified (including gearing and debt maturity and other assumptions about the type of debt issued), I am of the opinion that it would be preferable for these to be determined at the time of each regulatory determination for the reasons provided in section 3.6 in answer to question 30. However, I would expect these benchmark assumptions to be stable over time. Consequently, periodic review is likely to be least problematic with respect to these assumptions.

5.1. Debt term benchmark – recent regulatory precedent

130. The debt term of 10 years was assessed by the AER in its review of electricity transmission and distribution WACC parameters. Whilst a 5-year term (i.e. a term which matches the length of the regulatory period) was considered in the proposed statements¹⁵, the AER established in the final decision that there was not persuasive evidence to depart from a 10 year term¹⁶.
131. As discussed in response question 31 below, IPART utilised a benchmark bond maturity of 5 years in its final reports from May and December 2011.¹⁷ IPART estimated the DRP on this benchmark as the median of the DRP calculated for a sample of observations formed as the 5-year Bloomberg BBB fair value and also considering bonds with at least 2 years to maturity. IPART noted that¹⁸:

We will target a 5-year term to maturity for the debt margin, inflation adjustment and risk-free rate.

132. The ERA in its most recent final decision for DBNGP determined the DRP by looking at shorter term bonds. The ERA took a term-to-maturity weighted average of four scenarios, two scenarios of which included bonds with maturity greater than 2 years, and two scenarios of which included bonds with maturity greater than 5 years.¹⁹

5.2. Correct interpretation where businesses issue some short term debt at less than the regulatory cost of debt

5.2.1. Fallacy of composition

133. The AER and others have pointed to the ability of regulated businesses to issue debt at shorter maturities and at a lower rate than the regulatory DRP based on issuing 10-year debt. It has been argued that this implies that the DRP has been overestimated and the correct benchmark financing assumption should be a shorter maturity.
134. Such a claim is inconsistent with the fundamental basis of modern finance theory as embodied in the Modigliani Miller theorem – as is discussed in subsequent sections.

¹⁵ AER, *Electricity transmission and distribution network service providers – Review of the weighted average cost of capital (WACC) parameters*, December 2008, p. 7

¹⁶ AER, *Final Decision – Electricity transmission and distribution network service providers – Review of the weighted average cost of capital (WACC) parameters*, May 2009, p. xiii

¹⁷ See: IPART, *Developing the approach to estimating the debt margin, Other Industries – Final Decision*, May 2011, pp. 14-15; and IPART, *Review of water prices for Sydney Desalination Plant Pty Limited, Water – Final Report*, December 2011, p. 86

¹⁸ IPART, *Developing the approach to estimating the debt margin, Other Industries – Final Decision*, May 2011, p. 1

¹⁹ ERA, *Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline*, October 2011, p. 141 - 149



135. However, there is a further important source of error in such claims. It is the implicit assumption that:

- the rates at which these businesses are actually able to issue short-term rates given their actual circumstances (which includes a long-term maturity profile prudently built up prior to the GFC);
- are the same rates at which they would hypothetically be able to issue short-term debt *if all of their debt was short term*.

136. This is clearly not true. The shorter the maturity profile of a business's debt the riskier it is to lend to that business. Other things equal, a business with a short-term debt portfolio will tend to have a lower credit rating because the shorter the maturity profile of debt the greater the exposure of the business to the need to refinance debt in poor market conditions.

137. Put simply, observing low interest rates paid by firms issuing *some* short-term debt does not imply that the same firms could achieve those interest rates if they issued *all* of their debt on a short-term basis.

138. Standard & Poors outlines its consideration of this issue in relation to US pipeline businesses' credit ratings:

*"Staggering debt maturities (with excessive short-term debt avoided) prevents refinancing problems."*²⁰

139. In addition, Gopalan, Song and Yerramilli (2010) also conclude along the following lines:

We find that long-term bonds issued by firms that have a higher proportion of their debt maturing within the year trade at higher yield spreads, even after controlling for the firm's credit rating and all other known determinants of yield spreads. All else equal, firms that have a higher proportion of their debt maturing within the year are also more likely to experience deterioration in their credit quality, as measured by their propensity to experience multi-notch rating downgrades. This effect is present in both small and large firms, in both investment-grade and below investment-grade firms, is stronger when the firm's fundamentals are weaker and when credit market conditions are tougher, and is robust to instrumenting for the proportion of short-maturity debt. Our results are broadly consistent with theories that argue that short-maturity debt exposes the firm to rollover risk, which increases the firm's overall credit risk. Our results also highlight that credit ratings do not adequately account for rollover risk, which

²⁰ S&P, Criteria | Corporates | Industrials: Rating Criteria For U.S. Midstream Energy Companies. Available at: <http://www.standardandpoors.com/prof/ratings/articles/en/us/?articleType=HTML&assetID=1245324609677>



*may explain their failure to predict the collapse of firms like Bear Stearns and Lehman Brothers that had high exposures to rollover risk.*²¹

140. The higher the proportion of debt falling due in the short term the higher the interest rates on all of their debt (including long-term debt). Of course, the more a firm issues short-term debt the more debt that will, on average, be falling due in the near term. This means that the cost of issuing short-term debt, even if it is only part of a firm's debt portfolio, needs to include higher interest rates paid on longer term debt.
141. This is consistent with the evidence I submitted in my December 2011 report submitted to the AEMC²² describing why firms in the AER sample would issue longer term debt even though the interest rate on that debt was higher than on short-term debt issued simultaneously.
142. In summary, even before considering the Modigliani-Miller theorem and the impact on the cost of equity as discussed below, one cannot simply compare the interest rate paid by regulated businesses on short-term debt with the 10-year benchmark interest rate because:
 - the interest rate paid on short-term debt when issuing some short-term debt is not the same as the interest rate paid on short-term debt when issuing all debt at this maturity; and
 - the cost of issuing *some* short-term debt needs to include the cost of higher interest rates on long-term debt.
143. In order to illustrate that these are not idle theoretical issues consider Figure 3 above. Envestra's share price fell during the GFC based primarily on refinancing fears. This is despite Envestra having a very long average maturity at issue (well in excess of 10 years). If Envestra had, instead, an average maturity at issue of 5 years then it must be a realistic possibility that Envestra would not have been able to refinance its debt during the GFC.
144. Put another way, had regulated businesses not prudently issued long-term debt prior to the GFC they may not have survived the GFC. The fact that they were able to issue some debt, even though it was short-term debt, in the wake of the GFC is testimony to the prudence of issuing on long-term debt on average. The fact that the exact opposite conclusion is being drawn from the experience of the GFC (i.e. that it is efficient to issue short-term debt) is surprising. After all, as Gopalan *et al* state in the quote above, it was the very short-term debt strategies pursued by Bear Sterns and Lehman Brothers that led to their collapse and which, in the case of Lehman Brothers, signalled the beginning of the worst of the crisis.

²¹ Gopalan, Radhakrishnan, Song, Fenghua and Yerramilli, Vijay, Debt Maturity Structure and Credit Quality (August 17, 2010). Available at SSRN: <http://ssrn.com/abstract=1495849> or <http://dx.doi.org/10.2139/ssrn.1495849>

²² CEG, *Critique of AER Rule change proposal – A report for ETSA Utilities, Powercor and Citipower*, December 2011



5.2.2. Modigliani-Miller in frictionless financial markets

145. Ultimately, the Modigliani-Miller theorem suggests (under strict assumptions) that adopting one term or the other won't change the overall cost of capital. A lower WACC estimated using a shorter, for example 5-year, term is illusory because it does not capture the shifting of risk from debt holders to equity holders to the extent that it is estimated using an equity beta estimated over companies that predominantly issue 10-year debt.
146. It may well be the case that by assuming that regulated businesses issue 5-year instead of 10-year bonds, the estimated cost of debt for the regulated businesses will be reduced because interest costs on 5-year bonds are lower than interest costs of 10-year bonds. This, in itself, is not necessarily an error. The error exists if one fails to analyse what this implies about the cost of equity.
147. Modigliani and Miller demonstrated that the level of risk in a firm is like the amount of air in a balloon. If one squeezes risk out of one area (e.g. debt) then the risk simply moves to another (i.e. equity). Issuing short-term debt may lower the cost of debt but it does so precisely because it lowers the amount of risk that debt providers have to bear. The corollary of this, however, is that the equity providers have to bear higher risk (i.e. the risk that was previously passed onto debt providers is now retained in the business for equity holders).
148. Miller, 33 years after his seminal paper with Modigliani has used a similar analogy. Miller states:²³

Think of the firm as a gigantic tub of whole milk. The farmer can sell the whole milk as it is. Or he can separate out the cream, and sell it at a considerably higher price than the whole milk would bring. (Selling cream is the analog of a firm selling debt securities, which pay a contractual return.) But, of course, what the farmer would have left would be skim milk, with low butter-fat content, and that would sell for much less than whole milk. (Skim milk corresponds to the levered equity.) The Modigliani-Miller proposition says that if there were no cost of separation (and, of course, no government dairy support program), the cream plus the skim milk would bring the same price as the whole milk.

149. In this quote Miller notes that issuing low risk debt securities is analogous to a farmer separating out cream from whole milk. The firm gets a good price (low interest rate) for its debt but the corollary is that the equity it is left with is less desirable (requires a higher return to attract investors).
150. Assuming efficient financial markets and zero transaction costs (as are assumed in the derivation of the CAPM model) Modigliani and Miller demonstrated that the net effect

²³ Miller, *Financial Innovations and Market Volatility*, 1991, Blackwell Publishing, Cambridge, p. 269.



on the weighted average cost of capital will be zero – with the higher cost of equity offsetting the lower cost of debt. Modigliani and Miller effectively described the “law of the conservation of risk” that is analogous to the “law of conservation of energy” in the physical sciences.

151. A further conclusion that flowed from Modigliani and Miller was that, if financial markets are perfectly efficient with zero transaction costs, then no debt raising strategy will dominate any other debt raising strategy. All strategies, from issuing very short-term debt to issuing very long-term debt, will result in the same weighted average cost of capital (WACC). This means, other things equal, if one were to assume a benchmark regulated utility issued 5-year debt then such a utility would need to have a higher cost of equity than is assumed for a benchmark regulated utility issuing 10 year debt.
152. When similar analysis was put before the AER the AER accepted that it would be incorrect to simply assume that firms could issue 5-year debt at a lower interest rate cost without simultaneously increasing the cost of equity. The quote below from the AER’s Final Statement of Regulatory Intent provides a summary of its considerations on conclusions drawn from the Modigliani-Miller theorem:²⁴

The JIA’s consultant CEG argues that a focus on the cost of debt in setting the term of the risk-free rate is inappropriate as it violates a fundamental principle of asset pricing theory – that the value of an asset is determined independently of the way in which it is funded. CEG states that:

...one gains the impression that the AER believes that it is efficient to issue short term debt (which has lower interest rates) provided that the transaction costs of issuing short term debt are not higher by an offsetting amount.

We do not agree with this. The principle of conservation of risk suggests that any lower interest rates available from issuing short term debt will be fully offset by a higher cost of equity – this is known as the Modigliani-Miller theorem.

In the AER’s view, CEG correctly observes that the impact of current debt financing practices on interest rate risk should already be reflected in empirical equity beta estimates.

153. The AER goes on to state that their intention was only to estimate the cost of debt based on what businesses actually do. Having been convinced that businesses actually do issue 10-year debt (as discussed at section 5.3 above) the AER concluded that it would set the cost of debt based on what businesses actually do.

²⁴ AER, *Final Decision: Electricity transmission and distribution network service providers. Review of the weighted average cost of capital (WACC) parameters*, May 2009, p. 149



5.2.3. Modigliani-Miller financial markets with frictions

154. On the basis of the Modigliani-Miller theorem then, in frictionless financial markets, capital structure simply does not matter. As a result, we would expect to see very similar firms having a great variety of capital structures (some with short term debt and some with long-term debt, some with high gearing and others with low gearing etc).
155. By contrast, if we observe that, in the real world, there is a dominant debt raising strategy, such as issuing long-term debt; then Modigliani and Miller demonstrated that this must be because transaction costs are positive (financial markets are less than perfect). If we observe a dominant strategy of issuing long-term debt then this must be because there are advantages to issuing long term debt, such as lessening exposure to refinance risk and potential insolvency and bankruptcy transaction costs.
156. These advantages must more than fully offset the advantages of gaining a lower interest rate by issuing short-term debt. That is, if issuing long-term debt is a dominant strategy for particular kinds of businesses then it must be the case that issuing short-term debt not only does not reduce the WACC but actually raises the WACC (i.e. is less efficient than issuing long-term debt). That is, it must be that the cost of equity increases by more than the cost of debt reduces when short-term debt is issued – otherwise long term debt issuance would not be the dominant observed debt issuance strategy.
157. This suggests that it is important to look at what businesses actually do. When we do this we conclude that businesses with long lived sunk assets of the nature of regulated businesses have, historically, a very strong tendency to issue debt at maturities of 10 years or longer.

5.2.4. Summary

158. The fact that some businesses have recently issued some debt at lower maturities and lower interest rates than the 10-year BBB+ benchmark interest rate provides no basis for altering the 10-year term benchmark. In order to justify a shortening of the term to 5 years it would be necessary to demonstrate that:
 - businesses can issue *all* of their debt at 5 years at a materially lower interest rate than the 10-year benchmark interest rate; and
 - that any lower interest rate achieved (if it could be achieved) would not be fully (or more than fully) offset by a higher cost of equity.
159. No analysis has been produced to suggest that this is the case. Indeed, those who imply that there is some regulatory failure because businesses have issued *some* debt at a lower term/interest rate than 10 years have not even acknowledged the issues I raise above let alone attempt to address them in any systematic way.



160. In my view, the only compelling evidence for a change in the benchmark term assumption would be if we observed the outstanding debt portfolios for regulated businesses average term to maturity of debt falling materially below 10 years and being maintained at those levels. We have not observed this and the empirical evidence that I present in the next section strongly suggests that this is not happening.

5.3. Empirical evidence on the term of debt of regulated businesses

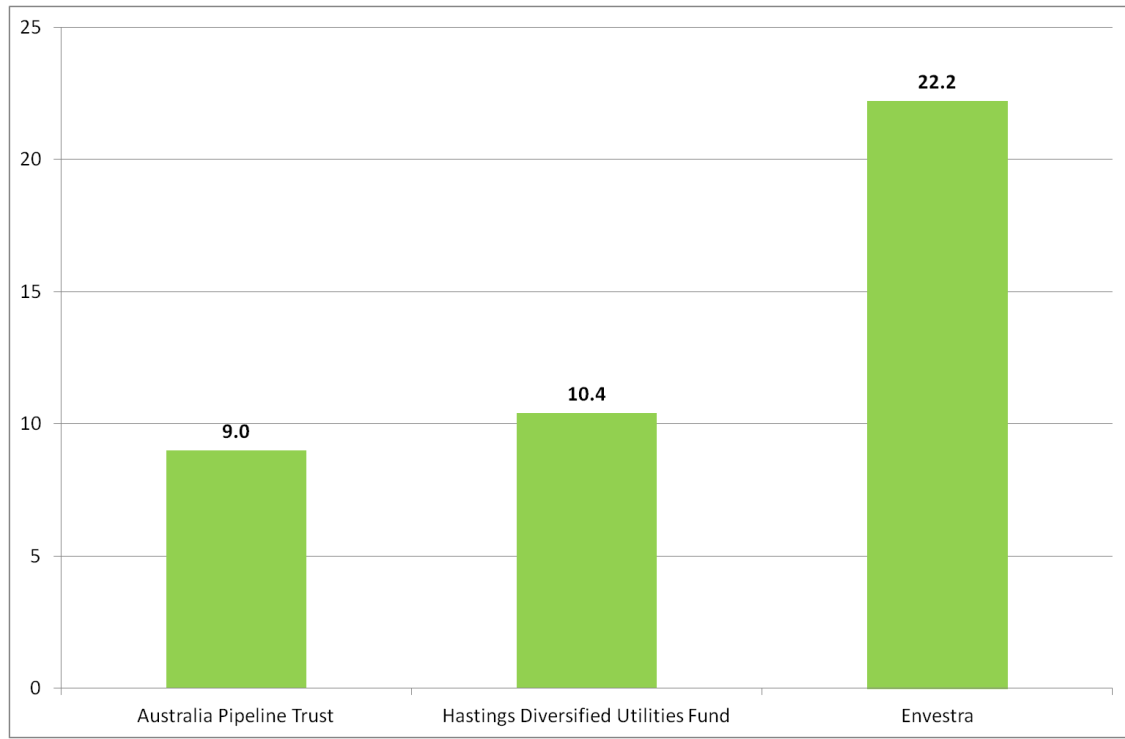
5.3.1. Average debt tenor in Australia

161. CEG has previously estimated that, prior to the GFC, the average term to maturity of debt at issuance issued by private regulated energy businesses in Australia was over 10 years. This was based on a Deloitte report to the AER. Deloitte derived the underlying data from financial statements of the businesses. I most recently presented this evidence in my December 2011 report submitted to the AEMC²⁵.
162. In addition, I have estimated the debt tenor for three Australian utilities companies, being Envestra, APA Group and HDF in 2010 by way of reviewing their annual reports. Envestra and APA Group specifically state the average debt tenor. I have estimated the average tenor for HDF using information published by the business relating to its proposed debt structure, and assuming that, on average, the debt is half way between the issuance and maturity date. Information for the businesses evidencing the weighted average debt maturity is summarised in Figure 5 and Table 1 below.

²⁵ CEG, *Critique of AER Rule change proposal – A report for ETSA Utilities, Powercor and Citipower*, December 2011



Figure 5: Average debt tenor for Australian utilities companies



Source: 2010 Annual reports, CEG analysis

163. My approach for arriving at the estimate for each company is outlined in Table 1 below.



Table 1: Average debt tenor for Australian utilities companies

Company	Tenor (years)	Maturity (years)	Justification
Envestra	22.2	11.1	The Envestra 2010 Annual Report states that the debt maturity profile shows an average maturity at 1 July 2010 of 11.1 years. ²⁶
APA Group	9	4.5	The APT annual report states that at 30 June 2011, APT's debt portfolio has a spread of maturities extending out to 2022, with an average maturity of 4.5 years. ²⁷
Hastings Diversified Utilities Fund (HDF)	10.4	5.2	The Hastings Diversified Utilities Fund 2011 Half Year Results proposed the following debt structure following expected March end financial close. Based on this proposed capital debt structure we have calculated weighted average maturity as 5.2 years. ²⁸

5.3.1.1. Average debt tenor in the United Kingdom

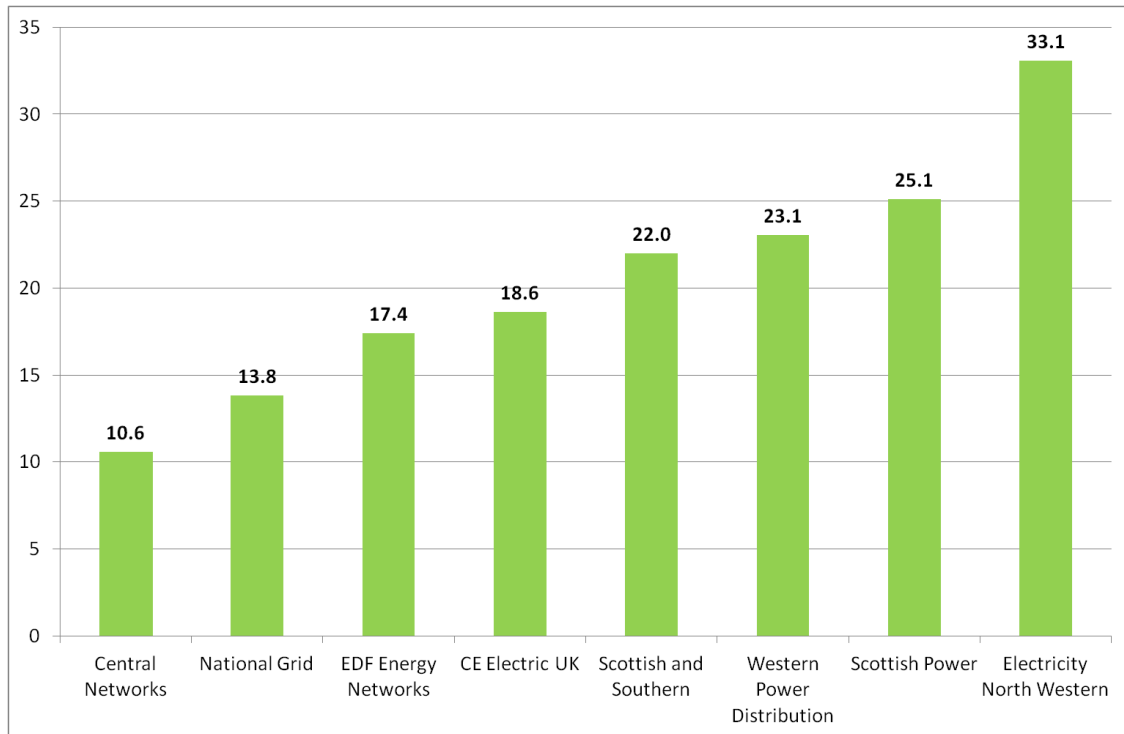
164. CEG also assessed the average tenor for electricity companies in the United Kingdom, including National Grid, CE Electric UK, Central Networks, EDF Energy Networks, Scottish Power, Scottish and Southern Energy plc, Electricity North West and Western Power Distribution. The results of this assessment are presented in Figure 6 below.

²⁶ Envestra Annual Report 2011, p. 104

²⁷ APA Group Annual Report 2011, p. 4

²⁸ Hastings Diversified Utilities Fund Results Presentation for the year ended 31 December 2011, p. 13

Figure 6: Average debt tenor for United Kingdom utilities companies



Source: Annual reports, CEG analysis

165. The approach for arriving at the estimate for each company is outlined in Table 2 below.

Table 2: Average debt tenor for Australian utilities companies

Company	Tenor (years)	Maturity (years)	Justification
National Grid	14	7	The National Grid 2009/10 Annual Report and Accounts divides borrowings into six categories (maturing in less than one year, 1 – 2 years, 2 – 3 years, 4 – 5 years and 5+ years). Based on this, we calculate an average weighted maturity of at a minimum 4.2 years and as a best estimate 7 years (if the average maturity of debt for 5+ years is 10 years). ²⁹
CE Electric UK	18.6	9.3	The CE Electric UK Reports & Accounts divides borrowings into two categories, maturing in one year or less, and maturing in 5+ years. Based on this, we calculate an average weighted maturity of at a minimum 4.7 years and as a best estimate 9.3 years (if the average maturity of debt for 5+ years is 10 years). ³⁰
Central Networks	10.6	5.3	The E.ON UK Plc Annual Report and Accounts for the year ended 31 December 2009 divides the non-current borrowings into maturing in 1-2 years, 2-5 years and 5+ years. Based on this, we calculate an average weighted maturity of at a minimum 3.3 years and as a best estimate 5.3 years (if the average maturity for debt for 5+ years is 10 years). ³¹
EDF Energy Networks	17.4	8.7	EDF Energy Annual Report and Financial Statements for 31 December 2009 states the maturity date for all non-current borrowings. Based on this, we have calculated a weighted average maturity of 8.7 years. ³²
Scottish Power	25.2	12.6	The SP Distribution Limited Corporate Report & Regulatory Accounts for the year ended 31 March 2010 divides the non-current loans and other borrowings by instrument with maturity date. Based on this, we calculate the average maturity as 12.6 years. ³³
Scottish and Southern Energy plc	22	11	The Scottish and Southern Energy plc Financial Report for the year ending 31 March 2010 states that the average debt maturity is 11 years. ³⁴

²⁹ National Grid Annual Report and Accounts 2009/10, p. 145

³⁰ CE Electric Funding Company Report & Accounts to 31 December 2009, p. 76

³¹ E.ON UK Annual Report and Accounts 2009, p. 89

³² EDF Energy Annual Report and Financial Statements 31 December 2009, p. 52.

³³ SP Distribution Limited Corporate Report & Regulatory Accounts, p. 23.

³⁴ Scottish and Southern Energy Financial Report for the year to 31 March 2010, p. 12.



Company	Tenor (years)	Maturity (years)	Justification
Electricity North West	33	16.5	The Electricity North West Limited Annual Report and Consolidated Financial Statements for the year ended 31 March 2010 divided the non-current borrowings by instrument. Based on this we calculate the average maturity as 16.5 years. ³⁵
Western Power Distribution	23	11.5	The Western Power Distribution Holdings Limited and Subsidiary Undertakings annual report and financial statements for the year ended 31 March 2010 divides borrowings maturity into four categories (less than one year, one to 5 years, 5 – 15 years and greater than 15 years). Based on this, we calculate weighted average debt maturity as 11.5 years. ³⁶

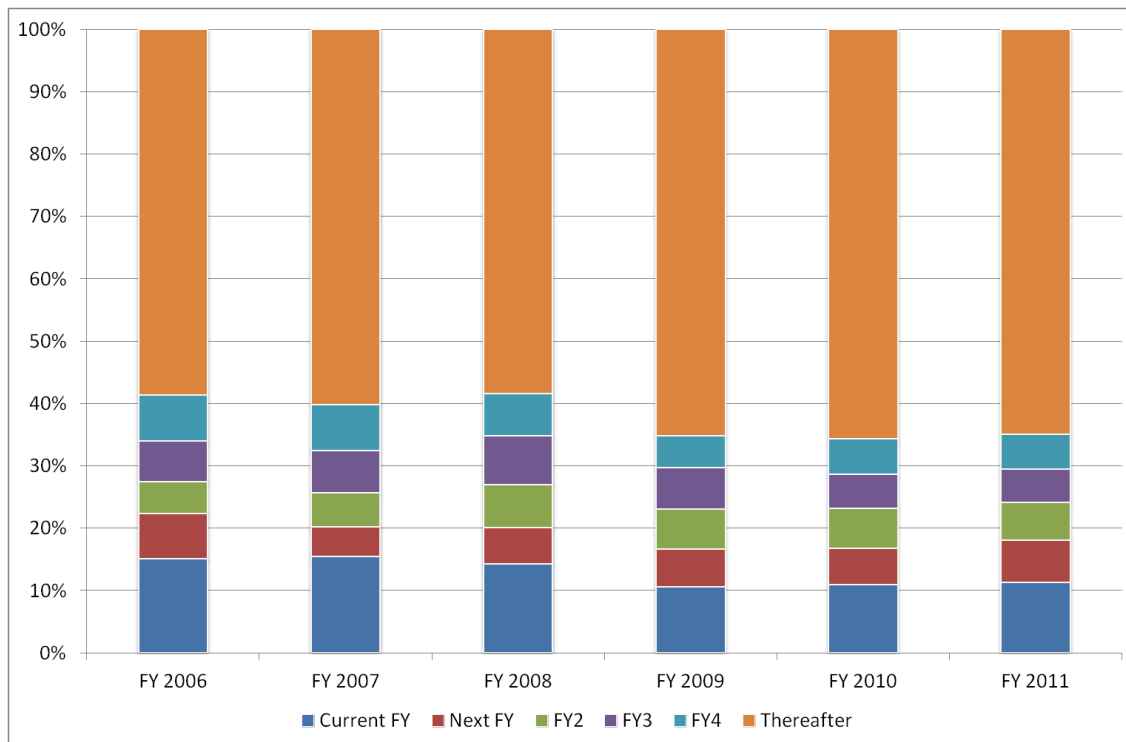
5.3.1.2. Average debt tenor in the United States

166. CEG has previously reviewed the weighted average tenor for listed electric and gas utilities in the United States, compiled from the database SNL Financial. SNL Financial directly reports the tenor of all debt issued by the respective companies. The average (median) weighted average debt tenor for these firms (in 2010) was 17.0 (17.4) years. The minimum weighted average debt tenor was 6.0 years and the maximum 27.1 years.
167. I have confirmed that the debt maturity profile has remained stable over time by compiling a time series from 2006 to 2011 of debt maturing in the current financial year, next financial year, each of the next three financial years and thereafter. This time series is based on a sample of 71 power and gas utilities in the United States for which a debt maturity profile is available from SNL financial. The weighted average debt maturity profile for this sample of firms is illustrated in Figure 7 below.

³⁵ Electricity North West Limited Statutory Account 2010 March, p. 52.

³⁶ Western Power Distribution Holdings Limited and Subsidiary Undertakings Annual Report and Financial Statements, p. 51.

Figure 7: Weighted average debt maturity profile for electric and gas utilities in the United States



Source: SNL Financial, CEG analysis

5.3.2. Debt issues by Australian companies since the GFC

168. Whilst it may be the case that there were no long-term debt issues in the immediate aftermath of the GFC. However, both theory and evidence suggests this does not signify a long term trend. Rather, the empirical evidence shows that Australian firms are returning to issuing long-term debt.
169. Table 3 below summarises bonds issued since the beginning of 2010 in Australia in Australian dollars, with a term of more than 7 years and rated between BBB and A- by Standard and Poor's. The information presented in this table clearly indicates that the 10-year bond market is 'open for business' - and that several firms, including infrastructure firms, are choosing to issue long-term debt.
170. A similar trend is also evidenced in the overseas bond markets, where Australian companies are issuing long-term debt in foreign currencies. This is illustrated in Table 4 which summarises bonds issued since the beginning of 2010 in Australia in *currencies other than the Australian dollar*, with a term of more than 7 years and rated between BBB and A- by Standard and Poor's.

Table 3: Long-term debt issued by Australian firms in Australian dollars (rated A- to BBB)

Issuer	ISIN Number	Crncy	S&P Rating	Issue Date	Maturity	Term
ANZ	AU0000ANZHA6	AUD	A-	3/04/2012	20/06/2022	10.2
Colonial	AU0000CNGHA2	AUD	BBB+	29/03/2012	31/03/2037	25.0
Wesfarmers	AU3CB0192128	AUD	A-	28/03/2012	28/03/2019	7.0
Woolworths	AU3CB0191815	AUD	A-	21/03/2012	21/03/2019	7.0
GPT	AU3CB0189009	AUD	A-	24/01/2012	24/01/2019	7.0
Caltex	AU3CB0186385	AUD	BBB+	23/11/2011	23/11/2018	7.0
Coca Cola	XS0680309191	AUD	A-	27/09/2011	27/09/2021	10.0
Sydney Airport	AU3CB0176485	AUD	BBB	25/05/2011	6/07/2018	7.1
Brisbane Airport	AU3CB0173201	AUD	BBB	4/04/2011	9/07/2019	8.3
SPI E&G	AU3CB0173482	AUD	A-	1/04/2011	1/04/2021	10.0
AMP	XS0608173679	AUD	A-	28/03/2011	26/03/2021	10.0
BaA Bank	AU3FN0012340	AUD	BBB+	15/12/2010	15/12/2020	10.0
Stockland	AU3CB0164820	AUD	A-	25/11/2010	25/11/2020	10.0
APT Pipelines	AU3CB0155133	AUD	BBB	22/07/2010	22/07/2020	10.0
Dexus Finance	AU3CB0147833	AUD	BBB+	21/04/2010	21/04/2017	7.0
SPI E&G	AU3CB0145696	AUD	A-	25/03/2010	25/09/2017	7.5
BaA Bank	AU3FN0009973	AUD	BBB+	13/01/2010	13/01/2020	10.0

Source: Bloomberg, CEG analysis

Table 4: Long term debt issued by Australian firms in currencies other than AUD

Issuer	ISIN Number	Crncy	S&P Rating	Issue Date	Maturity	Term
Goodman	US38239FAE97	USD	BBB	22/03/2012	22/03/2022	10.0
Goodman	USQ4229FAC97	USD	BBB	22/03/2012	22/03/2022	10.0
Transurban	CA89400PAD56	CAD	A-	6/03/2012	6/03/2019	7.0
Insurance AU	NZIAGDT002C5	NZD	A-	15/12/2011	15/12/2036	25.0
SPI E&G	XS0715702824	HKD	A-	13/12/2011	13/12/2021	10.0
Newcrest	US65120FAB04	USD	BBB+	15/11/2011	15/11/2041	30.0
Newcrest	USQ66511AB43	USD	BBB+	15/11/2011	15/11/2041	30.0
Newcrest	US65120FAA21	USD	BBB+	15/11/2011	15/11/2021	10.0
Newcrest	USQ66511AA69	USD	BBB+	15/11/2011	15/11/2021	10.0
Origin Energy	USQ7162LAA28	USD	BBB+	14/10/2011	14/10/2021	10.0
Origin Energy	US68620YAA01	USD	BBB+	14/10/2011	14/10/2021	10.0
Rio Tinto	US767201AQ92	USD	A-	19/09/2011	20/09/2021	10.0
Sydney Airport	CA87124VAC33	CAD	BBB	21/06/2011	27/07/2018	7.1
Rio Tinto	US767201AN61	USD	A-	20/05/2011	20/05/2021	10.0
Woodside	US980236AL79	USD	BBB+	10/05/2011	10/05/2021	10.0
Woodside	USQ98229AG44	USD	BBB+	10/05/2011	10/05/2021	10.0

Woolworths	US980888AF86	USD	A-	12/04/2011	12/04/2021	10.0
Woolworths	USQ98418AK49	USD	A-	12/04/2011	12/04/2021	10.0
Macquarie Bk	US55608XAA54	USD	BBB	7/04/2011	7/04/2021	10.0
Macquarie Bk	US55608YAA38	USD	BBB	7/04/2011	7/04/2021	10.0
Goodman	US38239FAC32	USD	BBB	31/03/2011	15/04/2021	10.0
Goodman	USQ4229FAB15	USD	BBB	31/03/2011	15/04/2021	10.0
Dexus	USQ3200PAB42	USD	BBB+	17/03/2011	15/03/2021	10.0
Dexus	US252391AB35	USD	BBB+	17/03/2011	15/03/2021	10.0
Amcor	XS0604462704	EUR	BBB	16/03/2011	16/04/2019	8.1
SPI Australia	XS0589885960	GBP	A-	11/02/2011	11/02/2021	10.0
Macquarie Gr.	US55608JAE82	USD	BBB	14/01/2011	14/01/2021	10.0
Macquarie Gr.	US55608KAD72	USD	BBB	14/01/2011	14/01/2021	10.0
Goodman	USQ4229FAA32	USD	BBB	12/11/2010	12/11/2020	10.0
Goodman	US38239FAA75	USD	BBB	12/11/2010	12/11/2020	10.0
Rio Tinto	US767201AL06	USD	A-	2/11/2010	2/11/2040	30.0
Rio Tinto	US767201AK23	USD	A-	2/11/2010	2/11/2020	10.0
Sydney Airport	US87124VAA70	USD	BBB	7/10/2010	22/02/2021	10.4
Sydney Airport	USQ8809VAA72	USD	BBB	7/10/2010	22/02/2021	10.4
Woolworths	US980888AD39	USD	A-	22/09/2010	22/09/2020	10.0
Woolworths	USQ98418AH10	USD	A-	22/09/2010	22/09/2020	10.0
Macquarie Bk	XS0543111768	EUR	BBB	21/09/2010	21/09/2020	10.0
Macquarie Gr.	US55608JAD00	USD	BBB	10/08/2010	10/08/2017	7.0
Macquarie Gr.	US55608KAC99	USD	BBB	10/08/2010	10/08/2017	7.0
SPI E&G	XS0494132540	HKD	A-	16/03/2010	16/03/2020	10.0
NAB	XS0485326085	EUR	A-	10/02/2010	10/02/2020	10.0
Macquarie Gr.	US55608KAB17	USD	BBB	14/01/2010	14/01/2020	10.0
Macquarie Gr.	US55608JAC27	USD	BBB	14/01/2010	14/01/2020	10.0

Source: Bloomberg, CEG analysis

5.3.3. Summary

171. While there was a period in the immediate aftermath of the GFC where the Australian long term debt market effectively 'closed' this is no longer the case. Moreover, despite this temporary closure the average tenor of debt issued by Australian and foreign regulated businesses remains at 10 or more years to maturity.

5.4. Debt credit rating benchmark

172. I have not conducted any extensive analysis in regards to the benchmark credit rating. However, I note that recent regulatory return on equity decisions have set much lower compensation for the cost of equity. Other things equal, this should have been (but was not) associated with a lower credit rating. This is because the smaller the allowed cost of equity the smaller the equity buffer supporting credit ratings.



173. In the case of AER electricity decisions, the failure to adjust the credit rating despite much lower cost of equity allowances may be because the NER allows the credit rating to be 'fixed' in the Statement of Regulatory Intent (albeit subject to a 'persuasive evidence' test for DNSPs).



6. AEMC question 31

What are the pros and cons of the recent approaches taken by IPART and the ERA in estimating the DRP?

6.1. IPART's approach

174. IPART utilises a benchmark bond of BBB/BBB+ and maturity of 5 years.³⁷ It estimates the DRP on this benchmark as the median of the DRP calculated for a sample of observations formed as the 5-year Bloomberg BBB fair value and also considering bonds:³⁸
- that are issued by Australian firms in either Australian or United States dollars;
 - that have at least 2 years to maturity;
 - that are rated BBB or BBB+ with Standard & Poor's;
 - that are fixed rate only, unwrapped and with no embedded options;
 - for which the issuing company is unaffected by factors such as M&A activity; and
 - for which prices are available from Bloomberg.
175. In the application of this methodology to Sydney Desalination Plant, IPART formed a sample consisting of the 5-year Bloomberg BBB fair value estimate, 11 Australian dollar bonds and 4 United States dollar bonds.³⁹
176. The median DRP from this sample of 16 observations was 331.5 basis points (being the midpoint between a Sydney Airport bond at 328 basis points and a Leaseplan bond at 335 basis points), to which IPART subsequently added a 20 basis point allowance for debt raising costs.

6.1.1. Choice of benchmark

177. In my view IPART's choice of a 5-year term for the DRP is a significant defect in its approach. In reaching its conclusion that a 5-year term is appropriate, it accepts evidence and arguments that in my view have demonstrably been proved incorrect and unreasonable.

³⁷ See: IPART, *Developing the approach to estimating the debt margin, Other Industries – Final Decision*, May 2011, pp. 14-15; and IPART, *Review of water prices for Sydney Desalination Plant Pty Limited, Water – Final Report*, December 2011, p. 86

³⁸ As summarised at IPART, *Developing the approach to estimating the debt margin, Other Industries – Final Decision*, May 2011, Box 1.1

³⁹ IPART, *Review of water prices for Sydney Desalination Plant Pty Limited, Water – Final Report*, December 2011, Table 9.4

178. IPART justifies its preference of a 5-year term on the basis that this more closely matches the maturity of debt to the length of the regulatory period. It refers to evidence provided by Kevin Davis and Martin Lally indicating that this would give rise to NPV-neutral compensation over time and hence was preferable to a 10-year term.
179. IPART indicated it preferred this theoretical evidence to empirical evidence provided to the AER which indicated that the average term of debt to maturity issued by regulated energy network infrastructure businesses was greater than 5 years and in fact, almost exactly 10 years. In addressing this evidence, IPART quotes the AER as stating that the average “effective” term of debt portfolios was shorter than this, at 7.11 years.⁴⁰ IPART does not provide or appear to have regard to the full context for how the AER came to this estimate.
180. I set out more detailed discussion of IPART’s considerations below.

6.1.1.1. Justification for a 5-year term

181. IPART has accepted in principle the views put forward by Kevin Davis and Martin Lally that the term for the DRP should be aligned with the length of the regulatory period.
182. This argument ignores the efficient term of debt financing in its derivation. Stating that a 5-year term would lead to “NPV=0” compensation does not establish that this is an efficient period over which to raise debt. In fact, it necessarily entails an implicit assumption that it must be efficient to raise debt over 5 years, since this is assumed to be deterministically cheaper (taking into account all risks and transactions costs) than issuing 10-year debt.
183. The objective of the National Gas Law (similar to that of the National Electricity Law) is to:
- ...promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.*
184. The fact that regulated energy infrastructure businesses issue debt at approximately 10-year terms (as discussed in more detail in answer to question 32) is a good indication that this is efficient financing practice, noting that the regulatory framework to date gives no incentive for firms to engage in inefficient financing practices.
185. Issuing 5-year debt may lead to a lower interest rate cost for a business than issuing 10-year debt (although even this is unclear as discussed in section 5.2 in response to question 32). Therefore, looked at in isolation it may appear that assuming firms issue

⁴⁰ IPART, *Developing the approach to estimating the debt margin, Other Industries – Final Decision*, May 2011, p. 25



10-year debt results in them being allocated a higher interest cost than is efficient (i.e. not the lowest interest rate cost available to the firm).

186. However, this logic is naïve and fails to properly take account of the interrelationship between the maturity structure of the debt issued by a company and the cost of equity as described by the Modigliani-Miller theorem. If we observe that, in the real world, there is a dominant debt raising strategy, such as issuing long-term debt; then Modigliani and Miller demonstrated that this must be because transaction costs are positive (financial markets are less than perfect). If we observe a dominant strategy of issuing long-term debt then this must be because there are advantages to issuing long-term debt, such as lessening exposure to refinance risk and potential insolvency and bankruptcy transaction costs.
187. This suggests that it is important to look at what businesses actually do. When we do this we conclude that businesses with long lived sunk assets of the nature of regulated businesses have, historically, a very strong tendency to issue 10-year (or longer) debt (again see response to question 32).

6.1.1.2. *Reliance on evidence for actual debt raising practice*

188. IPART noted in developing its benchmark for the DRP that it conducted an “in-depth investigation” into “the practice of the benchmark utility in seeking debt funding”.⁴¹ However, in its final report this investigation in respect of network utilities appears to be limited to considering the AER’s position in its review of WACC parameters.
189. IPART quotes the AER as rejecting 10 years as being the average maturity of debt from issue and calculating 7.11 years. However, it does not provide the proper context for this subsequent analysis by the AER.
190. On issue, the AER is clear that:⁴²

Taking into account this new information, the AER has verified that the weighted average maturity of debt portfolios at the time of issuance for these businesses is 10.14 years as presented above in table 6.1. That is, the further information confirms that these businesses refinance on average every 10 years.

191. In its final report on WACC parameters, the AER subsequently estimated an “effective term” of 7.11 years by applying an artificially lower maturity to floating rate debt, motivated by the assumption that:⁴³

⁴¹ IPART, *Developing the approach to estimating the debt margin, Other Industries – Final Decision*, May 2011, p. 28

⁴² AER, *Final decision: Electricity transmission and distribution network service providers – Review of the weighted average cost of capital (WACC) parameters*, May 2009, p. 159

⁴³ Ibid, pp. 158-159

... given that (at least a portion of) the yield on floating rate debt resets on a quarterly (i.e. 3 monthly) basis, this yield is likely to be lower than the equivalent fixed rate yield assuming an upward sloping yield curve. On this basis the prevalence of floating rate debt in the debt portfolios of these businesses is expected to alter the extent of the term premium faced at the time of physical debt issuance. In turn, this has an impact on the AER's consideration of the benchmark term assumption for the cost of debt (and the risk-free rate).

Given these conceptual considerations, the AER considered that even if the weighted average maturity of debt at issuance is around 10 years as reported by the businesses (see table 6.1), the weighted average duration (and therefore cost) of debt at issuance may be somewhat less than 10 years once the impact of floating rate debt is taken into account.

192. However, the AER's reasons for asserting that the yield on floating rate debt is likely to be lower than fixed rate debt are conceptually flawed. If businesses expected yields on floating rate debt to always be higher than the yields on fixed rate debt with the same maturity, no fixed rate debt would ever be issued. The Australian Competition Tribunal has accepted that principles of arbitrage mean that the expected yield to maturity on fixed and floating rate debt will be approximately the same and should be treated equivalently.⁴⁴ IPART does not appear to have considered the Tribunal's reasoning in its decision.
193. IPART did not review the AER's reasoning for estimating an "effective" rate of 7.11 years, or clearly state to what extent it relied upon this value. However, it does indicate that it believes that the empirical evidence relating to whether regulated network energy infrastructure businesses issue debt at maturities of 5 or 10 years is "conflicting".⁴⁵ Based on the evidence I present in answer to question 32 there is simply no basis for this conclusion. The evidence is clear that regulated businesses, both in Australia and elsewhere, issue debt with on average 10 or more years to maturity.

6.1.2. Choice of sample observations

194. In the application of this methodology to Sydney Desalination Plant, IPART formed a sample consisting of the five year Bloomberg BBB fair value estimate, 11 Australian dollar bonds and 4 United States dollar bonds.⁴⁶
195. The median DRP from this sample of 16 observations was 331.5 basis points (being the midpoint between a Sydney Airport bond at 328 basis points and a Leaseplan

⁴⁴ Application by ActewAGL Distribution [2010] ACompT 4 (17 September 2010), paras. 49-58.

⁴⁵ IPART, *Developing the approach to estimating the debt margin, Other Industries – Final Decision*, May 2011, p. 21

⁴⁶ IPART, *Review of water prices for Sydney Desalination Plant Pty Limited, Water – Final Report*, December 2011, Table 9.4



bond at 335 basis points), to which IPART subsequently added a 20 basis point allowance for debt raising costs.

196. Setting up a sample of yield observations is an important step in any analysis of the DRP. Where I consider that IPART's sample is improved upon that of the AER or the ERA is that it includes United States dollar bonds issued by Australian firms in its sample.⁴⁷ I note in this regard that it relied upon Kevin Davis' advice that:⁴⁸

...the domestic currency costs of issuing debt in foreign currencies and swapping into domestic currency should generally be the same as issuing debt in domestic currency (although minor differences emerge from time to time due to incomplete market integration) and that using these costs is compatible with use of a domestic CAPM.

197. However, I also consider that IPART's approach contains a number of unnecessary restrictions on bonds to be included in its sample. These include:

- the exclusion of floating rate debt from its benchmark sample;
- the exclusion of wrapped bonds; and
- the exclusion of bonds with embedded options.

198. In my opinion none of these exclusions are justified. In the case of floating rate debt, it is always possible to convert this into a fixed equivalent rate at any point in time by conducting a swap transaction whereby the issuer pays a fixed rate to maturity in return for regular payments of the 90-day bank bill rate. Principles of arbitrage suggest that it is not possible for this rate to be materially different from the yield on a fixed rate bond with the same maturity issued by the same firm. Existing Tribunal precedent holds that the treatment of these in assessing the DRP should be the same as for fixed rate debt.⁴⁹

199. In my opinion, the exclusion of wrapped bonds is not justified. If having a wrapper causes a bond to have a credit rating that is higher than the benchmark, then of course this would give rise to its exclusion. However, wrapped bonds with credit ratings consistent with the benchmark must be presumed to have yields that are informative of the risk of default at that credit rating. IPART has not provided any reasoning as to why it considers that this is not the case.

200. I understand that dealing with bonds with embedded options can be difficult and that an easier approach is to exclude these observations. However, when dealing with a limited number of observations, even if a regulator has a view that the benchmark

⁴⁷ I have not reviewed the method by which IPART makes this conversion.

⁴⁸ Professor Davis, *Determining debt costs in access pricing*, December 2010, p. 1

⁴⁹ Application by ActewAGL Distribution [2010] ACompT 4 (17 September 2010), paras. 49-58.



bond does not have any embedded options I consider that it is wasteful to exclude these bond yields without a reasonable attempt at determining and removing the value of the embedded option.⁵⁰ The AER's consultant, Oakvale Capital, has previously provided the basis upon which this value can be estimated.⁵¹

201. Furthermore, it is not the case that all types of embedded options would be expected to have a significant value. For example, make-whole call options require an issuer which calls its bonds to make good the holder for the payments that it would have received to maturity and not simply return the principal as is required for a simple call option. Application of the Oakvale Capital methodology, which utilises Bloomberg, confirms that the value of these make-whole call options is typically negligible.
202. In summary, a much more sophisticated approach to dealing with bonds with embedded options is recommended over the method adopted by IPART to filter out such observations from its sample.

6.1.3. Method for choosing benchmark DRP

203. Having formed a sample of 16 observations as described above, IPART estimates its benchmark DRP as the median of these values. In my opinion, this methodology is not nearly sophisticated enough to adequately deal with the issues raised in estimating the DRP.
204. If IPART had formed a sample of 100 bonds of exactly the correct maturity and credit rating, then taking a median of the DRP on these bonds would doubtless result in a value that would be reasonable. However, IPART does not have this luxury. It has formed a sample of 15 bond yields (and the Bloomberg fair value estimate) which are defined as having a maturity of 2 or more years. That is, this is a very small sample that varies widely in maturity and is not necessarily representative of 5-year debt.
205. Firstly, the criteria for inclusion in IPART's sample could potentially be much more inclusive such that the sample size is less of an issue, as discussed above.
206. Secondly, in the circumstances where there is limited or conflicting information around the DRP at the benchmark, but more information at other maturities, then I consider that it is very important to have proper regard to information available from other maturities. Proper consideration of this information should take into account the maturity that it is associated with, for example:
 - by using the Bloomberg fair value curve to adjust all DRPs to the desired benchmark for better comparison; and/or

⁵⁰ Although it is not necessary to assume that the benchmark bond would not have embedded options and this adjustment may not be required.

⁵¹ See Oakvale Capital, *The impact of callable bonds*, February 2011



- estimating an econometric model of the yield (and hence DRP) curve based on the available yield data.

6.1.4. Reliance upon Bloomberg

207. I consider that it is positive that IPART has regard to the results of Bloomberg's analysis. However, I do not consider that adopting this estimate as 1 of 16 observations in its sample is an appropriate way in which to give it weight.
208. The difference lies in the fact that the Bloomberg estimate is an expert opinion of the DRP for bonds with maturity of 5 years. This is not the same as an individual bond yield reported on by Bloomberg and it should not be treated in the same way.
209. I consider that there are significant advantages in relying on an independent expert opinion, such as that of Bloomberg, when setting the DRP. This does not imply that the Bloomberg BBB fair value curve should be uncritically accepted. In my opinion, it would in principle be reasonable for IPART to assess the reasonableness of the Bloomberg fair value estimate against other bond yield information it had collected, although for the reasons discussed above I do not consider that IPART's sample contains a sufficient breadth of observations to make this a very informed assessment.
210. To the extent a regulator such as IPART is less expert in this area than Bloomberg, it is reasonable that, in the absence of compelling evidence that the measurement of the DRP based on the Bloomberg curve would be unreasonable, a presumption should exist in favour of adopting Bloomberg's estimate.

6.2. ERA's approach

211. The ERA utilises a benchmark bond of A- and maturity of 5 years in its draft decision for Western Power. It estimates the DRP on this benchmark as the "term to maturity weighted average" of the DRP calculated for a sample of observations formed as bonds:⁵²
- having a rating of A- with Standard and Poor's;
 - with time to maturity of 2 years or longer;
 - issued in Australia by Australian entities and denominated in Australian dollars;
 - that are both fixed and floating;
 - that include both bullet bonds and bonds with call/put options; and
 - have yield data available from Bloomberg

⁵² See: ERA, *Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network*, March 2012, p. 181; and ERA, *Draft Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline*, March 2011, p. 154



212. Application of these filters in Western Power's draft decision resulted in the formation of a sample consisting of 27 bonds and a smaller sub-sample of 8 bonds with less than 5 years to maturity. The benchmark DRP set by Western Power was assessed to be the simple average of the "term to maturity weighted average" DRPs from these two samples, which resulted in a value of 2.027%.

6.2.1. Choice of benchmark

213. The ERA prefers a 5-year term to the 10-year term adopted by the AER in its regulation of Western Power. It also considers that an A- credit rating should be attributed to the benchmark bond. I consider that both assumptions are unreasonable and based on inadequate analysis. Based on the ERA's analysis, benchmarks of 10-year debt at a rating of BBB would be appropriate.

6.2.1.1. Term of the cost of debt

214. Unlike IPART, the ERA does not justify its assumption of a 5-year term based on theory. Instead it proffers evidence that it believes supports a case that regulated energy network businesses issue debt at maturities of approximately 5 years on average.
215. The evidence put forward by the ERA, for a range of privately owned and publicly owned energy network businesses, as well as Standard and Poor's data, suggests that approximately 50% of debt carried by these firms has more than 5 years to maturity, while 50% has less than this. For example, by examining annual reports the ERA concludes that:⁵³

in the sample of privately owned Australian energy networks, 52.5 per cent of total debt instruments have an average term of 5 years or less.

216. My understanding of the data put forward by the ERA is that it measures the term of debt measured not from time of issue, but from the time of reporting. That is, I consider that the ERA has established that the average term to maturity *remaining* on debt for regulated energy network businesses may be approximately five years. This is entirely consistent with the average term to maturity of debt *at issue* by regulated network businesses being 10 years.
217. To see this, suppose a firm issued 10-year bonds each year of uniform amounts and had done so for some time. At any point in time, looking now, the average term to maturity remaining on its debt would be 5 years. This is because the maturity profile of the firm will consist of debt maturing in equal amounts over the next 10 years.

⁵³ ERA, *Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network*, March 2012, p. 178



218. I further note that these observations reconcile the evidence collected by the ERA against the evidence that I present in response to question 32 above.

6.2.1.2. Reliance on A- as a benchmark credit rating

219. The ERA surveys 14 regulated energy network businesses and concludes, on the basis of Standard and Poor's credit ratings of 13 of these, that the median rating is A-. I consider that the ERA's analysis of the benchmark credit rating is seriously deficient and contains a number of errors. Overall, I consider the ERA's analysis suggests a median credit rating of BBB.

220. First, the ERA has incorrectly assigned AGL a credit rating of A-, when in fact it is rated BBB with Standard and Poor's and has been since 20 October 2006.⁵⁴ When this adjustment is made, the median credit rating observation in the ERA's sample is BBB.

221. Second, the ERA has included the credit ratings of three regulated businesses which reflect support by Australian state governments. Standard and Poor's states that its ratings from Ergon Energy (AA) is not a standalone rating and reflects implied support from the Queensland state government. Endeavour Energy (previously Integral Energy) and Essential Energy (previously Country Energy) appear to no longer have ratings with Standard & Poor's, however I understand that their previous credit ratings were similar enhanced due to their ownership by the New South Wales state government. Since the benchmark regulated firm is privately owned, it is incorrect to set its credit rating against government supported metrics. Removing these firms leaves the median credit rating observation from the ERA's sample unchanged at BBB.

222. Third, the ERA has included the credit rating of SPI PowerNet and SP AusNet, two firms that are ultimately majority owned by the Singapore government and rated A-. The AER's consultant, Oakvale Capital, stated in regard to bonds issued by SPI E&G:⁵⁵

During the averaging period the bond was attracting one of the lowest yields, in contrast to other A- bonds observed (as per the CEG report). The key feature supporting the bond was the parental support of the issuer's owners and the link to the Government of Singapore.

223. Removing these firms leaves the median credit rating observation from the ERA's sample unchanged at BBB.

⁵⁴ This information is available from the Standard and Poor's website.

⁵⁵ Oakvale Capital, *The impact of callable bonds*, February 2011, p. 24



224. Fourth, the ERA's table contains Alinta and Alinta Networks, which have not held credit ratings with Standard and Poor's since 2004. I consider that these ratings may not be relevant to the benchmark rating at the current time. Removing these firms leaves the median credit rating observation from the ERA's sample unchanged at BBB.
225. Fifth, the ERA appears to validate its selection of an A- credit rating by reference to the A+ credit rating of Synergy, an electricity retailer in Western Australia. In my opinion, the credit rating of Synergy has no bearing on the credit rating of the benchmark regulated energy network infrastructure business and the ERA should not have regard to irrelevant information in formulating this benchmark.

6.2.2. Choice of sample observations

226. The ERA considers two related samples of bonds. These samples consist of:
- all 27 A- bonds satisfying its selection criteria; and
 - a sub-sample of 8 bonds further filtered to have a maturity of greater than 5 years.
227. Notwithstanding my criticisms above of the ERA for its selection of the benchmark, there are a number of positive attributes to the sample that is collected by the ERA. Its sample includes both fixed and floating rate bonds, which is an improvement over the extremely narrow view taken by IPART. It also includes bonds with embedded options such as call and put options.
228. However, its selection criteria also suffers due to:
- the use of only A- bonds when similarly rated bonds could also potentially reveal useful information about the DRP on the benchmark bond; and
 - the use of Australian dollar bonds only when there is no reason to expect that bonds issued overseas by Australian companies could not also provide information about the benchmark DRP.
229. I also note that the requirement for yield data to only come from Bloomberg (similar to IPART's requirement) appears unnecessarily restrictive on the field of information that is considered. It is not clear to me why the ERA considers that bond yield information sourced from UBS would not be similarly informative. In previous considerations of the DRP, the Tribunal has even stated that it preferred UBS data:⁵⁶

On the other hand, we do agree with Professor Handley's criticism of the use of the median reported observed yields from three data sources – UBS, Bloomberg and CBASpectrum. As explained in the Oakvale Report, "the use of a market maker's price sheet such as that provided by UBS is the most commonly used

⁵⁶ Application by Jemena Gas Networks (NSW) Ltd (No 5) [2011] ACompT 10 (9 June 2011), para. 58



guide for pricing of bond instruments, whether fixed, floating or hybrid structures.” The Tribunal prefers the use of the UBS data alone.

230. Furthermore, I note that the ERA also gives equal weight to the benchmark estimate derived from the smaller sub-sample of 8 A- bonds which it chooses to have maturities of greater than 5 years. I consider that a benchmark estimated off such a small sample is unlikely to be reliable. I do not understand, and the ERA does not explain, why it considers that forming a sample which includes only bonds with *greater* than 5 years to maturity would give a reasonable estimate of the DRP on a bond with 5 years to maturity.
231. In summary, I consider that the sample of observations devised by the ERA may be too limited for it to arrive at a reliable estimate of the DRP. However, I have greater concerns over its methodology for estimating the benchmark from this sample, which I set out below.

6.2.3. Method for choosing benchmark DRP

232. The ERA explains that it adopts a “term to maturity weighted average” on each of its two preferred samples, and then takes a simple average of these results to come to its estimate of the benchmark DRP, 2.027%.
233. I cannot find a clear explanation by the ERA as to what it means by the “term to maturity weighted average”. It is concerning that the ERA may have adopted a methodology for which it has not provided sufficient information for third parties to replicate and this makes it difficult for me to adequately assess its methodology.
234. The most intuitive interpretation of the ERA’s label for its methodology is that it means that it has placed weight across different observations in its sample in proportion to the number of years to maturity. This would be consistent with the style of reasoning that saw the ERA form a smaller sample of bonds with only 5 years to maturity. However, as I set out immediately above, in my opinion it does not make sense to place greatest weight on observations with the very longest time to maturity if the ERA truly wishes to estimate a benchmark DRP for 5 years.
235. In any case, I note that, as for IPART, the sample size used by the ERA is relatively small (particularly the smaller sub-sample) and does not contain enough bonds with maturities very close to 5 years to produce a reliable result. As suggested above, more reliable methods for using the information from bonds with maturities significantly different from 5 years could possibly include:
- using the Bloomberg fair value curve to adjust all DRPs to the desired benchmark maturity for better comparison; and/or
 - estimating an econometric model of the yield (and hence DRP) curve based on the available yield data.



6.2.4. Reliance upon Bloomberg

236. The ERA's methodology has no regard to the Bloomberg A fair value curve in setting a benchmark DRP based on a bond with a credit rating of A-. This appears to be an important limitation of its approach. In assessing information that is indicative of a benchmark bond yield, there is a limited amount of conflicting information available. In this context, setting aside any relevant information is likely to lead to error.
237. In my opinion, it is inexplicable that the ERA would completely set aside the Bloomberg fair value estimate without very strong reasons as to why this estimate was not representative of the information obtained from the broader population of A- bond yields.

6.3. AER's proposed approach

238. In November 2011, the AER released draft decisions in its regulatory reviews of both Aurora and Powerlink. In these decisions, the AER estimated a DRP of 3.14% and 3.19% respectively.⁵⁷
239. The AER's lower DRP estimates for Aurora and Powerlink are the result of a new methodology that it introduced subsequent to its final decisions for APT Allgas and Envestra. The most important change in its methodology is its proposal to move away from any reliance upon Bloomberg's fair value curve and to estimate the DRP based on a simple average of the reported yields for a selection of nine long-dated bonds to estimate the DRP.
240. My comments below about the AER's proposed approach are necessarily brief so as to be relevant to the context of this report. My detailed considerations of the AER's proposed approach, many of which are not repeated here, are set out in a report for the Victorian gas distribution businesses.⁵⁸

6.3.1. Choice of benchmark

241. The AER utilises a benchmark bond that has a credit rating of BBB+ and a maturity of 10 years. I consider that this is reasonable.
242. In my opinion this term to maturity is supported by the empirical evidence and should be deemed to be consistent with efficient capital raising behaviour by regulated Australian energy network businesses. I further consider that a credit rating of BBB or

⁵⁷ See AER, *Draft Distribution Determination: Aurora Energy Pty Ltd*, November 2011, p. 241; and AER, *Powerlink: Transmission Determination*, November 2011, p. 224. The same methodology was used in both decisions, but the averaging period for Aurora was 20 days to 14 October 2011, whereas the averaging period for Powerlink was 40 days to 14 October 2011.

⁵⁸ CEG, *Estimating the regulatory debt risk premium for Victorian gas businesses*, March 2012



BBB+ is likely to be reasonable for the benchmark bond, having regard to the analysis of the ERA summarised at 6.2.1 above.

6.3.2. Choice of sample observations

243. In my opinion, a methodology that seeks to rely upon the yields of just 9 bonds, setting all other bond yield information aside, is not likely to be robust. In its Aurora and Powerlink draft decisions, the AER estimated the DRP based on a simple average over nine bonds. These bonds were selected based on:⁵⁹
- Australian domestic issuance, fixed and floating;
 - a term to maturity of between 7 to 13 years;
 - a rating of BBB to A- by Standard & Poor's; and
 - excluding callable or subordinated bonds.
244. As I note earlier in this report, the yields on callable bonds can be adjusted for the value of the call option using the method recommended by the AER's consultant, Oakvale Capital. I consider that the greater riskiness of subordinated debt is adequately accounted for by the higher credit rating accorded to this debt by Standard & Poor's. The AER has not supplied any reasoned evidence as to why it would be reasonable to exclude such bonds from consideration.
245. I consider that it is relevant to have regard to yield information on bonds for all maturities. This gives appropriate context to the value estimated at a maturity of 10 years. Furthermore, it is possible and appropriate to use the yield data from shorter-dated bonds to inform the yield at longer maturities where there are fewer bonds at these maturities. Not only does the AER exclude shorter-dated bonds from its sample, it provides no graphical representation of the yields on these bonds – making it impossible to assess the consistency of its sample with the information it has rejected.
246. I agree that for the purpose of estimating a benchmark corporate bond rate, the analytical focus should be on bonds issued by Australian companies. This is not the same as excluding bonds issued by Australian companies that are traded overseas or in foreign currencies, which is what the AER proposes to do.
247. In my opinion, setting aside all this potentially relevant information is unreasonable, and increases the likelihood that the DRP estimate produced by the AER's methodology relying upon this restricted dataset will also be unreasonable.

⁵⁹ Ibid, p. 216



6.3.3. Method for choosing benchmark DRP

248. The AER's method of taking an average DRP across a sample of bonds of varying maturities is similar to the approaches taken by IPART and the ERA. Greater sophistication is required to adequately deal with the impact of different maturities upon yields and DRPs, as set out at sections 6.1.3 and 6.2.3 above.

6.3.4. Reliance upon Bloomberg

249. In rejecting the use of the extrapolated Bloomberg BBB fair value curve to estimate DRP, the AER put forward the general proposition that:⁶⁰

- where market data is available, it is possible to estimate the DRP using this data
- where market data is not available, FVCs are a viable second-best alternative.

250. I agree that where market data is available, it is 'possible' to estimate the DRP using this data. But this is precisely what Bloomberg does. The AER does not address adequately why it is 'preferable' to supplant its own use of market data for that of Bloomberg.

251. In my opinion, the AER has not made a reasonable assessment in weighing up the claimed deficiencies of Bloomberg's fair value curves against the obvious problems with its own methodology. I set out my detailed considerations on the AER's assessment in my report for the Victorian gas distribution businesses.⁶¹

252. Ultimately I consider that any benchmark estimate, whether provided by Bloomberg or the AER, should be assessed against the full weight of available evidence. It appears likely that an estimate that has had regard to a wide range of relevant information will perform better than one that relies upon a highly restricted sample, holding other factors constant.

⁶⁰ Ibid, p. 222

⁶¹ CEG, Estimating the regulatory debt risk premium for Victorian gas businesses, March 2012, section 7.



7. AEMC question 33

Is the EURCC's proposal of establishing the cost of debt using historical trailing average compatible with the overall framework for estimating a forward-looking rate of return? What are the potential benefits of using a trailing average and do they outweigh the potential costs if the estimate is less reflective of the prevailing cost of debt for NSPs?

253. The rationale for setting a forward-looking rate of return is to ensure that a business has the incentive to efficiently invest in essential infrastructure. The EURCC's proposal uses a historical trailing average estimate of the cost of debt. This is not, strictly speaking, consistent with establishing a fully forward-looking rate of return.
254. However, one could reasonably take the view that, at any given time, an efficiently financed firm will have liabilities to pay interest on debt that was incurred in the past (over the last 10 years or more based on the answer to question 32). One might further take the view that these liabilities are in the nature of operating cost liabilities (much as would be the case with long term lease or rental contracts entered into in the past). Similarly, one could take the view that, by updating the benchmark to include each year as it passes, the EURCC approach gives the appropriate weight to the most recent market circumstances.
255. A potential problem with this line of logic is that there may be an impact on incentives to invest when the historical average is different to the prevailing market conditions. For example, when the cost of debt is materially above the historical average a business will have to incur current market rates on 100% of planned debt financing of new investments. However, it will receive compensation on that incremental investment that primarily reflects the historical average cost of debt. The consequence of this will be that the business may have an incentive to defer plans for, or simply not make, investments that would be efficient. The opposite will be true to the extent current market rates are below the historical trailing average.
256. However, it must be noted that once a regulatory period has begun, businesses can have similar incentives under the current regulatory approach of setting the cost of debt based on market conditions at the beginning of the regulatory period. That is, if the actual cost of debt varies from the allowed cost of debt during the regulatory period then a firm can have a resulting incentive to delay/bring forward capital expenditure.



8. AEMC question 34

What possible changes would be required in the NGR to implement the EURCC's trailing average approach?

257. I have been asked to answer this question with respect to the NGR. It is not obvious to me that any change to the NGR is necessary to allow the EURCC's trailing average approach to be adopted. Provided one took the view that the prevailing cost of existing debt on a prudently financed business's books reflected 'prevailing conditions in the market for funds' then the EURCC's approach could be proposed by a gas business under the NGR (or argued for by the AER).



Estimating the regulatory debt risk premium for Victorian gas businesses

Dr. Tom Hird

March 2012



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1. Introduction

1. My name is Tom Hird. I have a Ph.D. in economics and 20 years experience as a professional economist. My curriculum vitae is provided separately. The Victorian gas businesses¹ have asked me to provide an opinion on the benchmark cost of debt and associated debt risk premium (DRP) to be applied in the regulation of the pipeline Victorian natural gas distribution and transmission businesses. My terms of reference are set out below.

Background

The legislative requirements for calculation of the DRP are contained in the National Gas Law and the National Gas Rules.

The National Gas Law requires that:

- *A regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs in providing reference services; and*
- *A reference tariff should allow for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates.*

The National Gas Rules require that the rate of return on capital is:

- *To be commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services; and*
- *In determining a rate of return on capital:*
 - *It will be assumed that the service provider meets benchmark levels of efficiency and uses a financing structure that meets benchmark standards as to gearing and other financial parameters for a going concern and reflects in other respects best practice; and*
 - *A well-accepted approach that incorporates the cost of equity and debt, such as the Weighted Average Cost of Capital, is to be used; and a well-accepted financial model, such as the Capital Asset Pricing Model, is to be used.*

For the calculation of the DRP this has been interpreted in previous regulatory decisions as meaning:

¹ Envestra, Multinet and SPAusNet. APA.



- *It must be determined using the 'observed annualised Australian benchmark corporate bond rate for corporate bonds' or some proxy thereof;*
- *the bonds must have a BBB+ credit rating;*
- *the bonds must have a maturity period of 10 years; and*
- *It is the margin over the annualised nominal risk free rate and by implication is measured over the same period as the nominal risk free rate.*

Questions

The businesses are seeking your opinion on whether the Bloomberg fair value yield curves (extrapolated to 10 years using the methodology proposed by PWC in the report entitled “Estimating the benchmark debt risk premium”) can be relied upon to reasonably meet the legislative requirements.

If the Bloomberg BBB rating fair value curve, (BFV), is not suitable, then please propose an alternative methodology for calculating the DRP that best meets the legislative requirements.

In either case, you should perform your analysis in respect of the 20 business days from 21st November to 16th December 2011.

In providing the advice, you should take into consideration the outcomes of recent AER decisions and relevant judgments handed down by the Australian Competition Tribunal.

2. The analysis in this report is based on market data over the period between 21 November 2011 and 16 December 2011.
3. The remainder of this report is set out as follows:
 - Section 2 considers the benefits of relying on the estimates of a well recognised independent expert, such as Bloomberg, when setting the DRP;
 - Section 3 examines the fit of the Bloomberg BBB fair value curve to the yields on bonds issued by BBB to A- rated Australian companies in Australia and in Australian dollars. This is the data set that has been the primary focus of recent regulatory precedent where the debt risk premium has been assessed.
 - Section 4 considers the best estimate of the DRP in the context of including information on bonds issued by Australian companies in foreign currencies;
 - Section 5 provides a robust econometric methodology capable of using all of the available information to determine the best estimate of the DRP;
 - Section 6 examines other cross-checks on the reasonableness of the extrapolated Bloomberg fair value curve;



- Section 7 provides an assessment of the AER's rationale, as expressed in its Aurora and Powerlink draft decisions, for deviating from the use of the Bloomberg fair value curve; and
 - Section 8 concludes.
4. I have read, understood and complied with the Federal Court Guidelines on Expert Witnesses. I have made all inquiries that I believe are desirable and appropriate to answer the questions put to me. No matters of significance that I regard as relevant have to my knowledge been withheld.
5. I have been assisted in the preparation of this report by Daniel Young and Johanna Hansson from CEG's Sydney office and Yuliya Moore who works with me in Melbourne. However, the opinions set out in this report are my own.

A handwritten signature in black ink, appearing to read 'T. Hird', with a stylized flourish at the end.

Thomas Nicholas Hird

29 March 2011



2. Reliance upon an independent expert opinion

6. I consider that there are significant advantages in relying on an independent expert opinion, such as that of Bloomberg, when setting the DRP. This does not imply that the Bloomberg BBB fair value curve should be uncritically accepted. Rather, if it can be shown that the Bloomberg fair value curve provides a robust fit to the data, I consider that it would be poor regulatory practice to impose an alternative estimate that is formulated in a casual manner without an in depth understanding of all of the available information.
7. Second guessing the expertise of Bloomberg in gathering and interpreting information relevant to determine a fair value curve is a fraught exercise. To the extent the AER is less expert in this area than Bloomberg, it is reasonable that, in the absence of compelling evidence that the measurement of the DRP based on the Bloomberg curve would be unreasonable, a presumption should exist in favour of adopting Bloomberg's estimate.
8. In this regard it is relevant to note that interpretation of bond data is not straight forward. Bond yields might be affected by a number of factors, including:
 - the expected loss given the default of the issuer;
 - the size of the bond issue;
 - the growth options of the particular issuer;
 - the capital expansion plans of the issuer;
 - the liquidity of trading in the issuer's bonds; and
 - particular features of the bond (such as maturity, call features, credit rating, recognition of issuer's corporate brand, implied government backing etc).
9. It must also be kept in mind that the observations that the AER (and myself) work from are not actual bond yields but are estimates of bond yields if the bonds were to trade. Some estimates will be better than others depending on factors such as when the most recent trade took place in that bond (or other of the issuers' bonds) and the extent to which comparable bonds have recently traded. Moreover, some bond yield estimates may be more reliable than others. For example, a UBS yield estimate might be more reliable for a particular bond than an ABNAMro yield estimate because UBS trades in those bonds more frequently (or *vice versa*).
10. Properly synthesising debt market information is a difficult and complex task. To the extent that the AER is less expert in this task than Bloomberg then, other things equal, this provides a basis for preferring Bloomberg's estimate over those of the AER.
11. In summary, the Bloomberg fair value curve is built for and commercially provided to debt market participants who pay to use it for commercial purposes. In deriving its fair value curves Bloomberg has a great deal of information available to it – including, but not limited to, estimates of market prices of many hundreds of bonds across a range of



credit ratings and maturities (including but, again, not limited to the BBB to A- bonds charted in this report).

12. By comparison, the AER decisions in Envestra and APT Allgas gave equal weight to the Bloomberg fair value curve and a single bond issued by APA. This methodology was rejected by the Australian Competition Tribunal (the Tribunal) who substituted a DRP based on the extrapolated Bloomberg BBB fair value curve. In its recent Aurora and Powerlink draft decisions, the AER proposed to amend this methodology to include eight other bonds (such that the AER sample is now nine bonds) and to give no weight to the Bloomberg fair value curve.²
13. However, the consideration of nine bonds rather than one only partially addresses the risk that the sample will be unrepresentative and/or that the sample includes outliers that are that should not be included.
14. In fact, this is precisely what has occurred in the construction of the AER sample. The average DRP of the bonds in the AER's sample does not result in an estimate that is representative of the wider information available from the population of bonds.
15. This is at least partly because in constructing the sample the AER has shown a lack of expertise and understanding of the bond yield data that it has extracted from the Bloomberg database. This is discussed more fully in section 7 below but is best illustrated by examining the A- rated Coca Cola Amatil bond that the AER includes in its sample.
16. This bond has a reported DRP of around 1% which is by far the lowest of any long term bond rated AA+ or below (let alone those rated A-). However, closer inspection of the reason this bond has such a low yield demonstrates that its reported yield is set within Bloomberg by being (incorrectly) benchmarked against AAA and AA+ rated comparables (being Australian State Government debt and debt backed by the German government).
17. This may simply reflect a data entry error in maintaining the Bloomberg database. However, the important point to note is that Bloomberg when putting its A rated fair value curve together does not use the Coca Cola Amatil bond. By contrast, the AER gives this bond an 11% weight (ie, one out of nine) in its estimate of the benchmark DRP.

² See Aurora and Powerlink draft decisions.



3. Assessing the Bloomberg fair value curve against bonds issued in Australia

18. I explain in the previous section that there are persuasive reasons why it is desirable to rely upon, where possible, a fair value estimate made by an independent expert assessor of cost of debt information like Bloomberg. Nonetheless, in some circumstances different experts can hold divergent views, as was evident when Bloomberg and CBASpectrum provided very different estimates for fair values. I consider that it is reasonable to apply a 'sanity check' to the extrapolated Bloomberg BBB fair value estimate by comparing it to the yields of bonds with similar characteristics.
19. My terms of reference instruct me to test the accuracy of the Bloomberg BBB fair value curve as extrapolated to 10 years by PwC. PwC estimate the spread to CGS yields increases by 7.6bp per year as the Bloomberg fair value curve is extended from 7 to 10 years. This estimate is based on an examination of the increase in spreads on matched pairs of bonds (from the same issuer) that have maturities comparable to 7 and 10 years.³

3.1. Description of relevant bond data

20. I have identified the population of fixed and floating corporate bonds issued by Australian companies in Australian dollars where those bonds are rated between BBB and A- by Standard & Poor's. Using Bloomberg I have identified the population of fixed and floating corporate bonds issued by Australian companies in Australian dollars rated between BBB to A- on issue during the period from 21 November 2011 to 16 December 2011. This population consists of 145 bonds with terms to maturity that range from a month to over 20 years.
21. I have sourced data for these 145 bonds from Bloomberg and UBS. Bloomberg relies on several price series, including Bloomberg composite prices (BCMP), Bloomberg generic prices (BGN) and Bloomberg's evaluated price (BVAL). As described by Bloomberg, a BCMP yield is any sourced by Bloomberg from a set of quality contributors. A BGN yield is Bloomberg's assessment, using bond-specific information only, of a market consensus price for the bond.⁴ Bloomberg will not estimate a BGN price if it is not comfortable that there is a market consensus on price. A BVAL price is Bloomberg's assessment, using bond-specific and/or general market information, of the price a bond might trade at.⁵

³ PwC, Estimating the benchmark debt risk premium, March 2012.

⁴ Bloomberg description of Bloomberg Generic Price (BGN) available in the Help Search function (search: Bloomberg Generic Price) under sub-heading Frequently Asked Questions

⁵ Bloomberg description of BVAL Final Price available in the Help Page for BVAL.

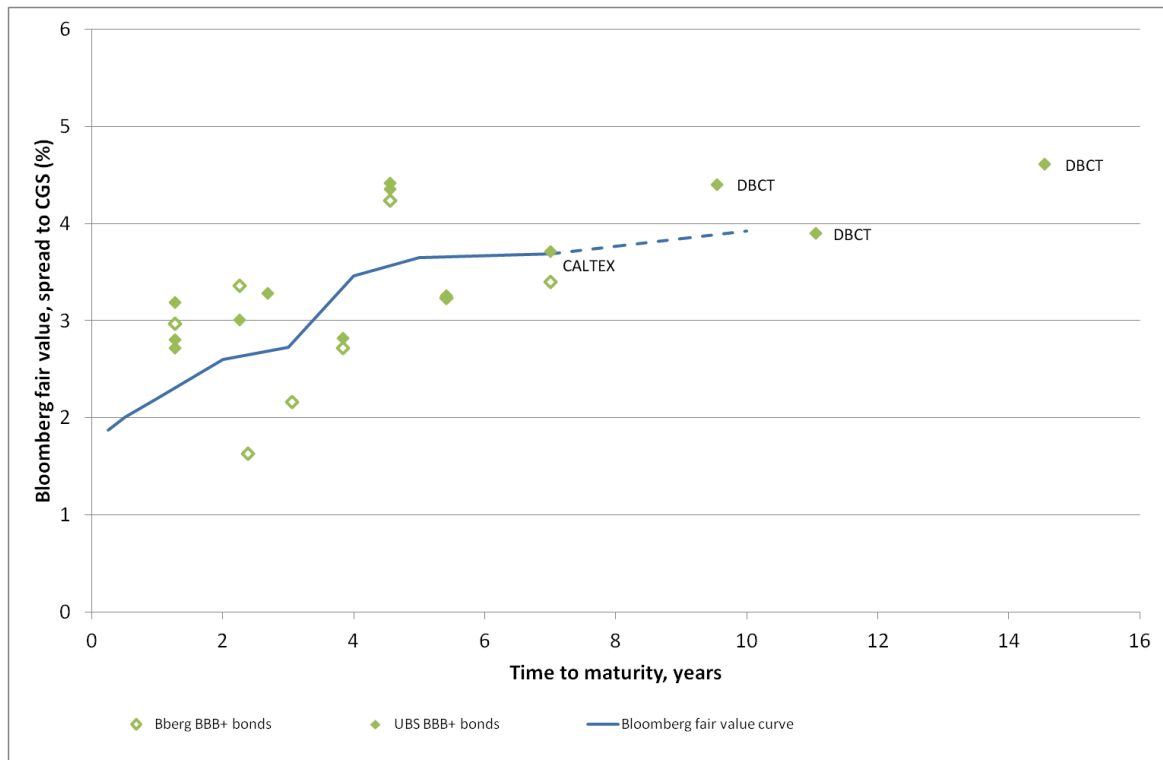


22. In respect of the Bloomberg data, I have relied on BGN yields where these are available, followed in order of preference by BVAL and BCMP. I believe that this is a fair reflection of Bloomberg's assessment of the reliability of these sources. However, I note that this choice of preference is not material to any of the conclusions in this report.
23. The yields obtained from UBS and Bloomberg have been annualised on the basis that fixed rate bonds pay coupons semi-annually and that floating rate bonds pay coupons quarterly. Spreads have been calculated as the difference between annualised yields and annualised CGS yields interpolated to the same maturity as the bond.
24. In the following sections I have relied on the maturity date reported by Bloomberg. This is of relevance in the context of callable bonds, since Bloomberg reports the final maturity date for callable bonds, whereas UBS rate sheets sometimes list the next call date under the maturity column rather than the final maturity of the bond. I explain in section 3.3.3 and in more detail at Appendix A the basis upon I consider that it is reasonable to interpret UBS yields as being expressed to maturity rather than to first call.

3.2. Analysis of relevant bond data

25. As a starting point, Figure 1 below sets out all bonds that meet the criteria described above and are rated BBB+ only. Bonds rated BBB+ are the logical starting point because the AER's benchmark bond from which the DRP relates to is a BBB+ rated Australian corporate bond with a maturity of 10 years.
26. In Figure 1 below and in all further charts in this report, the extrapolation of the Bloomberg BBB fair value curve is indicated by a dashed line for maturities beyond 7 years.

Figure 1: Bonds with maturity greater than one year rated BBB+



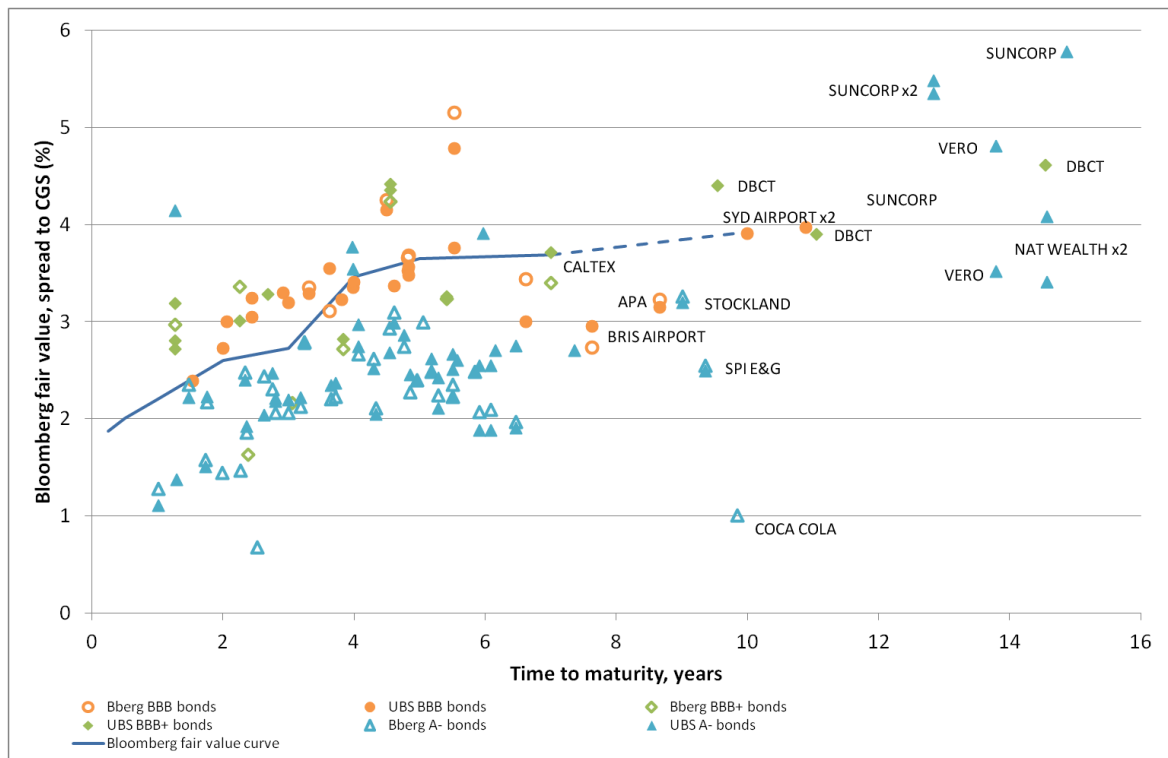
Source: Bloomberg, UBS, RBA and CEG analysis

Note: Data sourced as an average over 21 November 2011 to 16 December 2011

27. The quantitative evidence presented in Figure 1 suggests that the extrapolated Bloomberg BBB fair value provides a reasonable estimate for bonds rated BBB+. At the lower maturities the line passes through the middle of a 'cloud' of bonds, whereas at the higher maturities the Caltex bond and the three DBCT bonds all lie on or close to the curve.
28. It may be relevant to note that DBCT is an Australian infrastructure issuer rated BBB+. To the extent that one takes the view that infrastructure issuer's bonds are more relevant to an assessment of the BBB+ benchmark (as the AER has previously done to justify giving weight to the APA bond, but rejected by the Tribunal in its Envestra decision⁶) then these long dated bonds may be given more weight than other bonds (especially the floating rate bond maturing in almost exactly 10 years). We note that this does not appear to the approach adopted by the Tribunal, which has indicated that it does not necessarily place greater weight upon infrastructure issues.

29. Figure 1 above indicates that the extrapolated Bloomberg BBB fair value curve is a good fit to the available data for BBB+ bonds. However, this remains a small sample of bonds. Following the process originally proposed by CEG and accepted by the Tribunal and now the AER, Figure 2 expands the selection of bonds to include fixed and floating corporate bonds issued in Australia in Australian dollars rated BBB to A-, with maturity greater than one year. This larger dataset provides a further cross-check on the reasonableness of the extrapolated Bloomberg BBB fair value curve, as well as providing a cross-check upon the BBB+ data used in Figure 1 above for that purpose.

Figure 2: Bonds with maturity greater than one year rated BBB to A-



Source: Bloomberg, UBS, RBA and CEG analysis

Note: Data sourced as an average over 21 November 2011 to 16 December 2011

30. Including bonds rated BBB and A- expands the number of bonds materially. However, it does not provide a basis for altering the conclusion that the Bloomberg fair value curve is a good fit to the available data.
31. The great majority of the A- bonds added have DRP's less than the Bloomberg BBB fair value curve (consistent with what one would expect). However, there are some A- bonds that are above the BBB fair value. Notably, three of the long-dated A- bonds that are the furthest below the curve are in the AER sample (Coca Cola, SPI E&G and Stockland).



32. Similarly, the majority of BBB bonds lie above the curve and most that are below the curve are only fractionally so – with the notable exceptions of the APA bond and the Brisbane Airport bond both of which are in the AER sample and are well below both the BBB fair value curve and most other BBB rated bonds with maturity of more than 4 years.
33. I do not consider that this wider population of bonds provides any basis upon which to conclude that the extrapolated Bloomberg BBB fair value curve is unreasonable. However, it does provide a basis for concluding that the AER sample of bonds is not representative of the wider population of bonds.
34. In this regard I note that two bonds in particular in the AER sample are clearly not representative and should be given little or no weight. These are the Coca Cola Amatil bond and the SPI E&G bond.
35. The SPI E&G issuer is part owned by the Singapore Government. The AER's experts, Oakvale Capital, stated in relation to a shorter dated SP E&G bond in an earlier period that:

During the averaging period the bond was attracting one of the lowest yields, in contrast to other A- bonds observed (as per the CEG report). The key feature supporting the bond was the parental support of the issuer's owners and the link to the Government.⁷

36. The Coca Cola Amatil bond yield is clearly anomalous and CEG research, described in more detail in section 7.4.2 below, explains that this yield is actually being determined in Bloomberg based on comparisons with AAA and AA+ rated State Government and supranational debt.

3.3. Analysis of callable bonds

37. Call options allow the issuer of a bond the right to repay the principal of the bond earlier than the final maturity date. There are different types of call options, including those that allow discrete dates at which these options may be exercised and others that permit a call to be made at any point beyond a certain date.
38. The potential exercise of these options may mean that a lender may demand a higher interest rate on these bonds to compensate for the fact that they may be made worse off if the bond is called. For example, the issuer may be likely to call the bond if interest rates have fallen and, as a result, the interest rate on the bond is higher than prevailing rates in the market. However, calling the bond in those circumstances makes the lender worse off – because the lender ceases to earn above market interest rates on the bond.

⁷ Oakvale Capital, *The impact of callable bonds*, February 2011, p. 24

39. However, if a bond is ‘make whole callable’ this means that the issuer must pay the borrower a penalty if the bond is called. The penalty is calculated such that the borrower is compensated (or ‘made whole’) for lost interest as a result of the bond being called. For this type of bond a lender would not expect a higher interest rate due to the callable nature of the bond because the intention is that they would be compensated for losses as a result on the bond being called.
40. The AER appears to accept this contention in its Aurora and Powerlink draft decisions.⁸ This reflects the advice of Oakvale Capital, which stated that call options on make whole callable bonds should not raise yields relative to the same bond with no call options (and may even depress yields as investors see some value from the potential that the bond may be called).⁹
41. It is also relevant to note that for many bonds issued before the global financial crisis with relatively low coupons/spreads, the ability of the issuer to now or in the future lower financing costs by exercising a call option is negligible.

3.3.1. Should callable bonds be excluded

42. I consider that the DRP should be assessed relative to the population of callable and non-callable bonds for the simple reason that businesses, including regulated businesses, prudently issue both callable and non-callable bonds. Moreover, the cost of equity has been estimated by the AER based on the observed equity betas for regulated businesses. To the extent issuing callable bonds lowers the cost of equity then removing the impact of the call option from the cost of debt involves an element of double counting (as it has already been captured in a lower cost of equity).
43. The AER has in the past not accepted this view and in its Aurora and Powerlink draft decisions it has excluded callable bonds from its assessment of the DRP.

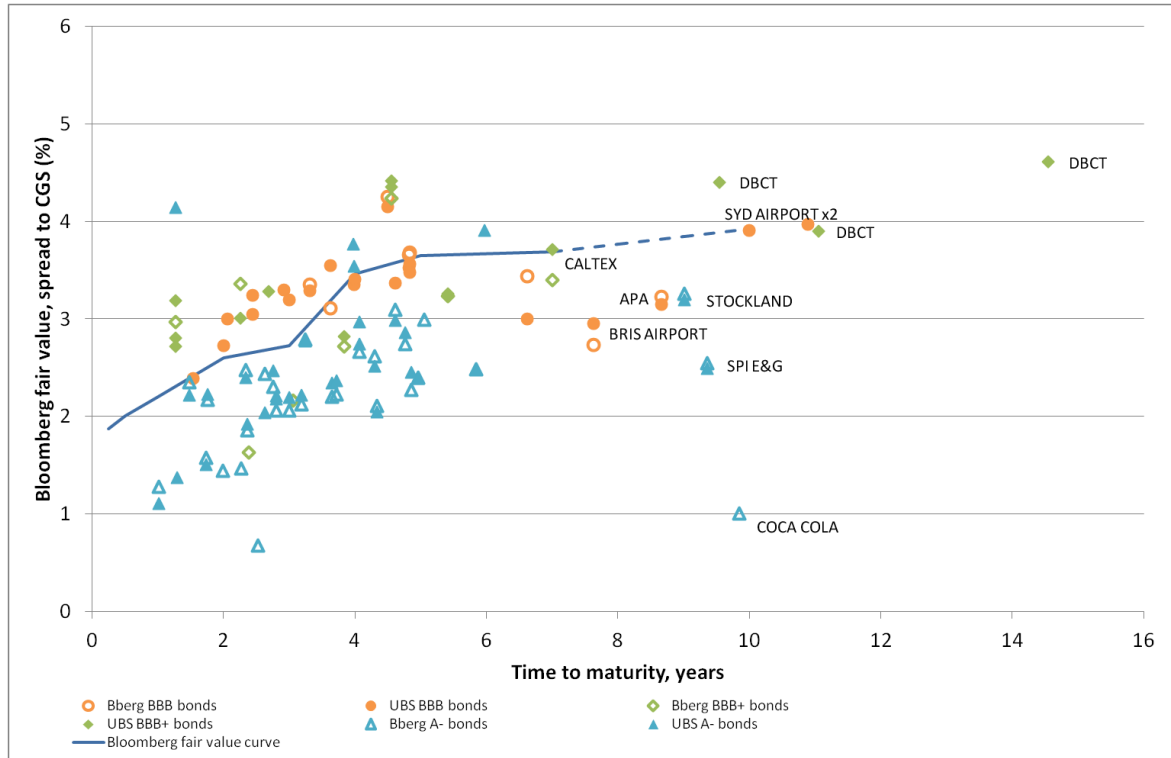
3.3.2. Impact of excluding callable bonds

44. Out of the total population of bonds in Figure 2, 28 bonds are callable but not make whole callable (for ease of exposition below, I call the class of bonds remaining after excluding callable bonds “non-callable” notwithstanding that they include make whole callable bonds). Figure 3 below is the same as Figure 2 above excluding all such bonds.

⁸ See for example: AER, *Draft decision: Powerlink transmission determination*, November 2011, footnote 573.

⁹ Oakvale Capital, *Report on the cost of debt during the averaging period: The impact of callable bonds*, February 2011., p. 7.

Figure 3: Bonds with maturity greater than one year rated BBB to A- (excluding callable but not make whole callable bonds)



Source: Bloomberg, UBS, RBA and CEG analysis

Note: Data sourced as an average over 21 November 2011 to 16 December 2011

45. This chart shows that the majority of non-callable bonds with more than 6 years to maturity have yields that are below the Bloomberg fair value curve. These are the bonds that the AER relies on in its sample of nine bonds (all of the named bonds in the above chart are in the AER sample except the Caltex bond which is less than 7 years maturity and the DBT bond which is more than 13 years maturity).
46. Examined in isolation and assuming that one accepted that the excluded callable bonds had no relevant information, the fact that the majority of non-callable bonds with 7 to 13 years maturity lie below the extrapolated Bloomberg BBB fair value curve might cause one to question the accuracy of that curve.
47. However, there are two reasons why, even if I restricted myself to this very narrow range of information, I reject this conclusion. First, for reasons set out above and in more detail below in section 7.4, I consider that the Coca Cola and SPI E&G bonds are either false observations (Coca Cola) or depressed by the implicit backing of the AAA rated Singapore Government. These bonds have the lowest yields and, once removed, there are more bonds on or above the extrapolated fair value curve than below it (four against three).

48. Second, looking at the whole population of non-callable bonds it is clear that the sample between 7 and 13 years is small and inconsistent with the wider population. For example, the BBB bonds in this sample have a lower average DRP than the BBB bonds with between 4 and 7 years to maturity. In fact, these shorter dated BBB bonds average 5.03 years to maturity and an average DRP of 3.79%. This compares to 9.30 years maturity and 3.48% DRP for BBB bonds in the AER's sample. Notably, the DRP calculated from the UBS yield for the Brisbane Airport bond is less than all but one of the other BBB bonds despite the Brisbane Airport bond having much higher maturity than these comparators.
49. In order to reconcile these facts one would have to assume that DRP fell as maturity rose. This is not consistent with what one would normally expect for investment grade bonds, what the AER has historically assumed in past regulatory decisions, nor is it consistent with the matched bond analysis of PwC which finds increases in DRP for the same issuer the longer the maturity.
50. This inconsistency between the long dated sample and the short dated sample illustrates why it is an error to simply reject the accuracy of a curve that is *drawn through all of the data* on the basis of a comparison of that curve with a *subset of the data* as the AER effectively does.
51. In this case the data for bonds maturing at less than 7 years provides information on where the benchmark yield is at those maturities. If one draws a curve through this data *and* long dated bonds then it may be the case that such a curve is higher than a curve drawn through only long dated bonds. However, this does not mean the curve is wrong. It simply means that the sample of long dated bonds are, once adjusted for maturity, not representative of the population as a whole. (I discuss in section 5 below how one can use mathematical modelling of bond yields to attempt to give proper weight to both short and long dated bonds.)
52. In any event, I do not believe that it is appropriate to restrict myself to this sample of bonds. One reason is that callable bond yields can be adjusted to remove any premium due to their callable nature (rather than simply excluding them outright). I perform this adjustment in the sub-section immediately below.

3.3.3. Adjusting rather than excluding callable bonds

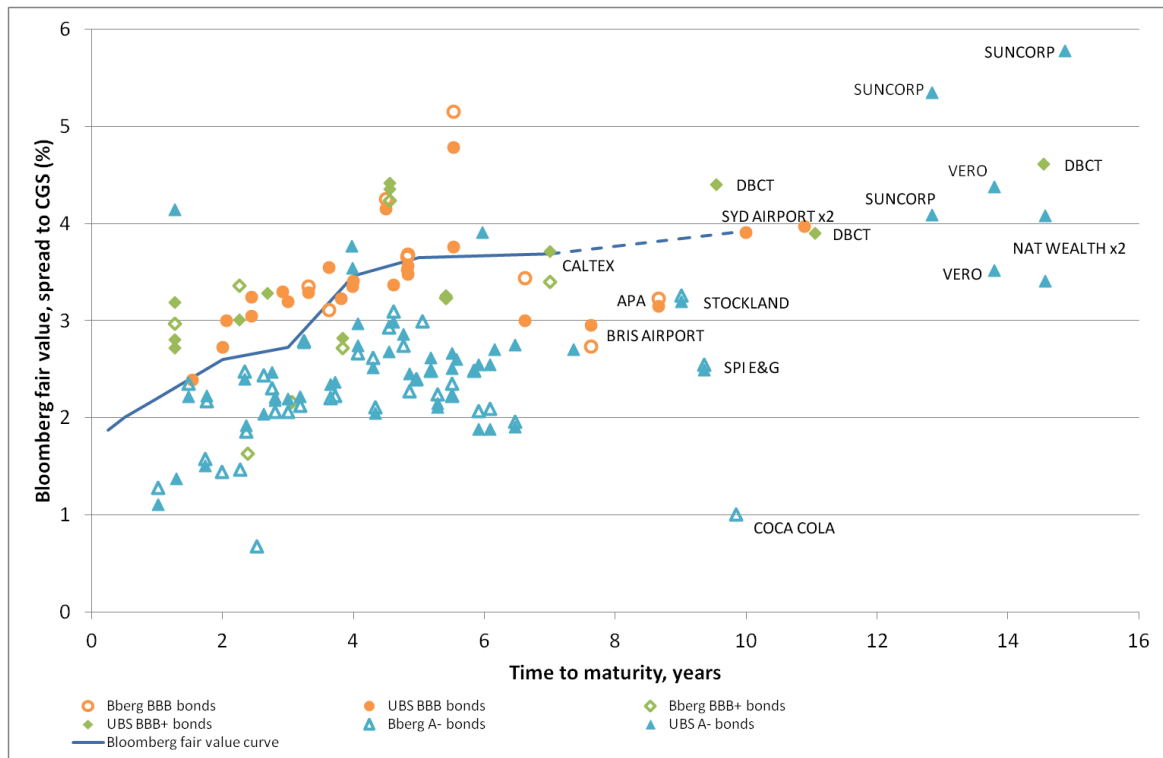
53. In the context of the appeal of JGN's access arrangement decision, the AER commissioned a report from Oakvale Capital about how to value bonds with non-standard features.¹⁰ Oakvale suggested a methodology for adjusting the yield on callable bonds to remove any impact of callability.¹¹ This methodology involves identifying option premiums embedded in the callable structure via a pricing model

¹⁰ Oakvale Capital, *Report on the cost of debt during the averaging period: The impact of callable bonds*, February 2011.

¹¹ Ibid, pp.13-16.

provided by Bloomberg. Adjusting the UBS spreads in Figure 2 using the Oakvale adjustment gives the following figure.

Figure 4: Bonds with maturity greater than one year rated BBB to A- (Oakvale adjustment applied to callable bonds)



Source: Bloomberg, UBS, RBA and CEG analysis. Maturity dates for callable bonds are final maturity date for the bond (i.e., not call date).

Note: Data sourced as an average over 21 November 2011 to 16 December 2011

54. Making the Oakvale adjustments does not materially change the pattern of bonds from that described in Figure 2.
55. The AER has also argued that UBS reports yield to call data rather than yield to maturity data for some callable bonds.¹² If correct, then this would mean that some of the callable bond yields would require a further adjustment in order to convert them from yield to call to yield to maturity.
56. I have tested whether the AER is correct by making the adjustment that the AER suggests is required to the DBCT bond that matures on 12 December 2022 but which had a call date listed in UBS as 12 December 2011. I have taken the trading margin

¹² See page 217 of the Powerlink draft decision (second dot point).



from UBS's rate sheets for that bond on 2 December 2011 (300bp to swap) and treated it 'as if' UBS intended it to be a trading margin to call date (rather than to maturity date). Assuming this to be the case, I calculate the fixed equivalent yield to maturity on the bond would be 5.26%. This is equivalent to a DRP of 1.17% (details of this calculation are set out in Appendix A).

57. In my opinion, this is not a credible estimate of the yield to maturity/DRP on this bond. My reason for this conclusion is that there are two other DBCT bonds with similar maturities that, according to the AER logic, require no adjustment (because UBS correctly identifies the maturity date of these bonds as their final maturity date). All three DBCT bonds are labelled in the figures above with the bond requiring adjustment according to the AER's logic being the middle bond with a maturity of 11 years.
58. The two bonds not requiring adjustment have similar yields/DRPs to the pre-adjustment yield/DRP of the 12 December 2022 bond. However, they have dramatically higher yield/DRPs than the post adjusted yield on the 12 December 2022 bond. In fact, the adjusted DBCT bond has a yield/DRP that is more consistent with the yield on AA+ rated State Government debt than on a BBB+ bond. It is the incongruous nature of the adjusted DBCT bond yield/DRP relative to the other DBCT bond yields/DRPs that lead me to the conclusion that the AER is incorrect to claim that all UBS trading margin information relates to the call date rather than the maturity date.

4. Having regard to foreign bond data

59. As I set out at section 3 above, I consider that the information from Australian domestic bonds is sufficient to conclude that the extrapolated Bloomberg BBB fair value curve provides a reasonable estimate for at 10-year BBB+ benchmark. However, additional cross-checks of this conclusion can be made by comparing the extrapolated Bloomberg BBB fair value curve to yield information from bonds issued by Australian companies in foreign currencies. Given the sparseness of Australian dollar denominated long dated bonds in the A- to BBB credit rating it is important to consider the information that is available from other sources. This is especially the case if the AER's proposed exclusion of callable and subordinated bonds is employed.
60. It has been observed by both the AER and Tribunal that there appear to be few bonds close to the benchmark maturity of 10 years.

There is another point worth noting about the AER's methodology. It arises out of the difficulty in identifying a sufficient number of long term bonds to determine yield. The reason a 10 year bond was originally chosen was because, in the past, many firms favoured long term debt, albeit that it came at a higher cost, because it reduced refinancing or roll-over risks. The high rate was then hedged via interest rate swaps. That may no longer be the position. If not, the AER may need to be reconsider its approach in light of more current strategies of firms in the relevant regulated industry. Further, there seems to be little point in attempting to estimate the yield on a bond which is not commonly issued.¹³

61. These comments were made in the context of the analysis of Australian dollar bonds issued in Australia. The implicit conclusion drawn in these comments appears to be that a maturity of 10 years might not be appropriate because it does not reflect the borrowing behaviour of regulated infrastructure businesses.
62. However, a significant body of evidence exists that indicates that regulated electricity and gas network businesses actually do issue long dated debt, with average time to maturity of greater than 10 years.¹⁴ The seeming inconsistency of this with the above quote from the Tribunal can be reconciled by observing that a significant proportion of long-dated debt issued by these firms is not issued in Australian dollars but rather in foreign currencies.¹⁵ That is, the assumption that regulated firms issue 10 year debt is not wrong. Rather, it is just that much of these firm's long term debt is issued in foreign currencies.

¹³ Australian Competition Tribunal, Application by ActewAGL Distribution [2010] ACompT 4 (17 September 2010), para 72.

¹⁴ See section 2.1 of, CEG, Critique of AER Rule Change Proposal, A report for ETSA, Powercor and Citipower, December 2011.

¹⁵ See for instance, EUAARCC Rule Change Proposal, 17 October 2011, p. 14



63. I also note that the Tribunal's reference to hedging interest rate risk on domestic debt issues has a parallel in the hedging of currency risk on foreign denominated debt issues by businesses – a process that I discuss below.
64. It is notable that analysis to date on observed bond yields has not generally encompassed Australian bonds issued in foreign currencies. A possible explanation for this is that until quite recently, debate in this area mainly focused on which of Bloomberg or CBASpectrum (or most recently just Bloomberg) fair yields were the best fit to the observed data. Because these sources did not rely upon foreign currency bonds it seemed natural not to do so in analysing them.

4.1. Can yields on foreign currency bonds be expressed on an Australian dollar basis?

65. One barrier to the inclusion of foreign currency bonds in the determination of an Australian benchmark bond rate is that yields expressed in foreign currencies cannot be readily compared to Australian dollar yields. Future coupon payments and the return of principle must be assessed at their expected value in Australian dollar terms in order to determine the converted yield.
66. In practice, businesses that issue bonds in foreign currencies often immediately convert these bonds to Australian dollar equivalents using an instrument known as a "cross currency swap". For a bond issued in United States dollars, a business would enter into a swap agreement (or series of swap agreements) where it would receive an amount in US dollars that would cover its coupon and principle liabilities on the US dollar bond. In return, it would promise to pay its counterparty an amount denominated in Australian dollars.
67. By entering into a cross currency swap, the foreign currency bond is converted to an Australian dollar bond without currency risk to the issuer (beyond that inherent in the default of the counterparty to the swap). The converted yield reflects the market cost in Australian dollars of issuing the bond in US dollars. This is a common practice for Australian companies, including Australian regulated businesses. For example, CEG has been informed by ETSA that it raises US dollar debt which it then swaps back into Australian dollars in this manner.¹⁶

4.2. How does CEG convert foreign currency bond yields to Australian dollar terms?

68. The principles governing the pricing of cross-currency swaps are clear. The conversion is based on observable market instruments indicating investors' expectations about future currency movements.

¹⁶ See, CEG, *Critique of AER Rule change proposal, a report for ETSA Utilities, Powercor and Citipower*, December 2011.



69. Bloomberg's "XCCY" function estimates cross-currency swap rates between any pair of currencies for given characteristics, such as maturity, coupon payments and payment frequency.
70. Given the number of foreign currency bonds issued in Australia (over 1000, with 20 days of data for each over the averaging period) it is not practicable to use this function to convert each bond on each day of the averaging period. Instead, tables of cross currency swap rates associated with a range of maturity-yield pairs were produced for each currency and interpolation over these points used to convert foreign currency yields into Australian dollar terms. The technique is explained in greater detail at Appendix B below.

4.3. Is inclusion of Australian bonds issued in foreign currencies consistent with the Rules?

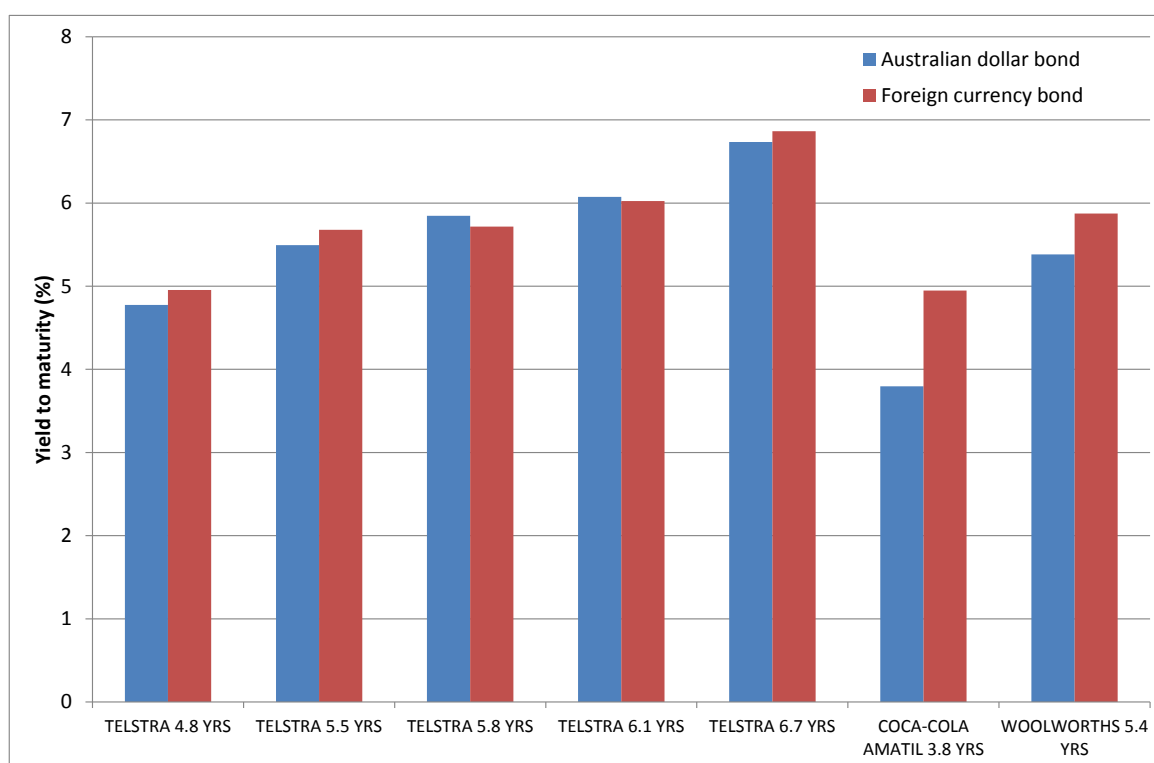
71. Rule 87(1) of the NGR requires that the rate of return on capital is to be commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services. The obvious question is whether a strategy that involves an Australian company issuing foreign currency bonds and swapping them back into Australian dollars using market swap rates constitutes a source of funding that is within 'the market for funds' as per 87(1).
72. In my opinion, the answer is that the cost of funding using such a strategy should be considered either part of the market for funds, or relevant to the cost in the market for funds, to the extent that:
- Australian businesses, including regulated businesses, engage in such funding strategies for a substantial portion of their debt; and/or
 - The existence of such a strategy for both borrowers and lenders constrains the yields that can exist on bonds issued in Australian dollars.
73. Australian businesses do engage in foreign currency bond issues which are swapped back into Australian dollars. The evidence provided by ETSA and referred to above is an example. More generally, the fact that we identify many bonds issued by Australian companies in foreign currencies supports the conclusion that this is an important source of funding for Australian companies.
74. However, even if very few Australian companies issued foreign currency bonds, the potential for an Australian company to do so would place a cap on the interest rate that it was prepared to pay on a bond issued in Australia. Similarly, the potential for a lender to buy a bond denominated in a foreign currency and swap it back into Australian dollars places a floor under the yield that they will accept for lending to a similarly risky entity in Australia.
75. For these reasons, it is my view that the yields on foreign currency bonds issued by Australian companies are at least relevant to an assessment of the conditions in the market for funds from which Australian companies raise debt. As such, the cost of

funding using such a strategy can, at the minimum, be used as a cross-check on the analysis of Section 3 where we restrict ourselves to bonds issued in Australian dollars.

4.4. Are swapped foreign currency yields consistent with domestic yields

76. I have compared the swapped yield on the foreign currency bonds relied upon in this report (ie, those issued by Australian firms rated BBB- to A) with the yields on Australian dollar bonds issued by the same firm, with the same rating and with a term to maturity that is within half a year of the foreign currency bond. This comparison captures six bonds which are shown in Figure 5 below.

Figure 5: Comparison of yields on swapped foreign currency bonds and AUD bonds by the same issuer and with similar maturity



Source: Bloomberg, CEG analysis

77. This chart demonstrates that the yields are broadly comparable on bonds by the same issuer. Sometimes the swapped yield is higher than the AUD yield and sometimes it is lower but the differences are not significant. The only exception relates to the Coca-Cola Amatil bond where where the Australian dollar yield looks low compared to the swapped foreign currency yield. This not a surprise given the analysis in section 7.4.2 which demonstrates that there is a downward bias in Bloomberg's estimate of the Australian dollar yield for this bond.
78. I consider that Figure 5 provides strong evidence to suggest that the yields on swapped foreign currency bonds issued by Australian firms are likely to be a



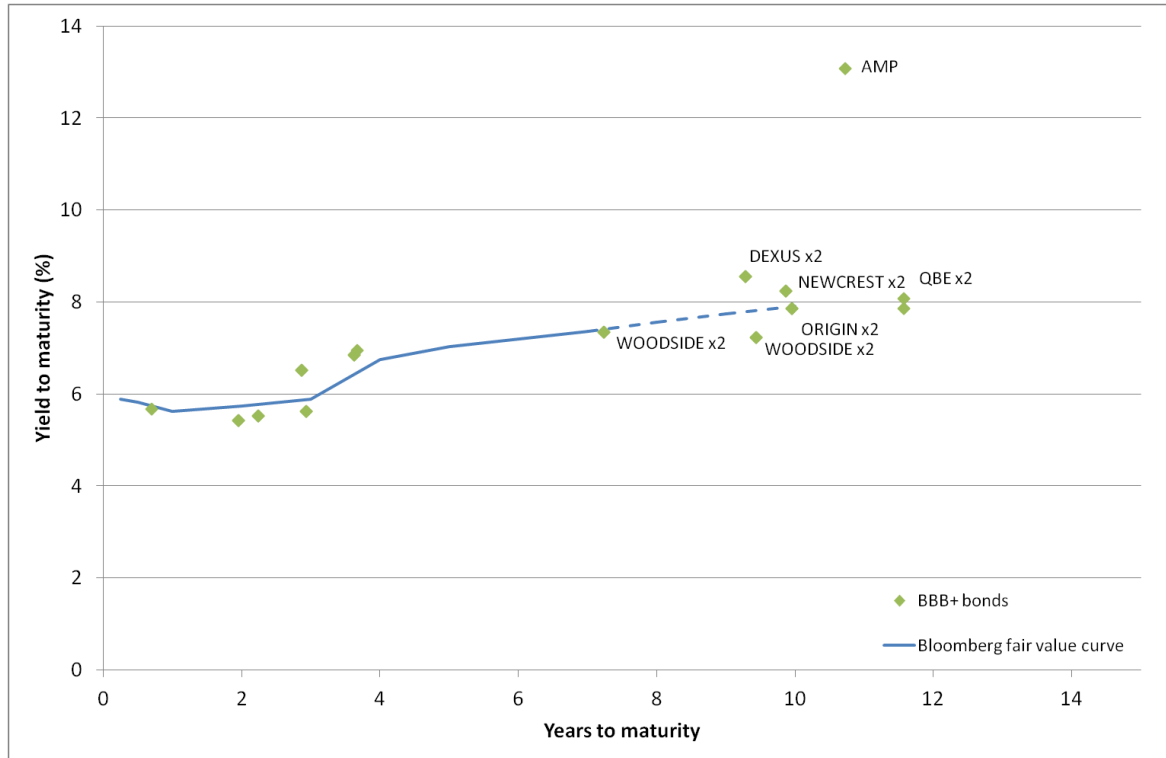
reasonable estimate for how similar bonds would trade (or be assessed) if issued in Australian dollars.

4.5. Data analysis and conclusions

79. The following charts show the yields on bonds issued by Australian companies in a foreign currency once these are swapped into Australian dollars. These yield observations are compared with the extrapolated Australian BBB Bloomberg fair value curve. All of the data on foreign currency yields is sourced from Bloomberg as are the cross currency swap rates used to convert these into Australian dollars.¹⁷
80. I have chosen to exclude all callable bonds that are not make-whole callable from this analysis. This is not because I believe that callable bonds should be excluded from the analysis. Rather, I do so because the treatment of callable bonds is a point of contention between the AER and myself and I wish to make distinct the impact of including foreign currency bonds from the impact of including callable bonds. Moreover, as will become clear in the following analysis, there are sufficient non-callable foreign currency bonds such that one can draw clear conclusions from the additional information. It is, therefore, not necessary to rely on callable bonds, and any contested adjustments thereto, in order to reach a conclusion on the reasonableness of the extrapolated Bloomberg BBB fair value curve.
81. In particular, there are a sufficient number of long dated BBB+ and similarly rated foreign currency bonds issued by Australian companies to allow a robust check on whether the extrapolated Australian Bloomberg BBB fair value curve is consistent with this data.

¹⁷ Foreign currency yields have been sourced from Bloomberg's BVAL pricing source.

Figure 6: Yields on BBB+ bonds issued by Australian companies in a foreign currency swapped into Australian dollars

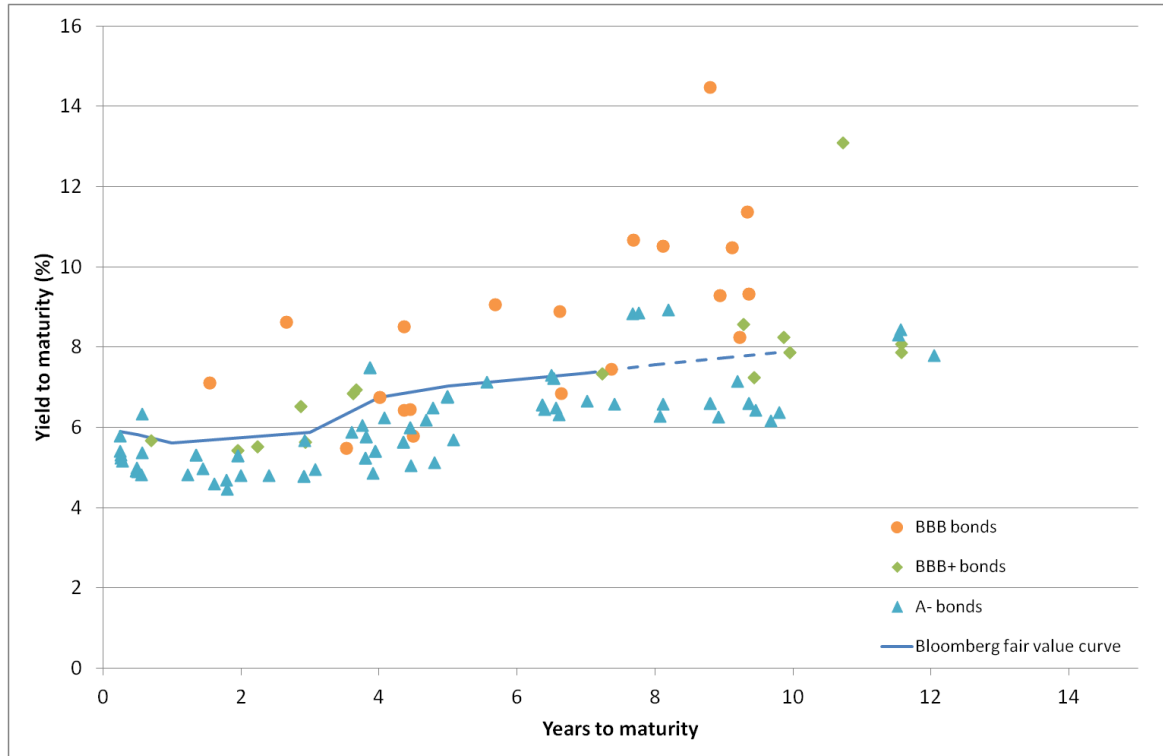


Source: Bloomberg and CEG analysis

Note: Data sourced as an average over 21 November 2011 to 16 December 2011 using cross-currency swap information as at 2 December 2011.

82. As can be seen in the above figure, the yields on BBB+ foreign currency bonds issued by Australian companies and swapped back into Australian dollars provides a very good fit to the extrapolated Bloomberg fair value curve, with the possible exception of the AMP bond.
83. Following the same logic as was applied in the context of the analysis of Australian currency bonds issued by Australian companies, I now extend the relevant sample to include A- to BBB rated bonds.

Figure 7: Yields on A- to BBB bonds issued by Australian companies in a foreign currency swapped into Australian dollars



Source: Bloomberg and CEG analysis

Note: Data sourced as an average over 21 November 2011 to 16 December 2011 using cross-currency swap information as at 2 December 2011.

84. In this case the foreign currency bonds show a clearer pattern than the Australian currency bonds, with:
- BBB+ bond yields (swapped into Australian dollar terms) sitting mostly on or very close to the extrapolated Australian Bloomberg BBB fair value curve (the curve);
 - BBB bonds sitting mostly above, but sometimes below, the curve; and
 - A- bonds sitting mostly below, but sometimes above, the curve.
85. This foreign currency bond data provides support for my earlier conclusion, based on Australian currency bonds, that there is no basis for concluding that the extrapolated Australian Bloomberg BBB fair value curve does not provide a good fit for the available data.

5. Making explicit use of all bond data – constructing alternative fair value curves

87. Since the Tribunal's decision in ActewAGL¹⁸ it has been common practice to assess a benchmark estimate for a 10-year BBB+ DRP by reference to reported yields across credit ratings between BBB and A-. The AER now also has reference to this range of credit ratings in assessing the DRP.¹⁹
88. Although the AER explains the inclusion of BBB and A- rated bonds in its sample with reference to their 'similarity' to the benchmark bond, this is not identical to the reasoning by the Tribunal when it considered the evidence from these bonds:²⁰

In the Tribunal's view, if it were reasonable not to include A- and BBB bonds in the population (because they are not representative of BBB+ bonds), it was unreasonable for the AER not to consider whether useful information could be obtained from taking these bonds into account without including them in the population. That A- yields sat above BBB+ yields should have indicated to the AER that by use of its methodology it may not have selected the fair value curve most likely to provide the best estimate of the benchmark bond yield.

89. In the quote above, the Tribunal is specific that the AER should have had regard to the yields on A- and BBB bonds, not because they were 'representative of' (or similar to) BBB+ bonds, but because they provided information that was potentially relevant to the assessment of the best estimate of the benchmark yield.
90. Similarly, the AER in its Aurora and Powerlink draft decisions includes in its bond sample only bonds with maturities of between 7 and 13 years. By doing so, the AER makes no use of the information that is embodied in bonds with shorter maturities, or the Bloomberg fair value curves.²¹ In fact, the AER draft decisions for Powerlink and Aurora do not show charts of the type that I have shown previously – where all bond yield data, including at short maturities, is included in the chart.
91. For the reasons explained in the next section, this failure to properly use information on shorter dated bonds to assess the reasonableness of its long dated bond sample leads the AER into error. I have taken this information into account in the previous

¹⁸ Application by ActewAGL Distribution [2010] ACompT 4 (17 September 2010)

¹⁹ See for example, AER, *Draft distribution determination: Aurora Energy Pty Ltd*, November 2011, p. 249

²⁰ Application by ActewAGL Distribution [2010] ACompT 4 (17 September 2010), para. 63

²¹ It is the case that the AER includes a 'sensitivity' where it includes all maturities between 5 and 15 years. However, it makes no use of yields on bonds with fewer than 5 years maturity (which, for the reasons described in the following section leads it into error) and even the 5 to 15 year 'sensitivity' is very crude. The AER simply takes an average of all bond yields in this range and makes no adjustment for the fact that, with the exception of one 15 year DBCT bond, the weight of the sample is very much biased to bonds with lower maturities than 10 years – as can be seen from Figure 2 noting that the AER exclusion of callable bonds and subordinated bonds would exclude all the A- bonds with maturities greater than 10 years in that figure.



sections in a qualitative manner. Specifically, by placing all the yield data points, including at short maturity, on a graph and visually assessing whether the Bloomberg fair value curve is a good fit to that data. This approach ensures I do not incorrectly conclude that the 'true' fair value curve passes through a small sample of long dated bond yields when this conclusion would mean that such a curve must pass well below a larger sample of short dated bond yields.

92. I consider that this visual assessment is an appropriate basis on which to proceed for the purpose of testing whether there is a reason to depart from the Bloomberg fair value curve (which I consider is the appropriate default option for the reasons set out in section 2).
93. An alternative approach is the approach I adopt in this section, which is to use modelling techniques to estimate an alternative fair value curve based on data greater range of credit ratings. This approach is reasonable as an additional cross-check on the reasonableness of the Bloomberg fair value. It is also an appropriate approach if one decided that an alternative to the Bloomberg fair value curve was required.
94. Both of the approaches adopted by me are consistent with the Tribunal's reasoning. The Tribunal's reasoning would justify reliance upon bonds of any credit rating or maturity, where these provide information that is relevant to assessing the benchmark yield. However, trying to use information from, say, two year A bonds to inform the yield on a 10-year BBB+ benchmark bond entails a greater degree of complexity than simply comparing yields to the benchmark.
95. In essence the AER's current practice in forming a sample of only BBB, BBB+ and A-rated bonds with maturities of 7 to 13 years to estimate the benchmark amounts to an implicit assessment that any adjustments required to compare yields across these credit ratings and maturities will be small. The exclusion of other credit ratings/maturities from the AER analysis implicitly reflects an assumption that required adjustments for these differences are both large and uncertain (possibly why the AER has not also considered BBB- and A bonds, for example).
96. However, it is not necessary to assume negligible adjustments between adjacent credit ratings or maturities and set aside the large amount of information available at other credit ratings and maturities when these factors are capable of being assessed qualitatively (as I have done in previous sections) or estimated empirically. In this section, I use the functional form for bond yields introduced by Nelson and Siegel²² as a framework for processing the bond yield evidence from a much wider sample of bonds than relied upon by the AER.
97. I estimate Nelson-Siegel yield curves on three alternative datasets of bonds, relying upon progressively larger datasets. In all cases I find results similar to the

²² Nelson, C.R., and Siegel, A.F. "Parsimonious Modeling of Yield Curves", *The Journal of Business*, Vol. 60, No. 4. (Oct., 1987), pp. 473-489.



extrapolated Bloomberg BBB fair value estimate and considerably higher than the results of the AER's methodology as proposed for Aurora and Powerlink. I consider that the application of this methodology provides compelling evidence that the preponderance of bond yield data is supportive of a 10 year BBB+ Australian corporate bond DRP consistent with the extrapolated Bloomberg fair value curve figure of 3.92% per annum.

5.1. Yield curve functional form

98. I have applied a yield curve functional form based on the method introduced by Nelson and Siegel. Nelson and Siegel first used their technique to approximate yield curves for US Treasury bills. This functional form is widely used in the empirical finance literature on yield curves. For example, Christensen et al. state:

Our new AF model structure is based on the workhorse yield-curve representation introduced by Nelson and Siegel (1987). The Nelson-Siegel model is a flexible curve that provides a remarkably good fit to the cross section of yields in many countries, and it is very popular among financial market practitioners and central banks (e.g., Svensson, 1995, Bank for International Settlements, 2005, and Gurkaynak, Sack, and Wright, 2006).^{23 24}

99. The Nelson Siegel model provides a flexible functional form that allows for a variety of shapes one would expect a yield curve might take but which also limits the amount of computing power required to estimate the relevant parameters.

5.1.1. Nelson-Siegel method

100. The functional form used is as set out below:

$$Yield(t, rank) = \beta_{1,rank} + (\beta_2 + \beta_3) \frac{1 - e^{-t/\beta_0}}{t/\beta_0} - \beta_3 e^{-t/\beta_0}$$

101. Conceptually, parameter $\beta_{1,rank}$ can be interpreted as a long-term component (which never decays), β_2 as a short-term component (its loading starts nearly at 1, and then decays over term to maturity), β_3 as a medium-term component (its loading starts at zero, then peaks at some point, and then decays to zero again), and β_0 as a parameter characterising the speed of decay of the short-term and medium-term effects. Therefore, as the term to maturity increases, the estimated yield goes to

²³ Christensen, Diebold and Rudebusch, "The affine arbitrage-free class of Nelson-Siegel term structure models", Journal of Econometrics, Volume 164, Issue 1, 1 September 2011, Pages 4-20

²⁴ See, also Robert R. Bliss. "Testing Term Structure Estimation Methods". Federal Reserve Bank of Atlanta, Working Paper 96-12a, November 1996; Elton, Edwin J. Martin J. Gruber, Deepak Agrawal, and Christopher Mann. "Explaining the Rate Spread on Corporate Bonds". The Journal Of Finance, Vol. LVI, No. 1 (February 2001).



$\beta_{1,rank}$ rather than to infinity as it would if I had adopted a linear or quadratic specification. The above parameters $rank$ and t refer to the bond's credit rating and its term to maturity, respectively.

102. This functional form gives the curve the flexibility to take on many different shapes (from monotonically increasing to hump shaped) which allows the curve to be fitted to the data rather than enforcing a shape that may not be consistent with the underlying data.
103. I use this specification in order to estimate the yield curve for bonds that all have the same credit rating. However, by allowing β_1 to vary across credit ratings. By doing so, I am effectively assuming that the shape of the curve is the same for all credit ratings but the level of the curve is different.
104. I consider that this is a reasonable assumption – especially for credit ratings that are similar to each other. That is, I consider that it is reasonable to assume that the underlying shape of the A- and BBB fair value curves is very similar to that of the BBB+ curve. By fitting a different value for β_1 for each credit rating, I am able to use data from A- to BBB in order to inform the shape of the yield curve.
105. I assume that $\beta_{1,A} \leq \beta_{1,A-} \leq \dots \leq \beta_{1,BBB-}$. With this adaptation, I estimate $\beta_0, \beta_{1rank}, \beta_2, \beta_3$ to minimise the sum of squared errors between the fair yield curves and the reported yield data.
106. It is worth noting that the regression above is non-linear due to the inclusion of the speed-of-decay parameter β_0 , and many statistics used to evaluate goodness of fit of a linear regression are not suitable for this model.

5.1.2. Yield to maturity versus zero-coupon yield curve

107. I first perform my analysis using yield to maturity (YTM) and term to maturity of each bond as the input data. This results in fitted YTM curves consistent with the Bloomberg fair value curve and consistent with the standard way in which bond data has been analysed in regulatory proceedings to date.
108. I then perform analysis using bond prices, terms to maturity, and coupons as the input data. This allows me to estimate a zero-coupon yield curve (a.k.a. the “spot rates curve” or “spot curve”). A point on a zero coupon yield curve, say at 10 years, represents the discount rate that should be applied to a payment that will be made in 10 years – with no payments between now and then. By contrast, the 10 year point on an YTM curve is the discount rate that, if applied to the final return of principle and all coupons paid before then, will give the present value of the bond's future payments equal to its assessed price.
109. The zero coupon yield at 10 years maturity is not directly comparable to the 10 year yield to maturity from the extrapolated fair value curve – with the latter being an average discount rate applied to coupons and principle while the former is the discount

rate applied to 10 year principle only. However, a comparable yield to maturity value can be calculated from the zero coupon curve by solving for the fixed coupon rate that would be necessary for a ten year bond to trade at par. I perform and report the results of these calculations below.

110. The YTM curve is technically simpler to estimate since all it requires is yield and maturity date information on the bond population to which the model is applied. By contrast, the spot curve is more computationally intensive but has the potential advantage that the estimated discount rates do not depend on the distribution of bonds' coupon rates in the sample.
111. There are seldom any direct observations of zero-coupon yields (they would only be observed for zero-coupon bonds). Hence, it is necessary to start with an assumed spot curve and then use it to compute the present value of all the future payments on each bond in my sample. This gives an estimated or "fitted price" for each bond in the sample. This "fitted price" of the bond then can be compared to its actual price to evaluate the quality of fit. A computer program is then used to repeat this process for different values of spot curve's parameters until the best fit to the data is made.
112. This more complex version of the Nelson-Siegel model gives rise to the following set of equations. Let:

$$r(t, rank) = \beta_{1,rank} + (\beta_2 + \beta_3) \frac{1 - e^{-t/\beta_0}}{t/\beta_0} - \beta_3 e^{-t/\beta_0}, \text{ rank} = A, A-, \dots, BBB -$$

be the discount rate curve, where t refers to the time to the bond's next payment, which is to be discounted at rate $r(t, rank)$ and $rank$ stands for bond's credit rating (as before, I allow the long-run values of the discount rates to vary, depending on the perceived bond's riskiness, as characterised by its credit rating).²⁵ Then, parameters $\beta_0, \beta_{1,rank}, \beta_2, \beta_3$ are chosen to minimise the weighted sum of squared pricing errors

$$\min \sum_{i=1}^N [w_i (P_i^A - \hat{P}_i)]^2$$

where $w_i = \frac{1}{\sum_{k=1}^N \frac{1}{d_k}}$, d_i is Macaulay duration of bond i , N is the total number of bonds in the sample, P_i^A is the actual 'dirty' price of bond i , and \hat{P}_i is the fitted price of bond i , defined below:

²⁵ Again, I assume that the long-term value of the discount rate for low-risk bonds is not higher than for high-risk bonds, that is, $\beta_{1,A} \leq \beta_{1,A-} \leq \dots \leq \beta_{1,BBB-}$.



$$\hat{P}_i = \sum_t C_{it} e^{-r(t, rank)*t},$$

where C_{it} is a cash flow on bond i promised to be paid t years from now.

113. The method described above provides the estimates of discount rates for bonds of different maturity and credit ratings. However, the BBB+ 10-year discount rate will not fully reflect the cost of debt associated with issuing a 10-year coupon paying bond. To the extent that what we are interested in the coupon rate on a bond issued at par then one needs to calculate this coupon rate from the estimated zero-coupon rates. I do this to arrive at “par-yield” curves – ie, coupon rates that would price a bond at par, given discounting based on the zero-coupon yield curve.

5.1.3. Bond yield data

114. In setting up the dataset for this analysis I have been careful to exclude all bonds issued by:

- sovereign governments and their agencies;
- state or provincial governments;
- local or municipal authorities;
- supranational bodies that are supported by governments; and
- bonds explicitly guaranteed by sovereign governments.

115. I have also excluded all bonds that are callable, but not make whole callable, from the analysis. This is not because these bonds do not contain information relevant to the benchmark yield but is a simplification I have made:

- to avoid a point of contention between the AER and myself on this issue; and
- due to the extra manual calculations that would be needed to estimate the yield adjustments required to each of these bonds to remove the value of the call options.

116. All yields have been sourced from UBS or Bloomberg, or an average of the two if both are available. I have not attempted to identify and exclude potential outliers from this sample. This means that I have not excluded from this analysis the low-yielding Coca Cola Amatil or SPI E&G bonds whose inclusion in the AER’s much smaller sample of bonds I object to.

5.2. Estimation of a YTM fair value curve

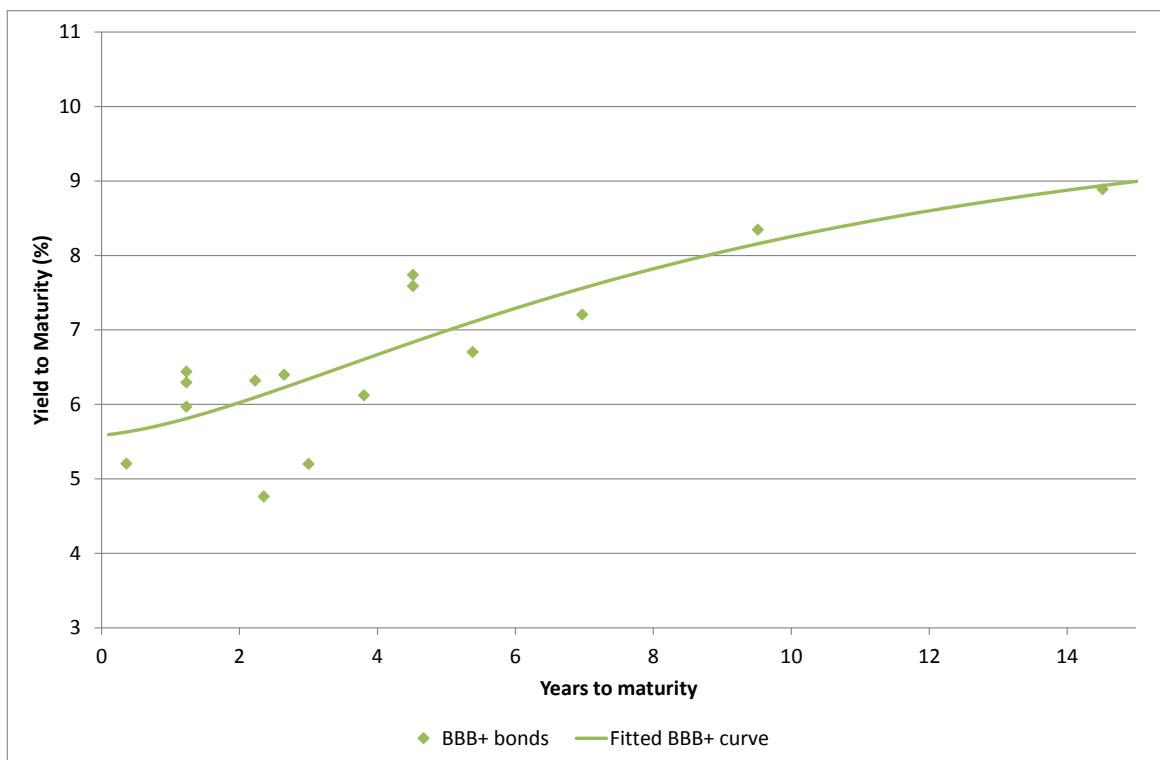
117. I have estimated the Nelson-Siegel equations across three bond populations of bonds issued by Australian companies. Initially I apply the technique to BBB to A- Australian dollar bonds, effectively the same population of bonds identified at section 3 above. I

then expand this sample further by having regard to BBB to A- bonds issued by Australian issuers in foreign currencies. Finally, I apply the technique across bonds issued by Australian corporate issuers with credit ratings with Standard and Poor's between BBB- and A.

5.2.1. Australian issued Australian dollar bonds rated BBB+ only

118. I estimate the YTM yield curves across 15 bonds issued by Australian firms in Australian dollars, rated BBB+ only by Standard and Poor's. The curve estimates across this dataset is shown in Figure 8 below.

Figure 8: Australian issued Australian dollar bonds rated BBB+ only



Source: Bloomberg, UBS, RBA and CEG analysis

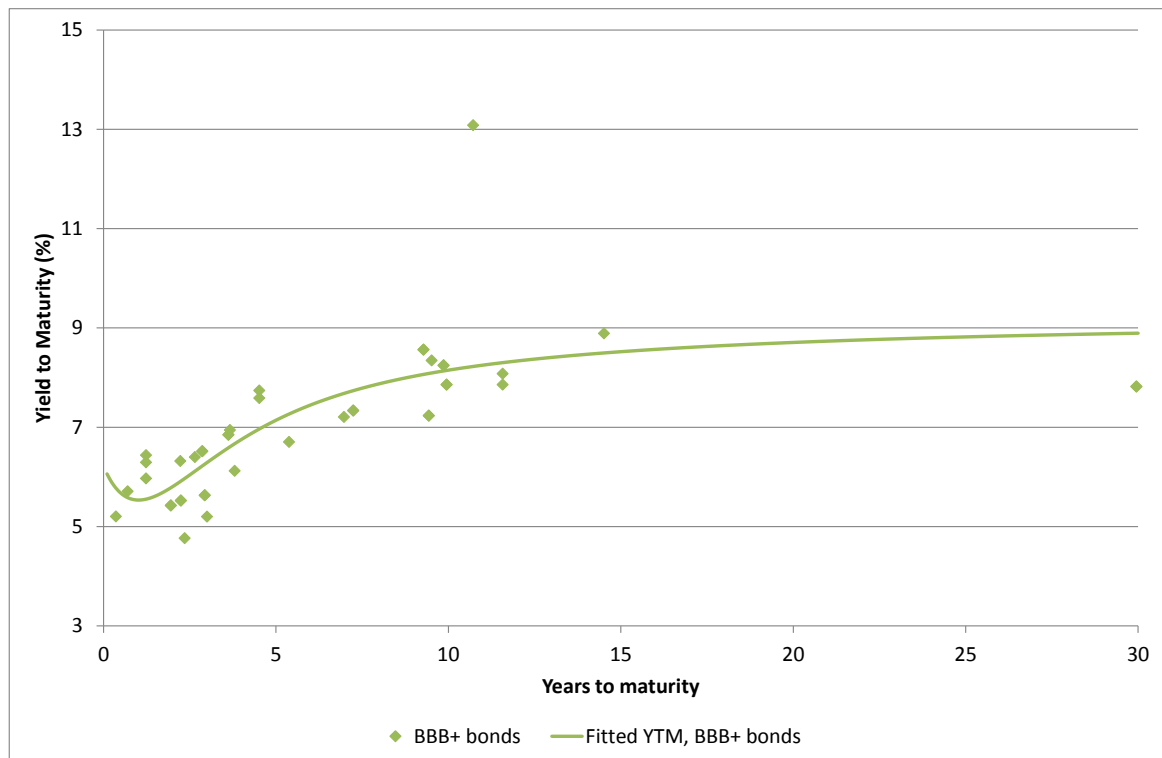
Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

119. At 10 years, the BBB+ yield is estimated to be 8.25%, equivalent to a DRP of 4.24%. This compares with the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.2.2. Australian issued bonds rated BBB+ only

120. Further including foreign currency bonds issued by Australian companies (swapped back to Australian dollars) increases the dataset of bonds to 42. The curve estimated across this larger dataset is shown in Figure 9 below.

Figure 9: Australian issued bonds rated BBB+ only



Source: Bloomberg, UBS, RBA and CEG analysis

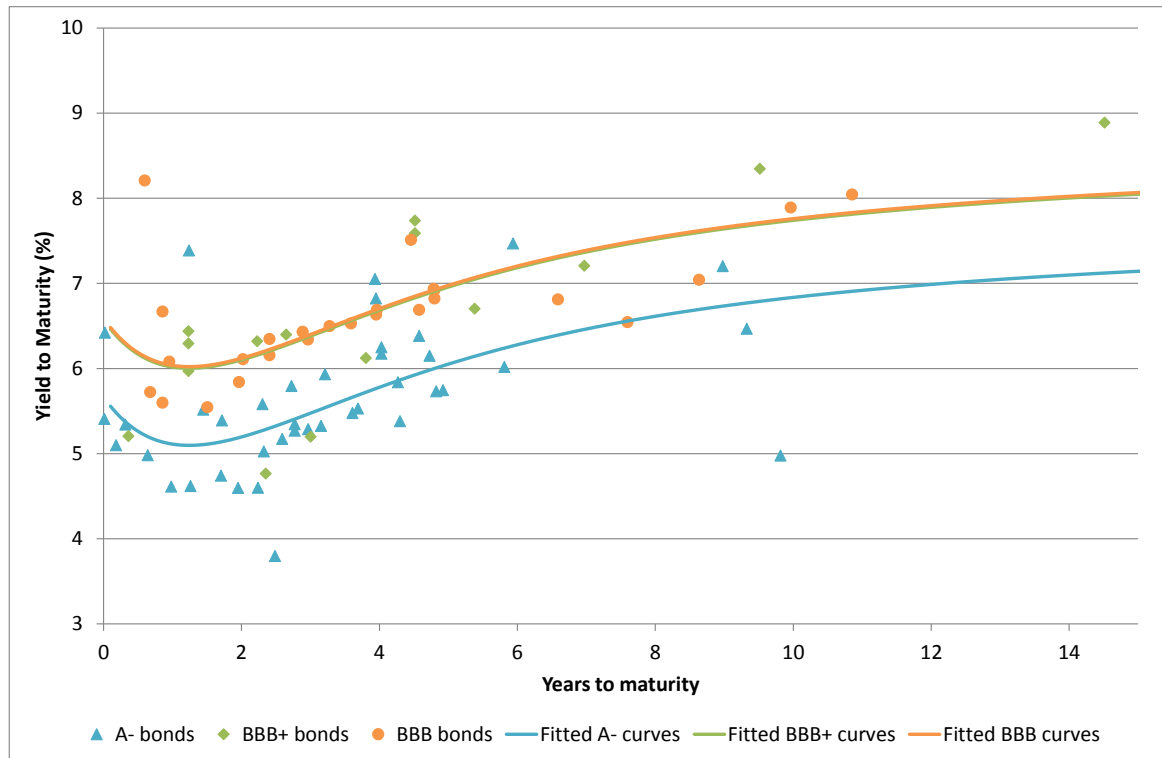
Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

121. At 10 years, the BBB+ yield is estimated to be 8.15%, equivalent to a DRP of 4.14%. This compares with the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.2.3. Australian issued Australian dollar bonds rated BBB to A-

122. I estimate the YTM yield curves across 80 bonds issued by Australian firms in Australian dollars, rated BBB to A- by Standard and Poor's. I generate fair value curves for each of the BBB, BBB+ and A- credit ratings from this dataset.
123. The BBB+ curve estimated on this dataset is coincident with the BBB curve. This is a reflection of the dataset used which, as demonstrated in Figure 10 below, does not show a material difference in average yields for BBB and BBB+ bonds. By contrast, the A- fair value curve does have a materially lower yield.

Figure 10: Australian issued Australian dollar bonds rated BBB to A-



Source: Bloomberg, UBS, RBA and CEG analysis

Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

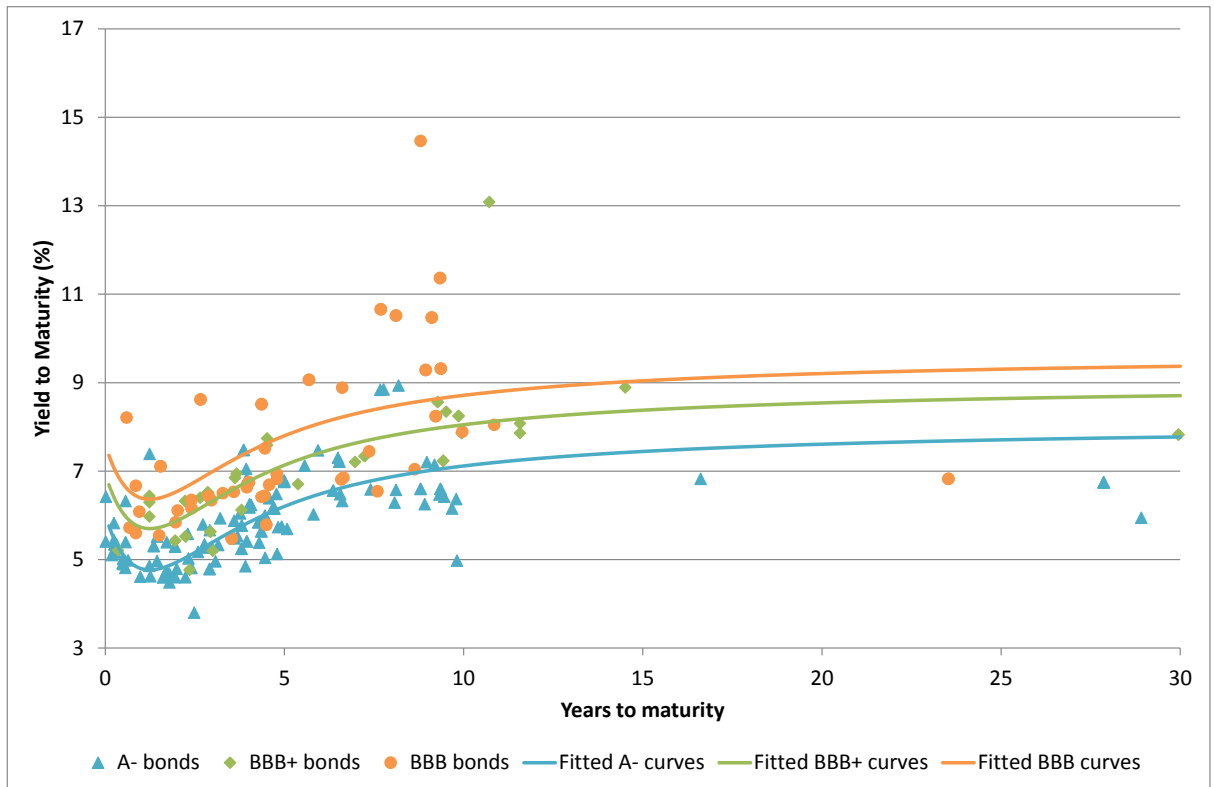
124. At 10 years, the BBB+ yield is estimated to be 7.74%, equivalent to a DRP of 3.75%. This compares with the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.2.4. Australian issued bonds rated BBB to A-

125. Further including foreign currency bonds issued by Australian companies (swapped back to Australian dollars) increases the dataset of bonds by 143 bonds (giving 223 observations in total) is available if yields on foreign currency bonds rated BBB to A- issued by Australian firms are also used.²⁶ Curves estimated on the augmented dataset are shown in Figure 11 below.

²⁶ Where these yields are swapped into Australian dollar terms using the process described at section 4.

Figure 11: Australian issued bonds rated BBB to A-



Source: Bloomberg, UBS, RBA and CEG analysis

Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

126. I note that once these foreign currency bonds (swapped back into Australian dollar terms) are included in the sample the estimated BBB fair value curve is clearly above the estimated BBB+ fair value curve.

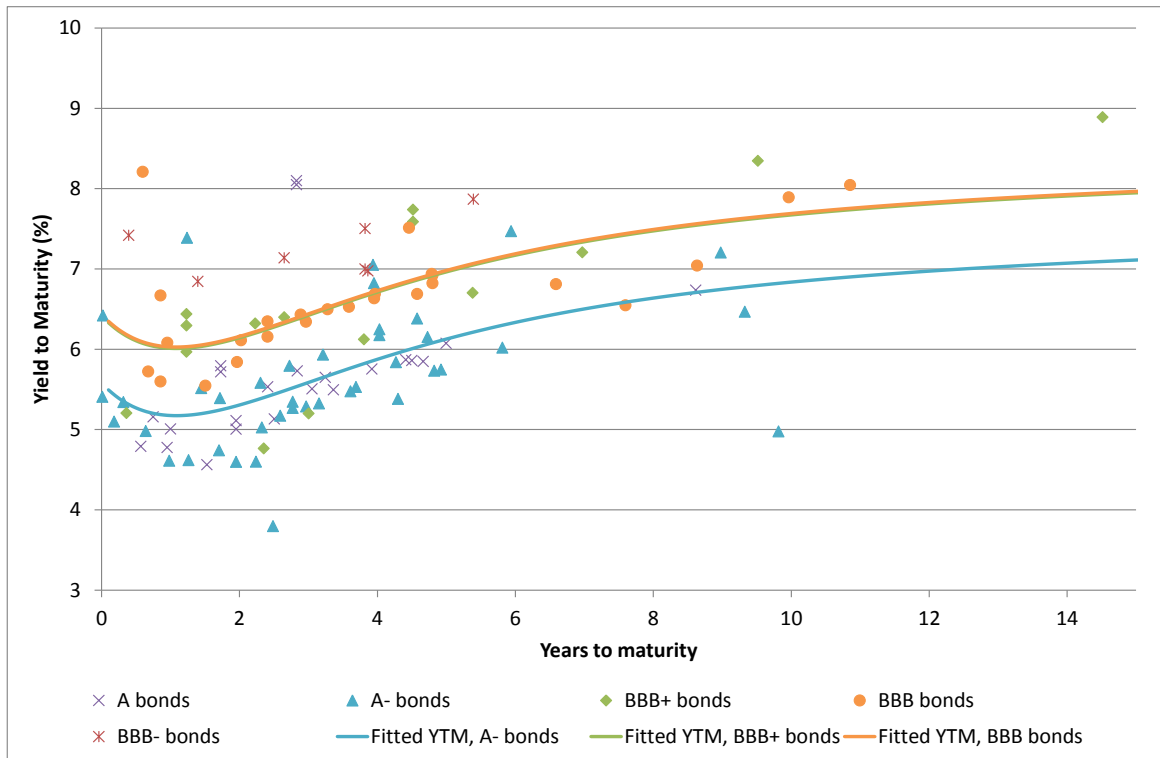
127. At 10 years, the BBB+ yield is estimated to be 8.05%, equivalent to a DRP of 4.06%. This compares with the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.2.5. Australian issued Australian dollar bonds rated BBB- to A

128. The generality of the technique described in this section is such that it can be applied to utilise yield information obtained from a wider range of credit ratings. It is important to note that the information obtained from other credit ratings would not be expected to have an effect on the level of the BBB+ curve *per se*, but could provide information that would affect its shape and therefore the yield estimate at 10 years.

129. Consideration of a wider dataset of Australian dollar bonds rated between BBB- and A gives a population of 110 bonds. Curves estimated on this dataset are shown in below.

Figure 12: Australian issued Australian dollar bonds rated BBB- to A



Source: Bloomberg, UBS, RBA and CEG analysis

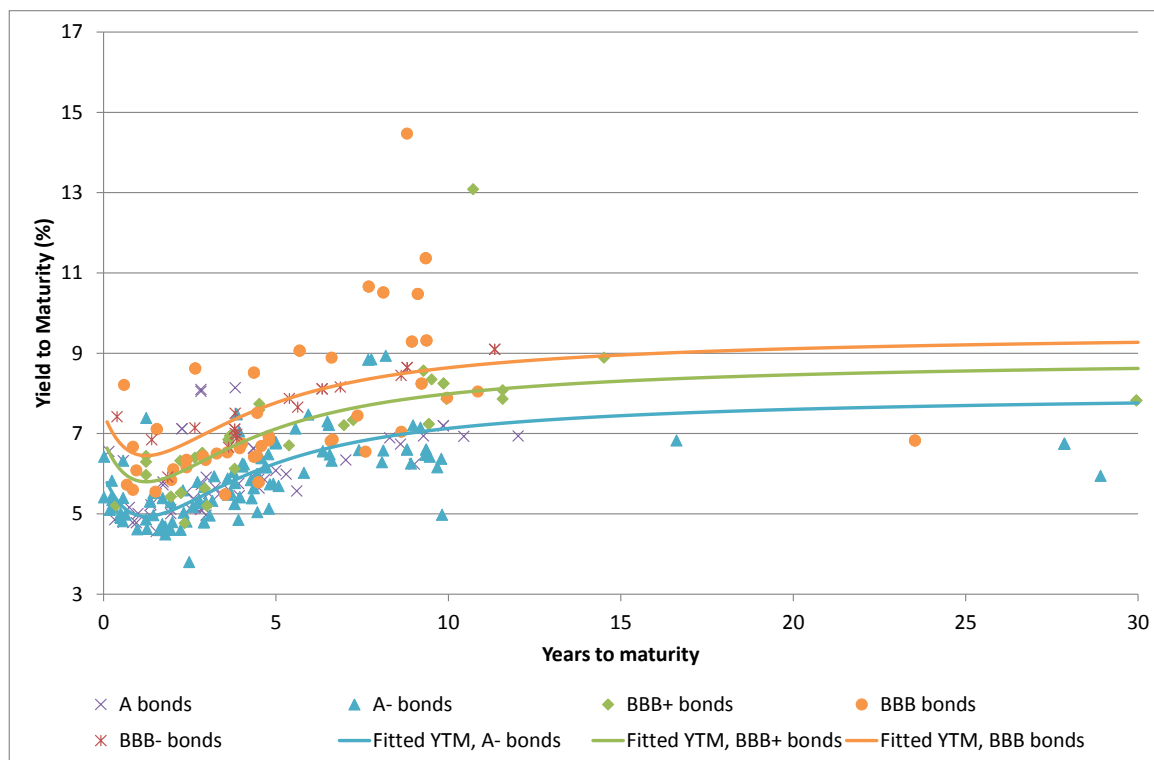
Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

130. At 10 years, the BBB+ yield is estimated to be 7.67%, equivalent to a DRP of 3.68%. This compares with the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.2.6. Australian issued bonds rated BBB- to A

131. Extending the dataset further to include all Australian issued bonds (including foreign currency bonds swapped back to Australian dollars) rated between BBB- and A gives a population of 297 bonds. Curves estimated on the augmented dataset are shown in Figure 13 below.

Figure 13: Australian issued bonds rated BBB- to A



Source: Bloomberg, UBS, RBA and CEG analysis

Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

132. At 10 years, the BBB+ yield is estimated to be 7.99%, equivalent to a DRP of 4.00%. This compares to the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.3. Application of zero coupon Nelson-Siegel yield curves to estimate par yield curves

133. I describe in section 5.1.2 the process of how I estimate zero-coupon yield curves using the Nelson-Siegel approach and estimate from these par yield curves. I have conducted this analysis for the samples of Australian issued Australian dollar bonds considered in section 5.2 above. It would be computationally complex to use bonds issued in foreign currency in the construction of this curve as each coupon would need to be swapped back into Australian dollars individually (rather than each bond). The par yield curves are derived so as to have a single (ie, annualised) coupon for easier interpretation.
134. In each of the diagrams below the par yield curves are shown in isolation without the backdrop of observations. This is not because the curves do not use information from the bond yield observations (in fact, they use more information than the yield to

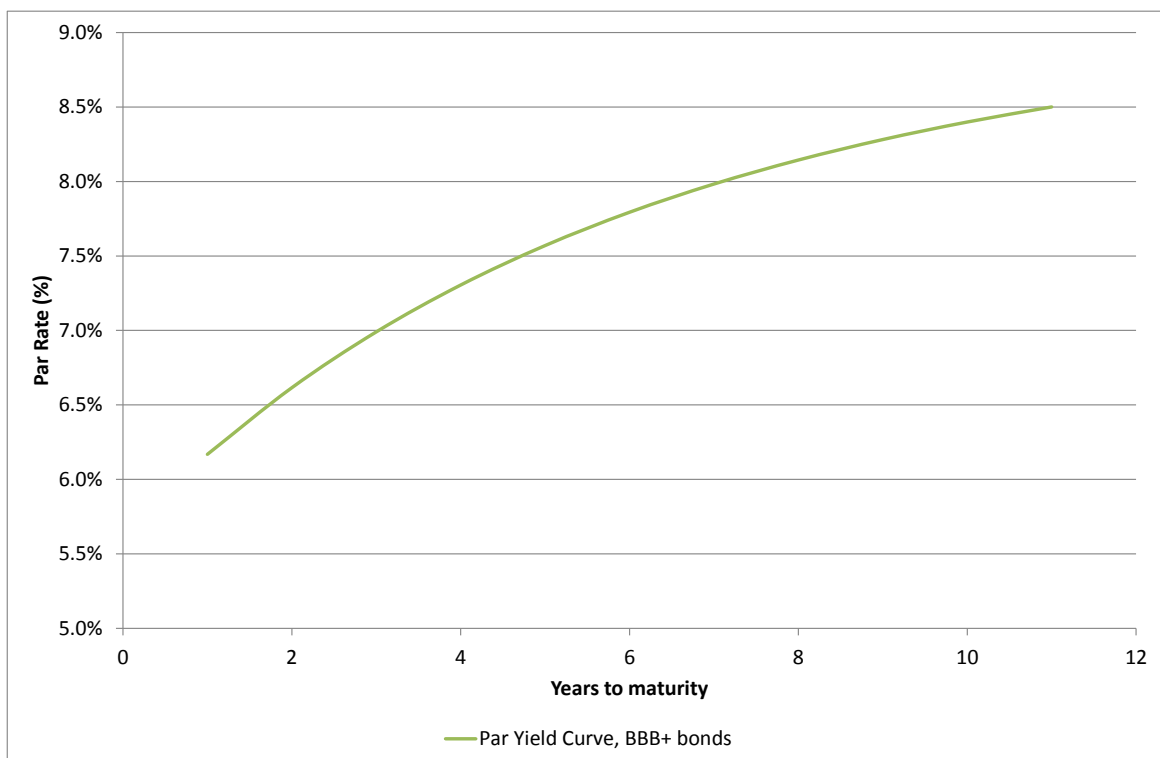


maturity curves derived above) but rather because it is incorrect to directly compare par yield curves with yields to maturity at various different coupon rates.

5.3.1. Australian issued Australian dollar bonds rated BBB+ only

135. The BBB+ par yield curve estimated across the dataset of Australian issued Australian dollar bonds rated BBB+ only is shown at Figure 14 below.

Figure 14: Par yield curve for Australian issued Australian dollar bonds rated BBB+ only



Source: Bloomberg, UBS, RBA and CEG analysis

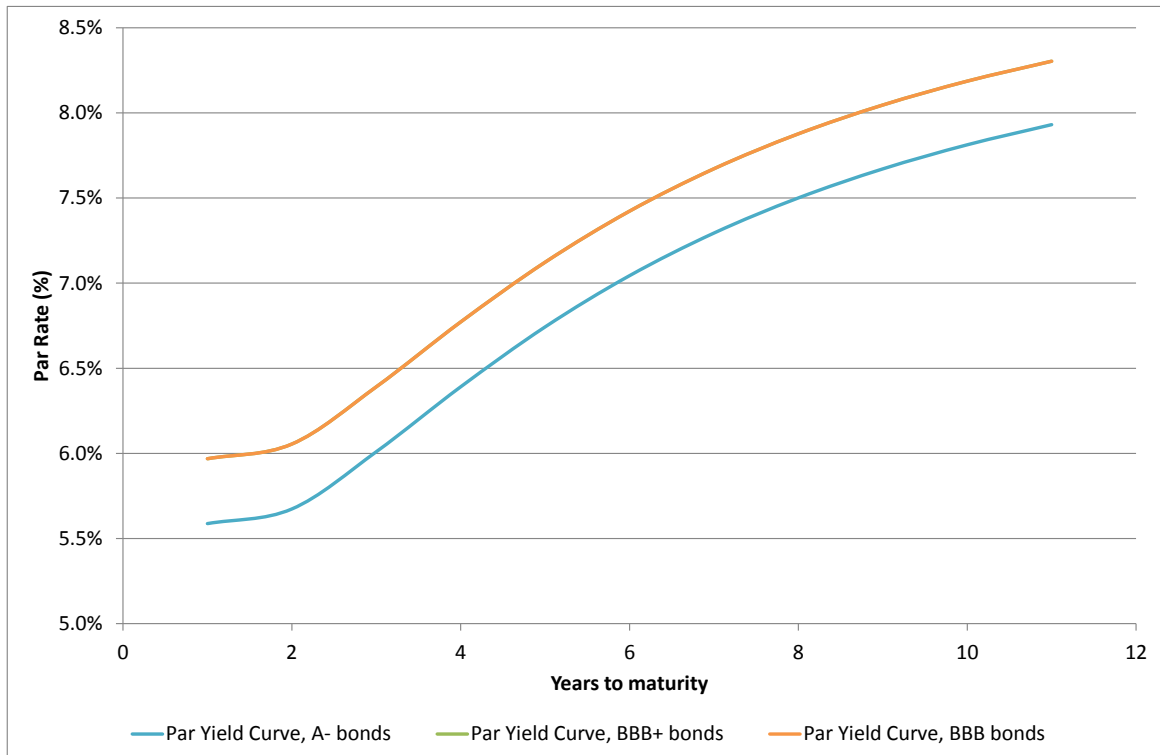
Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

136. The annual coupon estimated on a 10-year BBB+ bond trading at par is estimated to be 8.40%, equivalent to a DRP of 4.41%. This compares to the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.3.2. Australian issued Australian dollar bonds rated BBB to A- only

137. The par yield curves estimated across the dataset of Australian issued Australian dollar bonds rated BBB to A- only is shown at Figure 15 below.

Figure 15: Par yield curve for Australian issued Australian dollar bonds rated BBB to A-



Source: Bloomberg, UBS, RBA and CEG analysis

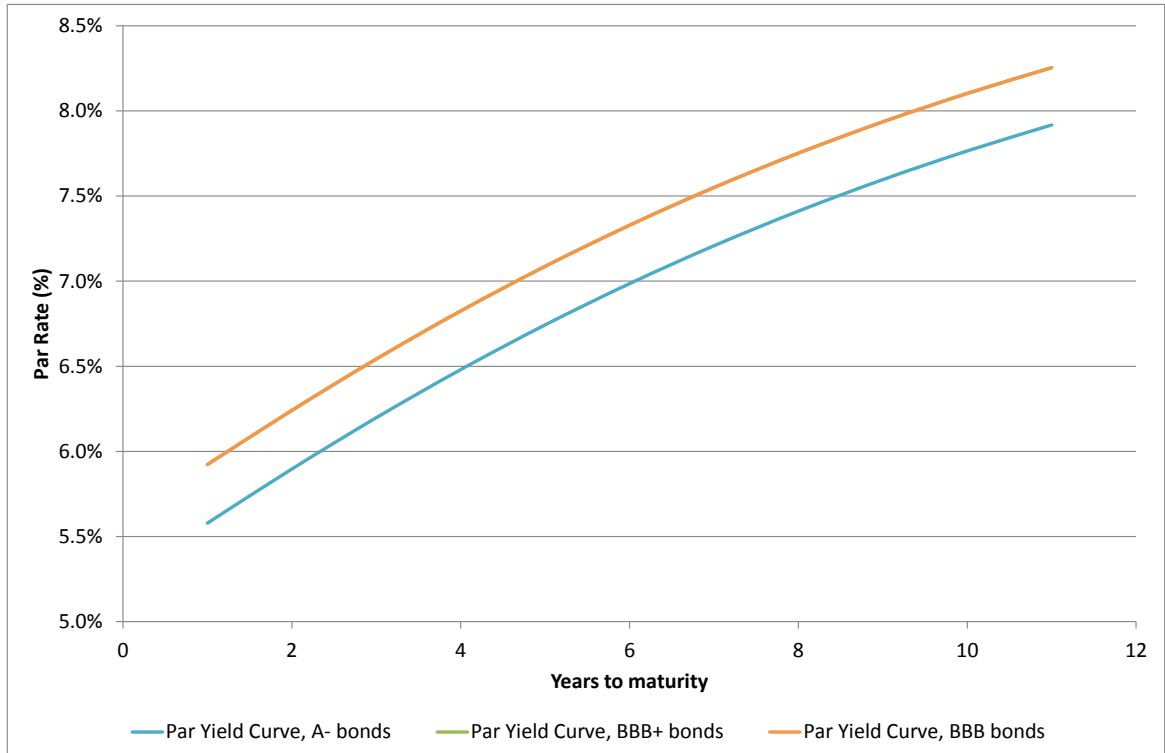
Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

138. In this chart, as with the equivalent yield to maturity chart at Figure 10, the curves estimated for BBB+ and BBB are coincident. The annual coupon estimated on a 10-year BBB+ bond trading at par is estimated to be 8.19%, equivalent to a DRP of 4.20%. This compares to the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.

5.3.3. Australian issued Australian dollar bonds rated BBB- to A only

139. The par yield curves estimated across the dataset of Australian issued Australian dollar bonds rated BBB- to A only is shown at Figure 16 below.

Figure 16: Par yield curve for Australian issued Australian dollar bonds rated BBB- to A



Source: Bloomberg, UBS, RBA and CEG analysis

Note: Observations sourced as an average over 21 November 2011 to 16 December 2011. Fitted curve calculated as an average over the same period.

140. The annual coupon estimated on a 10-year BBB+ bond trading at par is estimated to be 8.10%, equivalent to a DRP of 4.11%. This compares to the 3.92% DRP estimated using the extrapolated Australian Bloomberg BBB fair value curve.



6. Other cross checks on the Bloomberg fair value curves

141. This section examines other potential cross-checks on the extrapolated Bloomberg fair value curve.

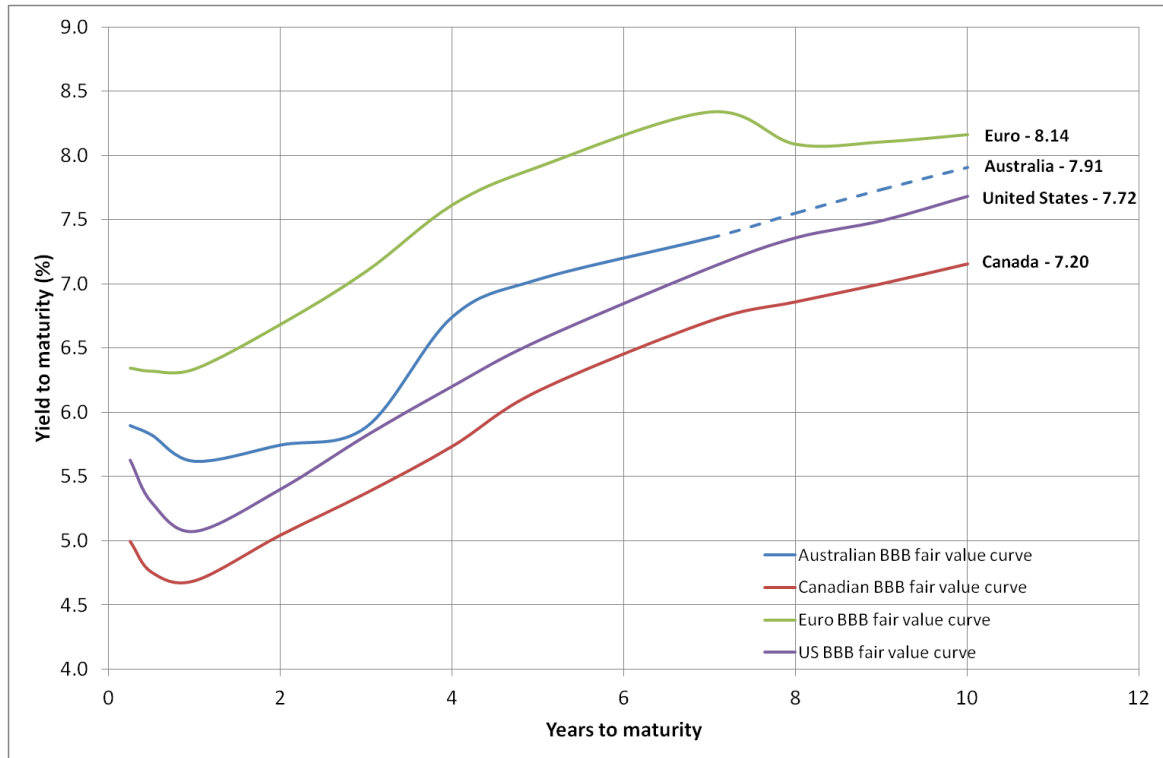
6.1. Comparison to foreign fair value curves

142. At section 4 above I discuss the availability of evidence from Australian bonds issued in foreign currencies. I consider that this provides an additional source of evidence against which to test potential candidates for extrapolation.

143. In addition to individual bond yields, I have also sourced Bloomberg fair value curves from foreign jurisdictions. These curves can potentially be used as a cross-check on the reasonableness of the Bloomberg fair value curve in Australia. However, these curves represent an estimate for the cost of debt of foreign firms which may be affected by factors not relevant to Australian firms. Consequently, these comparisons are best considered providing only a high level source of information – one that might provide a basis for further investigation of other facts rather than a basis for any strong conclusion on its own.

144. Figure 17 below shows Bloomberg BBB composite fair value curves in Australia, the Eurozone, the US and Canada. The non-Australian fair value curves have been converted into Australian dollar yields using cross currency swap rates available from Bloomberg (see Appendix B for more detail on this conversion process). The Australian curve is extrapolated beyond 7 years using PwC's estimates.

Figure 17: BBB fair value curves – Australia and other jurisdictions



Source: Bloomberg and CEG analysis

Note: Fair value curve yields calculated as an average over 21 November 2011 to 16 December 2011

145. I note that the Australian fair value curve sits close to the US fair value curve and below the Euro fair value curve. This comparison provides no reason to believe that the Australian fair value curve 'out of kilter' with foreign fair value curves.

6.2. Comparison to fitted curves

146. In section 5 I estimate a number of curves fitted to a number of alternative samples of bonds. Each of these gives rise to its own estimate of the DRP at 10 years. Table 1 below summarises these and compares them with the 7.91% yield associated with the extrapolated Bloomberg fair value curve at 10 years.



Table 1: CEG curve fitting vs Bloomberg fair value estimate

Bond sample	Yield at 10 years (%)	Extrapolated Bloomberg fair value at 10 years
<i>Yield to maturity analysis</i>		
BBB+ Australian only	8.25%	7.91
BBB+ Australian and foreign	8.14%	7.91
BBB to A- Australian only	7.74%	7.91
BBB to A- Australian and foreign	8.05%	7.91
BBB- to A Australian only	7.67%	7.91
BBB- to A Australian and foreign	7.99%	7.91
<i>Par yield analysis</i>		
BBB+ Australian only	8.40%	7.91
BBB- to A Australian only	8.19%	7.91
BBB- to A Australian only	8.10%	7.91

Source: CEG analysis based on Bloomberg, UBS and RBA data

147. In all but two cases the estimated DRP from CEG's curve fitting is higher than the extrapolated Bloomberg fair value estimate. However, there is a very tight bound in the estimates derived from all of the regressions – with the minimum estimate being 7.74% and the maximum estimate being 8.40%. This comparison provides no reason to believe that the extrapolated Bloomberg fair value estimate 'out of kilter' with the underlying data.



7. Assessment of AER methodology in Aurora and Powerlink

148. In November 2011, the AER released draft decisions in its regulatory reviews of both Aurora and Powerlink. In these decisions, the AER estimated a DRP of 3.14% and 3.19% respectively.²⁷
149. The AER's lower DRP estimates for Aurora and Powerlink are the result of a new methodology that it introduced subsequent to its final decisions for APT Allgas and Envestra. The most important change in its methodology is its proposal to move away from any reliance upon Bloomberg's fair value curve and to estimate the DRP based on a simple average of the reported yields for a selection of nine long-dated bonds to estimate the DRP.
150. In my opinion, the reasoning relied upon by the AER in those decisions to reject the use of the Bloomberg fair value curve is flawed. As I set out in more detail at section 2 of this report, I consider that reliance upon independent expert opinion in processing a vast array of information on bond prices is preferable to the AER's proposed methodology in Aurora and Powerlink. Furthermore, the specific evidence cited by the AER in support of its assessment of Bloomberg's 'inappropriate' fair value estimate does not establish that the Bloomberg estimate is unreasonable.
151. In my opinion, a reasonable assessment of the totality of evidence available to the AER over 21 November 2011 to 16 December 2011, such as that conducted in this report at sections 3, 4, 5 and 6 above, clearly indicates that the extrapolated Bloomberg BBB fair value curve provides a reasonable estimate of DRP.
152. In some contexts it may be open to the AER to devise its own methodology to determine a DRP in preference to the use of extrapolated Bloomberg BBB fair yields. Ultimately however, the reasonableness of that methodology must be assessed in the same way that the reasonableness of Bloomberg's fair yields must be assessed. In my opinion, the AER did not conduct adequate cross-checks within its Aurora and Powerlink decisions that could have established the reasonableness or otherwise of its proposed DRP estimates.
153. I consider that if it assesses its estimates against the wide range of information that I put forward in sections 3 and 4 above, or against the type of analysis that I conduct in sections 5 and 6, the AER cannot reasonably apply the methodology it proposed for Aurora and Powerlink for the Victorian gas distribution businesses.

²⁷ See AER, *Draft Distribution Determination: Aurora Energy Pty Ltd*, November 2011, p. 241; and AER, *Powerlink: Transmission Determination*, November 2011, p. 224. The same methodology was used in both decisions, but the averaging period for Aurora was 20 days to 14 October 2011, whereas the averaging period for Powerlink was 40 days to 14 October 2011.

7.1. Reconciling the results of the AER's new methodology with Tribunal precedent

154. Prior to its Aurora and Powerlink draft decisions in which it estimated DRPs of 3.14% and 3.19%, the AER's DRP estimates reflected its methodology of placing equal weight on the Bloomberg BBB fair value curve (extrapolated to 10 years) and the yield on a bond issued by APA Group. Most recently, the AER allowed DRPs in its June 2011 final decisions for the gas distribution pipelines of APT Allgas and Envestra South Australia of 3.64% and 3.81% respectively.²⁸
155. Subsequently, both these decisions were overturned on appeal to the Tribunal, which rejected placing substantive weight upon the APA bond and substituted instead sole reliance upon the Bloomberg fair value estimates. These changes resulted in DRP estimates for APT Allgas and Envestra of 4.37% and 4.67% respectively.²⁹ It is worth noting that the Tribunal commented that there was strong evidence in these cases in support of the extrapolated Bloomberg BBB fair value curve:³⁰

Envestra provided to the AER strong evidence in support of the EBV, in particular by its response to the May 23 letter. The view of Dr Hird of CEG was that that material did not demonstrate any basis for the substitution of an alternative estimate for the EBV. As noted, the AER itself accepted the relevance of the EBV. Whilst the Tribunal accepts that the AER properly considered the reliability of the EBV, it has reached the view on the available material that there is no reason shown from the available material why the use of the EBV should not be adopted in this particular matter.

156. In my opinion the outcome of the Tribunal decisions in respect of the DRP for APT Allgas and Envestra raise concerns about whether the AER's methodology as proposed for Aurora and Powerlink meets the requirements of the NGR and NGL and in particular the NGO (which is similar in structure to the NEO). In its Aurora draft decision, the AER asserts that Aurora's proposed DRP of 4.54%, relying upon the extrapolated Bloomberg BBB fair value curve, is:³¹

excessive and does not satisfy the requirements of the NER and NEL. In particular, the AER considers Aurora has, in estimating the DRP, had insufficient regard to:

- *achieving an outcome that is consistent with the NEO, in promoting efficient investment in, and*

²⁸ See AER, *Final decision: APT Allgas: Access arrangement proposal for the Qld gas network*, June 2011, p. 41; and AER, *Final decision: Envestra Ltd: Access arrangement proposal for the SA gas network*, June 2011, p. 59.

²⁹ See *Application by APT Allgas Energy Limited (No 2)* [2012] ACompT 5 (11 January 2012), para. 121; and *Application by Envestra Limited (No 2)* [2012] ACompT 4 (11 January 2012), para. 171.

³⁰ *Application by Envestra Limited (No 2)* [2012] ACompT 3 (11 January 2012), para. 123

³¹ See AER, *Draft Distribution Determination: Aurora Energy Pty Ltd*, November 2011, p. 240



- *efficient operation and use of, electricity services for the long-term interests of consumers of electricity*
- *the regulatory and commercial risks involved in providing the network service, and the economic costs and risks of the potential for under and over investment.*

157. Conversely, the AER considers that its own estimate of 3.14% for Aurora:³²

satisfies the requirements of the NER. The AER considers its DRP estimate will contribute to a rate of return that promotes efficient investment in Aurora's network, and reflects the regulatory and commercial risks of providing its network services.

158. It must be recalled in comparing the DRPs above that they are each estimated across different intervals of time. For completeness I set these out below, in chronological order of averaging period used:

- Envestra's proposed DRP of 4.67% based on Bloomberg was estimated over 25 February 2011 to 17 March 2011. This DRP was accepted by the Tribunal.
- Aurora's proposed DRP of 4.54% based on Bloomberg was estimated over 28 February 2011 to 25 March 2011. This DRP was rejected by the AER.
- APT Allgas' proposed DRP of 4.37% based on Bloomberg was estimated over 2 May 2011 to 31 May 2011. This DRP was accepted by the Tribunal.
- the AER's proposed DRP for Aurora of 3.14% based on a selection of nine bonds was estimated over 16 September 2011 to 14 October 2011, and for Powerlink 3.19% estimated over 19 August 2011 to 14 October 2011.

159. The AER's assertion that its preferred DRP estimates in the Aurora and Powerlink reviews satisfy the NEO is, at least superficially, difficult to reconcile with the latest Tribunal decisions in relation to APT Allgas and Envestra. There is a very large difference between DRP estimates that the Tribunal accepted in those cases and the DRP estimates that the AER has arrived at for Aurora and Powerlink. The difference in time between the various averaging periods is not sufficient to explain this.

160. Consequently, the AER's Aurora decision must rest on a belief that the AER has identified new and better information to justify its decision – information that was not before the Tribunal in the Envestra and Allgas decisions.

³² Ibid, p. 241



7.2. Reasons supplied by the AER for rejecting Bloomberg not compelling

161. In rejecting the use of the extrapolated Bloomberg BBB fair value curve to estimate DRP, the AER put forward the general proposition that:³³

- where market data is available, it is possible to estimate the DRP using this data
- where market data is not available, FVCs are a viable second-best alternative.

162. I agree that where market data is available, it is 'possible' to estimate the DRP using this data. But this is precisely what Bloomberg does. The AER does not address adequately why it is 'preferable' to supplant its own use of market data for that of Bloomberg. In order to make that assessment, it is necessary to consider what data is being used to estimate DRP and how that data is used. The AER claims that:³⁴

...the sample size in the current circumstances comprising 9 bonds is sufficiently robust, particularly when compared with the deficiencies of Bloomberg's 5 and 7 year BBB rated FVCs.

163. In my opinion, the AER has not made a reasonable assessment in weighing up the claimed deficiencies of Bloomberg's fair value curves against the obvious problems with its own methodology. The AER has raised at least eight separate criticisms of the use of the Bloomberg fair value curve. I do not consider that any of these provide a reasonable basis upon which to conclude that Bloomberg's fair value estimates should not be relied upon once validated against the full range of available data. Due to the large number of assertions made by the AER, I address these in detail in Appendix C to this report.

164. Ultimately I consider that any benchmark estimate, whether provided by Bloomberg or the AER, should be assessed against the full weight of available evidence. It appears likely that an estimate that has had regard to a wide range of relevant information will perform better than one that relies upon a highly restricted sample, holding other factors constant.

165. Having made this assessment myself at sections 3 to 5 of this report, and in comparing the extrapolated Bloomberg BBB fair value curve to a wide range of yield evidence, I am satisfied that it is a reasonable representation of the available data and there is no reason to depart from it. By contrast, I conclude that, in taking a simple average across a sample of just nine bonds, the AER has relied upon a dataset that is too narrow and a methodology that is not sophisticated enough for the purpose that it is being used.

³³ Ibid, p. 222

³⁴ Ibid, p. 222

7.3. The bond sample relied upon by the AER was inadequate

166. In my opinion, a methodology that seeks to rely upon the yields of just nine bonds, setting all other bond yield information aside, is not likely to be robust. In its Aurora and Powerlink draft decisions, the AER estimated the DRP based on a simple average over nine bonds. These bonds were selected based on:³⁵
- Australian domestic issuance, fixed and floating;
 - a term to maturity of between 7 to 13 years;
 - a rating of BBB to A- by Standard & Poor's; and
 - excluding callable or subordinated bonds.
167. In my experience, it is consistent with the AER's past and current approach to assessing DRP that it begins its analysis by determining the data that it wishes to exclude without due consideration of whether the information contained within the excluded data may be useful. For example, I note that in the past, the AER applied four very narrow criteria that excluded all but six bonds from its analysis of the DRP. Those criteria were that bonds had to be fixed rate bonds issued by Australian companies in Australia, rated BBB+ and with more than two years to maturity.³⁶
168. Ultimately, none of these four narrow criteria were necessary as part of a methodology informing the yield on a benchmark 10-year BBB+ rated corporate bond. Each exclusion set aside information that could potentially be relevant to this assessment. Subsequent to successful appeals of the AER methodology, the AER has relaxed these criteria somewhat (eg, allowing for the consideration of information on floating rate bonds and bonds rated close to BBB+).
169. In section 3 I consider the yield of callable bonds adjusted for the value of the call option using the method recommended by the AER's consultant, Oakvale Capital. I consider that the greater riskiness of subordinated debt is adequately accounted for by the higher credit rating accorded to this debt by Standard & Poor's. The AER has not supplied any reasoned evidence as to why it would be reasonable to exclude such bonds from consideration.
170. In sections 3 to 5 I consider the yield information on bonds for all maturities. I consider that this is necessary to give appropriate context to the value estimated at a maturity of 10 years. Furthermore, it is possible and appropriate to use the yield data from shorter-dated bonds to inform the yield at longer maturities where there are fewer bonds at these maturities. Not only does the AER exclude shorter dated bonds from its sample, it provides no graphical representation of the yields on these bonds –

³⁵ Ibid, p. 216

³⁶ See for example AER, *Draft decision: Access arrangement for the ACT, Queanbeyan and Palerang gas distribution network*, November 2009, p. 22



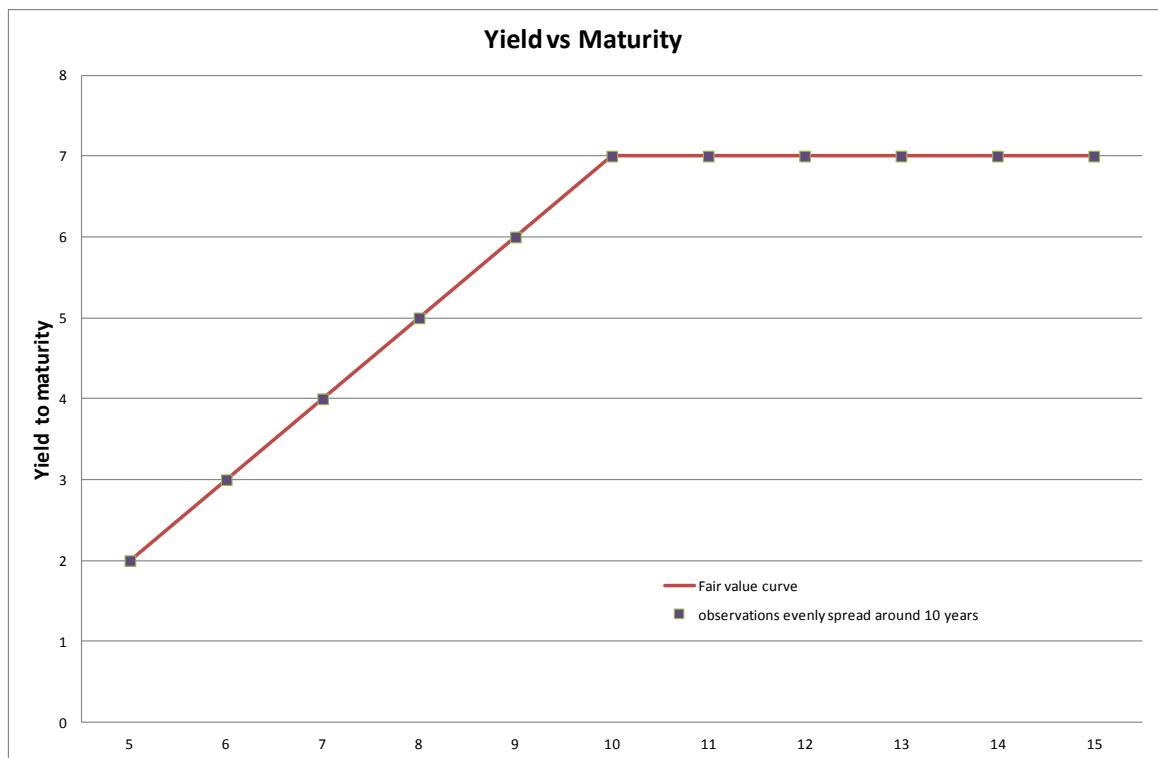
making it impossible to assess the consistency of its sample with the information it has rejected.

171. I agree that for the purpose of estimating a benchmark corporate bond rate, the analytical focus should be on bonds issued by Australian companies. This is not the same as excluding bonds issued by Australian companies that are traded overseas or in foreign currencies, which is what the AER proposes to do. I examine this data in sections 4 and 5 and conclude that this information is useful in assessing bond yields at longer maturities.
172. When assessing the benchmark rate for BBB+ corporate debt, the most directly relevant data will come directly from bonds with BBB+ or similar credit ratings. However, this does not mean that some information cannot be obtained from other credit ratings. In section 5 above I show how this information can be used to inform the shape and level of the yield curve passing through BBB+ yield data.
173. In my opinion, setting aside all this potentially relevant information is unreasonable, and increases the likelihood that the DRP estimate produced by the AER's methodology relying upon this restricted dataset will also be unreasonable. The analysis presented in sections 3 to 5 of this report indicate that this is precisely the result of the AER's methodology in Aurora and Powerlink draft decisions.
174. I note for completeness that the AER conducted a number of 'sensitivity tests' where it adopted alternative assumptions to those described above. Specifically, the AER considered having regard to:³⁷
 - BBB+ bonds only, although it did not pursue this approach;
 - maturities at 9-11 years and 5-15 years; and
 - considered fixed rate bonds only.
175. These sensitivity tests do not represent a material improvement on the AER's methodology. Indeed, in three out of four cases, the sensitivities actually amount to the AER considering a smaller set of data rather than a wider set. In the case where a larger dataset is considered there is no attempt by the AER to take into account and adjust for the wide differences in maturities of the bonds in the sample.
176. I note that the AER reports the average maturity of this 5 to 15 year sample at 9.2 years in the Powerlink draft decision. This may appear close to 10 years. However, the average maturity of a sample is only a good indicator of the influence of the distribution of sampled maturities on the sample mean yield if yield is linear in maturity.

³⁷ AER, *Draft Distribution Determination: Aurora Energy Pty Ltd*, November 2011, pp. 249-252

177. Imagine that the yield curve starts steep at 5 years and flattens out as maturity increases (ie, is concave) – which is what the Bloomberg fair value curve does. In this case, even if the within sample maturity is evenly distributed above and below 10 years (such that the mean maturity in the sample is 10 years) then the mean yield in the sample will be lower than the true 10 year yield.
178. The figure below demonstrates this with an example. There are 11 observations with five having maturity above 10 years and five having maturity below ten years and one with maturity of exactly 10 years. All of these are on the fair value curve so they are all representative of the benchmark cost of debt at their maturity.

Figure 18: Hypothetical scenario with a concave fair value curve



179. The average maturity of the sample is 10 years. Yet the average yield of the sample is not the 10 year benchmark of 7.00%. Rather it is 5.64%. This bias in the sample mean as the predictor of the true 10 year rate exists due to the concavity in the fair value curve. It exists despite:
- the mean maturity in the sample being 10 years;
 - there being no bias in the sample (in the sense that all bonds are reflective of the benchmark at that maturity); and
 - there being an equal distribution above and below 10 years.



180. The bias would be worse if:

- the mean maturity in the sample was less than 10 years;
- there were more bonds below 10 years than above (eg, the mean maturity in the sample was dragged up by a single 15 year bond);
- the sample included some bonds that are clearly biased estimators of the benchmark yield.

181. The first two of the above dot points are, as a matter of fact, true of the AER's 5 to 15 years maturity sample. I also consider that the inclusion of the Coca Cola Amatil and SPI E&G bonds makes the last dot point true (see below).

7.4. The bond sample relied upon by the AER was incorrectly applied

182. The full list of nine bonds relied upon by the AER is replicated in Table 2 below, both for Aurora's averaging period and for the Victorian gas distribution business' nominated averaging period. The DRP was calculated upon each of these bonds using either UBS or Bloomberg yield data, or taking the average between the two if both were available.

Table 2: Bonds relied upon by the AER

Issuer	Rating	20 days to 14 Oct 2011		20 days to 16 Dec 2011	
		Term to maturity	Average DRP	Term to maturity	Average DRP
APA Group	BBB	8.8	3.03	8.7	3.19
Brisbane Airport	BBB	7.7	2.64	7.6	2.84
Sydney Airport	BBB	10.1	3.77	10.0	3.91
Sydney Airport	BBB	11.0	3.86	10.9	3.97
Dalrymple Bay Coal Terminal	BBB+	9.7	4.26	9.5	4.40
Dalrymple Bay Coal Terminal	BBB+	11.2	3.69*	11.1	3.90
Coca Cola Amatil	A-	10.0	1.42	9.9	1.00
SPI Electricity and Gas	A-	9.5	2.63	9.4	2.52
Stockland Trust	A-	9.1	2.97	9.0	3.23
Average		9.7	3.14	9.6	3.22

Source: Aurora draft decision, p. 241, Bloomberg, UBS, RBA, CEG analysis

* The AER appears to have calculated the CGS at the wrong maturity for the DBCT bond, causing it to overestimate the DRP associated with that bond.

183. I consider that it is preferable to take into account a much wider range of information than the AER proposed to by having regard to only the bonds listed in Table 2 above. However, even if the AER's methodology were adopted without adjustment, I make the following observations provided in the three subsections below.

7.4.1. Inclusion of callable bonds

184. The AER's list of nine bonds includes two bonds issued by DBCT both of which are 'make whole' callable. Without these bonds the AER estimate would be even lower (2.90% in the Aurora averaging period). The AER has made an exception for make-whole callable bonds when establishing its criteria. This exception can be justified on the grounds that 'make whole' callable bonds require less adjustment than other callable bonds in order to convert them into equivalent zero option value fixed rate yields. This is the justification provided at footnote 573 of the Powerlink draft decision.
185. The second ground for this exception is more pragmatic. The AER methodology leaves it hostage to the vagaries of the final sample that its exclusions result in. These vagaries may result in a biased sample that, when considered in the context of the population of bonds, results in an unreasonably high/low estimate. However, because the AER's methodology gives little or no weight to the wider population there is no formal way in which the AER methodology can correct for any such sample bias.
186. Excluding all callable bonds would have resulted in an even lower, and in my opinion, even more unreasonable estimate of the DRP. Making an exception for the inclusion of make whole callable bonds can be justified purely on the pragmatic grounds that it gives a less unreasonable estimate relative to the wider set of information. Of course, the AER cannot rely on such a pragmatic explanation for its sample selection because its methodology includes no mechanism for assessing the reasonableness of its estimate relative to the wider population of bond yield data.

7.4.2. Erroneous inclusion of Coca Cola Amatil

187. The bond issued by Coca Cola Amatil Australia included in the AER's list of nine bonds at Table 2 above has a DRP of 1.42%. This is improbably low for an A- bond with a maturity of 10 years given the wider population of bonds. This should have caused the AER to exercise caution and investigate this bond further before relying upon it to estimate the DRP for Aurora and Powerlink.
188. The yield information relied upon by the AER for the Coca Cola Amatil Australia bond is available only from Bloomberg, and specifically the AER has relied upon the BVAL yield. Further information available from the BVAL pricing source indicates that Bloomberg has estimated the yield on this bond, not by direct observations in terms of bids, asks or executed transactions, but by reference to observed comparables. In my experience this is not unusual for bond yields sourced from Bloomberg and likely other data providers as well.
189. However, the comparables selected by Bloomberg for the Coca Cola Amatil bond deserve closer inspection. They include: the Queensland Treasury Corporation, the New South Wales Treasury Corporation, the Treasury Corporation of Victoria, Eurofima and KFW. That is, the yield for the Coca Cola Amatil has been determined by reference to comparables that include:



- Australian state treasuries, rated AA+ and AAA; or
- European organisations that are either sponsored or wholly owned by AAA rated European governments (both Eurofima and KFW are AAA rated and are funded by European governments including Germany in the case of Eurofima and exclusively Germany in the case of KFW).

190. A further comparable is another Coca Cola Amatil bond issued by Coca Cola Amatil New Zealand. However, similar inspection of this bond indicates that its yield is also estimated by reference to the same comparables.

Figure 19: Bloomberg BVAL screenshots for Coca Cola Amatil bond



Source: Bloomberg

191. In light of the information provided by Bloomberg and reproduced in Figure 19 above, it would be wholly inappropriate to continue to rely upon the DRP estimated for the Coca Cola Amatil bond to determine the benchmark DRP on 10-year BBB+ corporate bonds either now or in the future.
192. I note for completeness that I have seen objections raised to the inclusion of the Coca Cola Amatil bond on different grounds to those discussed above. In a report for Powerlink, PwC makes the claim that it should be excluded on the grounds that it is described by Bloomberg as a “Euro MTN”. PwC interpret this to mean that the bond was issued in Europe and:³⁸
- Accordingly, the inclusion of this bond does not meet the requirements of the National Electricity Rules to use the ‘observed annualised Australian benchmark corporate bond rate’.*
193. The Coca Cola Amatil bond was issued by an Australian domiciled company in Australian dollars. Bloomberg indicates that the “Euro MTN” description applies to bonds issued in “non-domestic currency”. In this context, the term “non-domestic currency” means a currency other than the domestic currency in the jurisdiction that the bond was issued. It does not mean a currency that is different to the currency in the jurisdiction in which the issuer is domiciled. For example, an Australian firm issuing a bond denominated in HK dollars in Australia would be described as a “Euro MTN” issue. The fact that the Coca Cola Amatil bond was issued in Australian dollars means that the bond must certainly have been issued in an overseas jurisdiction - although not necessarily Europe.
194. A case could be mounted that inclusion of this bond would violate the AER’s own criterion that it relies upon bonds with “Australian domestic issuance”. However, irrespective of whether that is the case, I consider that this would be inadequate grounds upon which to exclude Coca Cola Amatil or any other bond.
195. In my opinion, any information which can provide information relevant to assessing the “Australian benchmark corporate bond rate” should be considered. This includes the issuance by Australian companies into overseas markets, whether in Australian dollars or in foreign currency. The yields on bond issues into foreign markets provide relevant information about the yields that could be expected on domestic bond issues. In the context that we observe various firms simultaneously issuing into both markets, it is a reasonable assumption to make that the expected yields would be similar or the same in both cases.
196. I note that exclusion of information on the type of narrow grounds that PwC rely upon in respect of the Coca Cola Amatil bond has been attempted in the past by the AER in

³⁸ PwC, *Debt Risk Premium and Equity Raising Costs*, January 2012, p. 7



relation to floating rate bonds, by attempting to define the benchmark bond as fixed rate.³⁹ The Tribunal rejected this style of argument:⁴⁰

First, the AER said that floating rate bonds were not a perfect substitute for fixed rate bonds. The AER may be correct to say that the two are not perfect substitutes, but this is not determinative. The issue here is whether taking floating rate bonds into account could aid in determining the yield on 10-year BBB+ bonds. As a matter of theory, the yield on a floating rate bond will be an unbiased proxy for the yield on a fixed rate bond because of the law of arbitrage. Briefly summarised, the law of arbitrage says that if an investor has a choice between a fixed rate bond and a floating rate bond that are identical other than their yield, he/she could buy the floating rate bond and enter into a swap arrangement, which would give him/her a fixed income stream. Consequently, investors would choose to buy the bond with the higher yield until the yields equilibrate. This theory is supported by empirical evidence. For example, Figure 2 of CEG's report shows the yield on 10 companies' simultaneously issued floating rate and fixed rate bonds with the same maturity and same rating

197. In my opinion, it is incorrect to exclude the information obtained from any bond on the grounds that it is a "Euro MTN", a characteristic that is in fact shared by a very large number of bonds. However, I consider that the Bloomberg yield information for the Coca Cola Amatil bond is commensurate with a Standard & Poor's rating of AAA or AA+, rather than A-, and should therefore not be included in the AER's consideration of DRP.

7.4.3. Erroneous inclusion of SPI Electricity and Gas

198. SPI Electricity and Gas is a subsidiary of SP AusNet, which is majority owned by Singapore Power, itself wholly owned by Temasek Holdings, an investment holding company owned by the Singapore government. That is, SPI E&G is ultimately majority owned by the Singapore government through its ownership of Singapore Power.
199. I note that aside from the Coca Cola Amatil bond, the SPI E&G bond has the lowest DRP in Table 2 above. Caution must be applied in assessing whether the yields on SPI E&G's bonds are commensurate with its rating of A-. The Singapore government is rated AAA with Standard & Poor's.
200. The AER's consultant, Oakvale Capital, stated in regard to bonds issued by SPI E&G:⁴¹

³⁹ See for example ActewAGL, *Final decision: ACT, Queanbeyan and Palerang gas distribution network*, March 2010, p. 42. This was the AER's practice in electricity decisions prior to this as well.

⁴⁰ Application by ActewAGL Distribution [2010] ACompT 4 (17 September 2010), para. 53

⁴¹ Oakvale Capital, *The impact of callable bonds*, February 2011, p. 24



During the averaging period the bond was attracting one of the lowest yields, in contrast to other A- bonds observed (as per the CEG report). The key feature supporting the bond was the parental support of the issuer's owners and the link to the Government of Singapore.

201. On this basis, I consider that the yield on SPI E&G's debt should not be considered representative of an Australian benchmark corporate bond rate. The potential for error is particularly compounded when the yield on this bond is one of only a handful that are considered in calculating that rate, as under the AER's methodology. In my view, this bond should not be included in the AER's consideration of DRP.

7.4.4. Remaining bonds considered by the AER

202. Removing the Coca Cola Amatil and SPI E&G bonds previously mentioned from the AER's dataset leaves the six bonds set out in Table 3 below. The average DRP for these seven bonds over the Victorian distribution business' averaging period is 3.63%, 0.41% higher than I calculate over the AER's sample of nine bonds.

Table 3: Bonds relied upon by the AER (amended by CEG)

Issuer	Rating	20 days to 14 Oct 2011		20 days to 16 Dec 2011	
		Term to maturity	Average DRP	Term to maturity	Average DRP
APA Group	BBB	8.8	3.03	8.7	3.19
Brisbane Airport	BBB	7.7	2.64	7.6	2.84
Sydney Airport	BBB	10.1	3.77	10.0	3.91
Sydney Airport	BBB	11.0	3.86	10.9	3.97
Dalrymple Bay Coal Terminal	BBB+	9.7	4.26	9.5	4.40
Dalrymple Bay Coal Terminal	BBB+	11.2	3.69*	11.1	3.90
Stockland Trust	A-	9.1	2.97	9.0	3.23
Average		9.66	3.46	9.54	3.63

Source: Aurora draft decision, p. 241, Bloomberg, UBS, RBA, CEG analysis

203. Of the seven bonds listed at Table 3 above, four report DRPs over the Victorian business' averaging period that are higher than the extrapolated Bloomberg BBB fair value curve over the period between 21 November 2011 and 16 December 2011. The mean DRP of the sample is 3.63%, which is only 0.23% below the extrapolated Bloomberg BBB fair value curve assessed at 10 years.
204. In summary, I consider that while the AER's proposed methodology is likely to be inadequate for the purpose it is put to, when applied correctly it provides support for the extrapolated Bloomberg BBB fair value curve estimate, or at least provides no reason to suppose that the Bloomberg BBB fair value estimate is an unreasonable measure of DRP.



7.5. Cross-checks used by the AER were inadequate

205. In addition to adopting a methodology that used information from only a small sample of bonds to estimate the benchmark DRP, the AER's draft decisions for Aurora and Powerlink only employ limited cross-checks to test the robustness of its DRP estimates.
206. As described at section 7.3 above, the AER conducted what it described as 'sensitivity testing', which generally consisted of narrowing its sample of bonds still further. However, the AER did seek to compare its DRP estimates against analyst reports of the debt financing outlooks of various regulated network service providers. The evidence it put forward included that:⁴²
- Macquarie Equities Research expected that APA Group would refinance \$900m of bank debt at a spread of 240 basis points;
 - Macquarie Equities Research expected that Spark Infrastructure Group would be able to raise debt at spreads at around 150 basis points; and
 - Bank of America Merrill Lynch noted that DUET Group had refinanced \$3 billion of debt at approximately 300 basis points since April 2011.
207. In my opinion, none of these observations supplies useful information supporting the AER's draft decision (in the case of Aurora) of a DRP of 3.14%, and none would support a similar result in respect of the Victorian distribution businesses. The AER appears to have overlooked in its interpretation of this evidence that:
- in referring to basis points spreads, the analysts are almost certainly referring to "spread to swap", which is a market convention, and not "spread to CGS" as their statements are interpreted by the AER; and
 - the statements of expected spreads do not contain information about the expected maturity of the debt raising. The AER has no basis upon which to assume that the expected spreads are representative of 10 year debt.
208. Without further information, I do not consider that the analyst reports as summarised by the AER lend support to its proposed DRP estimate. To the extent that the expected spreads were for maturities considerably shorter than 10 years (which is very likely) then this information could indeed contradict the AER's assessment of DRP and lend support to Bloomberg's fair value estimates.

⁴² AER, *Draft Distribution Determination: Aurora Energy Pty Ltd*, November 2011, p. 242



8. Recommended benchmark cost of debt and DRP

209. I conclude that the extrapolated Bloomberg BBB fair value curve is a good fit to the available data. This gives rise to an estimate of the 10-year DRP of 3.92% over the averaging period from 21 November 2011 to 16 December 2011. This is associated with a benchmark cost of debt of 7.91%.
210. In my view this is the best estimate of the required DRP consistent with prevailing conditions in the market for funds over this averaging period. I consider that when combined with annualised yield on 10-year CGS estimated over the same averaging period, use of this estimate results in a cost of debt that is in line with the Australian benchmark corporate bond rate for corporate bonds which have a BBB+ credit rating and a maturity of 10 years.



Appendix A. Conversion calculations from YTC to YTM

A.1. Background

211. UBS quotes floating rate bonds by reference to “trading margins”. A trading margin is the same as a DRP but instead of being measured relative to the CGS rate the trading margin is measured relative to the swap rate. Quoting risk premiums for floating rate bonds relative to the swap rate is standard market practice. UBS quotes trading margins for floating rate bonds rather than DRPs. All of the bonds discussed below are floating rate bonds and so the discussion is primarily in terms of trading margins. The equivalent fixed rate yield on a bond is calculated as the trading margin plus the swap rate to the relevant maturity. However, in a given maturity range, the DRP is a roughly constant level above the trading margin reflecting a roughly constant difference between the swap rate and the CGS rate.

A.2. AER views

212. The AER appears to believe that where a UBS rate sheet lists a bond’s next call date under the ‘maturity’ column then the yield/trading margin for that bond should be interpreted as a yield/trading margin to call rather than a yield/trading margin to maturity.
213. If that is correct, the yield to maturity will be lower than the yield to call for any bond that is trading at less than its face value (ie, where the trading margin on the bond is more than the coupon margin the bond is paying).
214. This is because the capital gain payable on the bond if held to maturity (the difference between the trading value and the face value), while the same as the capital gain received if the bond is called, is received later (ie, at maturity rather than at the first call date). Put simply, if the capital gain occurs at maturity rather than call date then the bond is less attractive (has a lower yield to maturity) than if the capital gain is realised at the (earlier) call date.
215. If the AER is correct then CEG is wrong to include the yields on these bonds at their actual maturity.

A.3. AER views can be tested by examining DBCT bonds relative to each other

216. It is possible to test this speculation by comparing the yields on different DBCT bonds. If the AER is correct, two of the three labelled DBCT bonds in the charts in this report do not require adjustment because they are quoted ‘to maturity’. However, one does require adjustment because it is quoted ‘to call’ and therefore, under the AER’s contention, should be adjusted. However, as outlined below, if the adjustment is made, the DBCT bond is given a DRP that is not credible relative to the DRPs for the other two DBCT bonds - where it is agreed by the AER that no adjustment is necessary. Specifically, the adjustment would result in a DRP of around 1.2%



(calculation described below) which is inconsistent with the DRPs of the other two DBCT bonds which are in excess of 4.0%.

217. This demonstrates that UBS's trading margin is, at least for this bond, best interpreted as applying 'to maturity' rather than 'to call'.
218. However, this technique of pair-wise comparison cannot be applied to other bonds in question (eg, Suncorp and Vero) because, unlike the DBCT bonds, there is no single bond from these companies where UBS lists the true final maturity date. All of these bonds would, if the AER was correct, require adjustment and, therefore, there is no 'control' against which the adjusted yields can be compared for reasonableness.
219. Moreover, these bonds all have call dates that are much later than the DBCT bond – which means that the required adjustment would be much smaller. For these reasons, one cannot so readily demonstrate that the AER's hypothesis is not credible with respect to these bonds. However, it remains the case that the AER's hypothesis is speculation rather than fact and that this speculation is clearly wrong in relation to at least one of the callable bonds, namely the DBCT bond maturing on 12 December 2022.

A.4. Details of DBCT adjustment calculations

220. The DBCT bonds provide the best basis on which to test the AER's hypothesis because:
- There are two DBCT bonds where UBS lists the final maturity of the bond in its rate sheets. Therefore, it is uncontested that the trading margin information for these bonds is associated with the final maturity of the bond.
 - There is one DBCT bond where UBS lists the first call date in its rate sheets:
 - a. The first call date for this bond was on 12 December 2011 but the final maturity is 11 years later;
 - b. The trading margin on this bond is well above the coupon margin on the bond (300bp vs 29bp on the 2nd December 2011).
221. The coupon rate on the DBCT bond to be adjusted is only 29bp above the swap rate (that is the bond will pay coupons equal to the swap rate plus 0.29% of the face value of the bond).
222. Consequently, in order to earn a return of 300bp above the swap rate, the remaining return of approximately 271bp (300bp-29bp) must come in the form of a capital gain at the time the bond is redeemed (its maturity date or its call date). This capital gain reflects the difference between the bond's trading price and its face value.
223. If the AER is correct that UBS's yields are expressed to the first call date then UBS must be estimating that an approximate 271bp annual capital gain is to be delivered on



the bond's first call date, only 10 days after 2 December 2011 (being the date from which the UBS trading margin of 300bp was taken). However, because the call date is only 10 days away, it is equivalent to an absolute capital gain of around 7.4bp ($271 \times (10/365)$).

224. If this were indeed the case then this same 7.4bp capital gain, realised at maturity (11 years time) gives just 0.7bp capital gain per annum (7.4bp/11 years)
225. When this annual capital gain is added to the 29bp coupon return the total margin above the swap rate to maturity is only around 30bp. A 30bp trading margin is associated with a DRP of around 1.0% (given a margin between swap and CGS rates of around 73bp on 2 December 2012).
226. The nature of the calculations set out above are approximate because they are limited to simple addition and division of the relevant UBS rate sheet values. This makes the calculations, and the underlying financial logic, simple to understand. However, a precise estimate, discounting all relevant cashflows to determine the internal rate of return, would not differ materially from these values. We have performed these calculations and estimate an adjusted DRP for the DBCT bond of 1.17% on 2 December 2012.

A.5. Use of Bloomberg YASN function to make the adjustment

227. In the Powerlink draft decision the AER gas stated that:

The AER is aware of a method that applies the Bloomberg YASN function to make the adjustments discussed above. However, the AER has had technical issues with the application of the function, and is undertaking further analysis to address these issues. Accordingly, the AER considers the method for adjusting callable bonds is not, in the current circumstances, sufficiently reliable to include these bonds in the sample. (Page 217).

228. However, we are able to use this function to make the necessary adjustments. We have used this function in Bloomberg to estimate the yield to maturity of the DBCT bond maturing on 12 December 2022 if one interprets the UBS trading margin as being a yield to call.⁴³ The result is a yield to maturity of 5.10% (which is very close to our own estimate of 5.17%).

⁴³ This is achieved by substituting a price for the bond into the YASN function that is equal to the price in the UBS rate sheets on the 2nd of December 2012. I note that the price in the UBS rate sheets appears to be a mechanical calculation that solves for the price that is consistent with the trading margin and the maturity date that is listed in the spreadsheet. In the case of this bond, the maturity date is the call date and, therefore, the price is the price that would exist if the trading margin were expressed on a trading margin to call basis. (I note that, for the reasons described above, the only reasonable interpretation of this data is that the UBS trading margin is expressed on a yield to maturity basis but that the rate sheet mechanically derives an (incorrect) price for the bond by treating that trading margin as being expressed on a 'to call' basis.)

Figure 20: Screenshot of Bloomberg YASN function

<HELP> for explanation.
88<Go> to value using CDS curve

Corp **YASN**

90) Market Data 91) Edit Contract Floater Analysis

Bond DBCT FINANCE PTY LTD Type Floater
Maturity 12/12/2022 Currency AUD ID EG022210

Pricing Analysis

Calculate	Clean Price	OAS	Workout OAS
Price -> OAS	99.97000	22.1	22.1

Valuation 30) Invoice Curves/Cubes

Settle Date 12/02/11 Curve Date 12/02/11 Workout Date 12/12/22

Dirty Price 101.11 Discount Curve S1 Australian Dollar

Fixed Equivalent Yields Forward Curve S303 AUD 3M

To Next Call 12/12/22 5.1000 Curve Shift (bps) 0.0

To Workout 12/12/22 5.1000 Vol Cube VCUB AUD Bloomberg Cube

To Maturity 12/12/22 5.1000

Supplementary Analysis

Option Premiums		Stochastic Risk		Risk to Workout	
		OAS	Market	OAS	Market
Option Premium	N.A.	-8.4379	-0.0186	-8.4379	-0.0186
Cap Floor Premium	N.A.	0.8643	-0.0008	0.8643	-0.0008
DM Analysis to Workout		8.3449	0.0184	8.3449	0.0184
DM (bps)	29.5	0.8548	-0.0008	0.8548	-0.0008
Assumed Rate (%)	4.7171		0.0000		
Yield (%)	5.0121				

11) Pricing 12) Coupons 13) Option 14) Sinking 15) Partial Duration 16) Scenario

Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000
Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2012 Bloomberg Finance L.P.
SN 215925 AEDT GMT+11:00 G397-1634-0 17-Feb-2012 09:55:01

Source: Bloomberg



Appendix B. Method to calculate Australian dollar equivalent yields on foreign currency bonds

229. Bloomberg's XCCY function estimates cross-currency swap rates between any pair of currencies for given characteristics, such as maturity, coupon payments and payment frequency.
230. Given the number of foreign currency bonds issued in Australia (over 1000, with 20 days of data for each) it is not practicable to use this function to convert each bond on each day, given that each historical conversion is a manual process. To resolve this practical difficulty, I establish a mapping between foreign currency bond yields and Australian dollar bond yields for each currency using a cross-section of conversions obtained from Bloomberg at different maturity-yield pairs averaged over three days in the averaging period. Given the maturity and yield of the foreign currency bond to be swapped, I use interpolation across these points to identify the equivalent Australian dollar yield at that maturity.
231. It is convenient to establish this mapping on a common set of Australian dollar maturity-yield pairs. The following table of Australian dollar yields was swapped into equivalent foreign currency terms for the nine most common currencies averaged across three dates in the averaging period, being 21 November 2011, 2 December 2011 and 16 December 2011. These currencies were CAD, CHF, EUR, GBP, HKD, JPY, NZD, SGD and USD. It is important to note that the yields in Table 4 below have been chosen based on typical yields observed at each maturity in Australian dollar terms in order to establish a range that will encompass the majority of bond yields. However, the selection of these yields only forms a 'mesh' of points at which cross-currency conversions are made and then used to inform conversions at other points. The results of the methodology do not turn on the selection of these particular points.

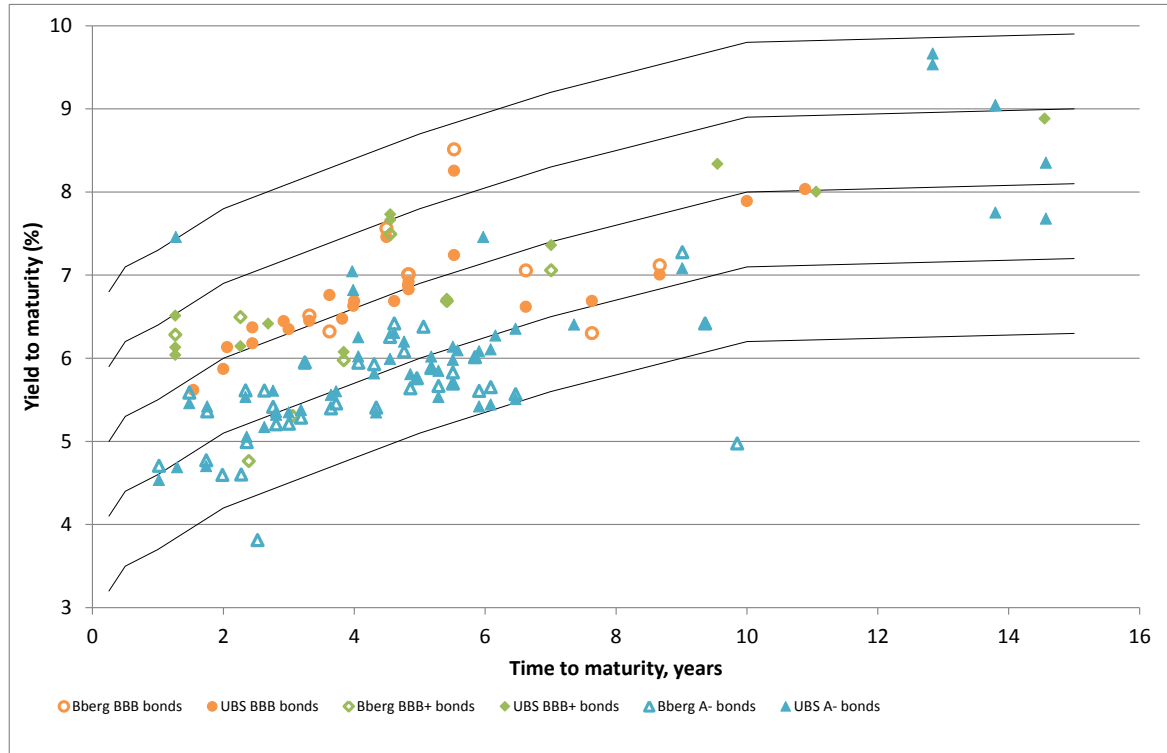


Table 4: Australian dollar yield-maturity pairs used for cross-currency swap calculations

Maturity					
0.25	3.20	4.10	5.00	5.90	6.80
0.5	3.50	4.40	5.30	6.20	7.10
1	3.70	4.60	5.50	6.40	7.30
2	4.20	5.10	6.00	6.90	7.80
3	4.50	5.40	6.30	7.20	8.10
4	4.80	5.70	6.60	7.50	8.40
5	5.10	6.00	6.90	7.80	8.70
7	5.60	6.50	7.40	8.30	9.20
8	5.80	6.70	7.60	8.50	9.40
10	6.20	7.10	8.00	8.90	9.80
15	6.30	7.20	8.10	9.00	9.90

232. To understand why I consider that the yield-maturity pairs used in Table 4 above are likely to produce reasonable estimates of Australian dollar yields, Figure 21 below shows these charted against the yields on the population of domestic bonds rated BBB to A- (as shown earlier at Figure 2 above).

Figure 21: Cross-currency yield-maturity pair matrix against BBB to A- domestic bond yields



Source: Bloomberg, UBS, RBA and CEG analysis

Note: Data sourced as an average over 21 November 2011 to 16 December 2011

233. I note that the precision of the approximation obtained could always be improved by collection of more maturity-yield pairs. However, I judge in the circumstances that the pairs in Table 4 above are sufficient to provide a reasonable approximation.
234. The swapped United States table was derived from Bloomberg as an average over 21 November 2011, 2 December 2011 and 16 December 2011, as illustrated in Table 5 below. Each element in Table 5 is mapped from the equivalent element in Table 4. Table 5 is provided for illustrative purposes but it should be noted that similar tables are produced for each of the nine currencies that I obtain bond yield information from.

Table 5: United States dollar calculated yield-maturity pairs used for cross-currency swap calculations

Maturity					
0.25	-0.844	0.048	0.939	1.831	2.723
0.5	-0.116	0.762	1.640	2.517	3.395
1	0.535	1.411	2.288	3.164	4.041
2	1.092	1.957	2.823	3.688	4.554
3	1.346	2.199	3.052	3.905	4.757
4	1.680	2.520	3.360	4.200	5.041
5	1.995	2.824	3.653	4.481	5.310
7	2.661	3.469	4.276	5.084	5.892
8	2.908	3.706	4.505	5.303	6.102
10	3.391	4.173	4.955	5.737	6.525
15	3.808	4.558	5.308	6.058	6.808

Source: Bloomberg

235. In order to swap bonds from foreign currency yields into Australian dollar yields, the tables are used to interpolate five foreign currency yields and five equivalent Australian dollar yields at the maturity of the bond. Then the foreign currency yield is used to interpolate across the five Australian dollar yields to give the resulting estimate in Australian dollar yield terms.
236. For example, the following table of foreign currency and Australian dollar yields can be constructed for a United States dollar bond with maturity of 9 years:

Table 6: Example of swap calculation

Maturity	Yield 1	Yield 2	Yield 3	Yield 4	Yield 5
AUD	6.000	6.900	7.800	8.700	9.600
USD	3.150	3.940	4.730	5.520	6.314

237. If the bond in question has a yield in United States dollars of 5.00%, then by interpolating between the second and third columns in the table above it is possible to show that the approximately equivalent Australian dollar yield is 8.11%. Yields for other foreign currency bonds are converted into Australian dollar yields in the same way.⁴⁴

⁴⁴ All cross-currency swaps from Bloomberg have been calculated in semi-annual terms, so annualisation is applied after the swap is performed.



Appendix C. Reasons relied upon by the AER to reject Bloomberg

238. The AER has asserted at least eight separate reasons in support of its proposal to rely upon its own methodology for assessing DRP in preference to the extrapolated Bloomberg fair value curve.⁴⁵

C.1. The Bloomberg fair value curve is not transparent

239. The AER notes that:⁴⁶

...the Bloomberg FVC is derived from estimates made by a market data provider, which are then reconciled with observed yield data drawn mostly from short dated bonds. The proprietary techniques used to produce the yield estimates cannot be assessed by third parties. This limits the ability of interested parties to gauge the efficiency of the underlying estimates, or to what extent they reflect the available market observed data.

240. Despite this apparent lack of transparency, the AER was able to identify the data relied upon by Bloomberg and the approximate methodology relied on by Bloomberg to fit its curve. This is information that the AER later relies upon to criticise Bloomberg's estimates.

241. I agree that, all else being equal, transparency is preferable. This does not mean that all outputs from proprietary models should be rejected simply because they are not transparent. If this were the case, the AER could not rely upon the labour cost forecasts that it receives from Access Economics, for example, because these are generated from a proprietary macroeconomic model of the Australian economy, about which much less is documented than is the case for Bloomberg's fair value curves.

242. One must be careful in uncritically accepting the outputs of a methodology that is not transparent. Certainly the AER should be careful to ensure that the extrapolated Bloomberg fair value estimates are reasonable before relying on them. This assessment should rely upon all relevant information that is available, which is what I have done in sections 3 to 5. However, it would be unreasonable to simply not have regard to Bloomberg's expertise and to lose the information that this provides simply because the AER does not understand perfectly how it comes to these estimates.

⁴⁵ See AER, *Draft Distribution Determination: Aurora Energy Pty Ltd*, November 2011, pp. 225-232

⁴⁶ Ibid, pp. 225-226



C.2. Bloomberg fair values are not intended to be a predictive source of pricing

243. The AER asserts, based on a letter it has received from Bloomberg, that Bloomberg's fair value curve:⁴⁷

is not intended to be a predictive source of pricing information. The AER considers it should be interpreted as a supplementary source of data where prices cannot be obtained for relevant bond comparators

244. It is unclear to me as to why the AER considers that statement is relevant to the use of Bloomberg's fair value estimates, or how it comes to its conclusion in the second sentence based on the information in the first.
245. Firstly, it is obvious that Bloomberg's fair value curves are not 'predictive' in the sense that they are not intended to mimic or exactly price the characteristics of any single bond. They are formed based on calculations across a range of bonds with similar credit ratings and, as such, act as a benchmark representative of bonds with those credit ratings. This makes the fair value curves ideal for use in the context of regulation where a 'benchmark' is required.
246. Secondly, it should be noted that although Bloomberg's methodology is not transparent, it is well understood as a methodology that seeks to use reported bond yields to derive a fair yield curve. As such, it is no different in principle from (although clearly much more sophisticated than) the AER's proposed methodology in Aurora and Powerlink to take a simple average across nine bonds that it considers most relevant to the benchmark. If the AER's statement is a valid criticism of Bloomberg's fair value curve, then it is also a valid criticism of any methodology (including its own) that seeks to use reported yield information to estimate a benchmark yield.

C.3. Bloomberg fair values do not take into account yields derived from floating rate notes

247. The AER notes that Bloomberg's fair value curve:⁴⁸

excludes floating rate bonds from the sample used to generate the FVC, which prevents representation of the full range of available information

248. To the extent that Bloomberg's methodology neither directly nor indirectly takes into account yields on floating rate notes then I agree that this is a reason for including these bonds when testing the accuracy of the Bloomberg curve.

⁴⁷ Ibid, p. 243

⁴⁸ Ibid, p. 243

249. Caution should be applied in considering any methodology that does not have regard to the full range of information available. That is why in this report and in previous reports I have exhaustively compared Bloomberg's fair value estimates to the full range of available yield information.
250. This is also an important reason why caution should be applied in considering the AER's most recent proposal, based on taking a simple average over nine bonds. Notwithstanding its concern that the Bloomberg fair value curve does not take account of floating rate bonds, the AER's proposed methodology is defined by the data that it seeks to exclude based on maturity, credit rating, option status, whether they are subordinated and where the bonds are traded. The 'excluded' bonds in the AER methodology exclude most bonds (both fixed and floating).

C.4. Bloomberg BBB fair value curve does not take into account many long dated bonds

251. The AER notes that:⁴⁹

Where there are few or no long dated bonds in the sample, the AER considers the scope for the FVC estimate to differ from a 'true' price at the benchmark term is likely to increase

252. I agree as a matter of principle that any methodology that seeks to use information to come up with an estimate may be less precise and/or robust where that information is scarce.

253. It then goes on to state:⁵⁰

The bonds used to derive the Bloomberg BBB rated FVC consisted largely of bonds with less than 5 years term-to-maturity, which may have explained the disparities between the observed yields for long dated bonds and the Bloomberg FVC estimates.

254. Where the AER talks about 'disparities' between observed yields for long dated bonds and the Bloomberg fair value curve estimates, it appears to be using its own nine bond sample as a reference point. This could be a valid criticism of Bloomberg's results if this sample of bonds represented the totality of information about the yields on long dated bonds that was available to the AER, and it was established that Bloomberg did not properly utilise this information.

255. However, it is apparent that the AER's sample of nine bonds includes bonds that are not directly comparable to the benchmark bond (as explained at section 7.4.2 and

⁴⁹ Ibid, p. 243

⁵⁰ Ibid, p. 244



7.4.3) and furthermore does not utilise all the information about yields on long-dated bonds by:

- excluding the information provided by bonds with maturities of greater than 13 years;
- excluding the information provided by bonds with call options;
- excluding the information provided by bonds issued overseas or in foreign currencies; and
- excluding the information about the relationship between yields on short-dated and long-dated bonds indicated by bonds of other credit ratings.

256. I do not consider that in forming this sample the AER has established an appropriate benchmark upon which to critique Bloomberg's long dated fair value estimates. Ultimately, other information as assessed at sections 3 to 5 suggests that Bloomberg's fair value estimates more accurately represent the available evidence on long-term bond yields.

257. Furthermore, any assertion that Bloomberg does not take into account much of the information that the AER would seek to rely upon is insupportable. The AER's second statement above suggests that it believes that Bloomberg only takes into account the yields on bonds that are reported as forming its fair value curve. My understanding, based on discussions with Bloomberg help desk, is that Bloomberg considers **all** fixed rate bond yields in the relevant rating range. This includes many of the bonds that the AER considers highly relevant, such as APA Group. However, its assessment process means that that some bonds will not be used in the construction of the curve.

C.5. Recent issuance of long dated bonds indicate poor fit of Bloomberg BBB fair value curve

258. The AER refers to discussion in its final decision on the Amadeus gas pipeline where it reviewed recent issues, including Brisbane Airport, Sydney Airport bonds,⁵¹ Stockland and SPI E&G. These yields, the AER claims:⁵²

further suggested the extrapolated Bloomberg BBB rated FVC was not a reliable estimator of long dated corporate bond yields. In contrast, the observed yields for bond issuances were consistent with those for the APA Group bond.

259. I agree that it is useful to compare bond yields to the Bloomberg fair value curve to assess its reasonableness. However, as demonstrated in sections 3 to 5 the five bonds noted by the AER are not the only source of information available to assess the Bloomberg fair value curve. Furthermore, since the AER's final decision in respect of

⁵¹ Noting that these are not 'new' issues, but bonds for which yield information has only recently become available from UBS.

⁵² See AER, *Draft Distribution Determination: Aurora Energy Pty Ltd*, November 2011, pp. 243-244

the Amadeus gas pipeline the reported yields of many bonds, and of the Bloomberg fair value curve, have changed significantly and the AER's critique should be reassessed based on the most recent information, as I do in sections 3 to 5.

260. Further, I note in section 7.4.2 and 7.4.3 that the SPI E&G and Coca Cola , Amatil bonds are not relevant comparisons.

C.6. Bloomberg BBB fair values have not reflected improvements in debt market conditions since the GFC

261. AER argues that, because Bloomberg BBB fair value spreads have not decreased substantially since the GFC, this is indicative of a flaw in the current level of Bloomberg's fair value estimates.⁵³ This is a continuation of an argument that the AER has made in a number of forums, including recent regulatory decisions.⁵⁴
262. However, this argument is ultimately predicated upon the notion that Bloomberg's fair value estimates properly reflected debt market yields during the worst of the GFC. That is, even if one accepted that debt market conditions had eased over this period, the fact that the Bloomberg fair value estimates had not changed much could be due to (amongst other explanations):
- Bloomberg's fair value estimates being too low then, and being correct now; or
 - Bloomberg's fair value estimates being correct then, and being too high now.
263. None of the evidence relied upon by the AER establishes that the second point above must be the case. This was accepted by the Tribunal in its recent decisions in respect of APT Allgas and Envestra:⁵⁵

At this point, it is sufficient for the Tribunal to express the view that the performance of the Bloomberg curve during and after the GFC alone would not necessarily have warranted its rejection. The unusual circumstances and market conditions, in particular the restriction of the debt market, that prevailed during the GFC are unlikely to persist for extended periods and might not therefore be viewed as indicative of the likely market conditions that would prevail during the majority of the ten year reference period. At most, the so-called "counterintuitive" performance would warrant further investigation of the reliability of the Bloomberg curve.

264. I believe that the most useful evidence that the AER puts forward is the iTraxx CDSI (page 246 of the Aurora draft decision), reproduced in Figure 22 below.

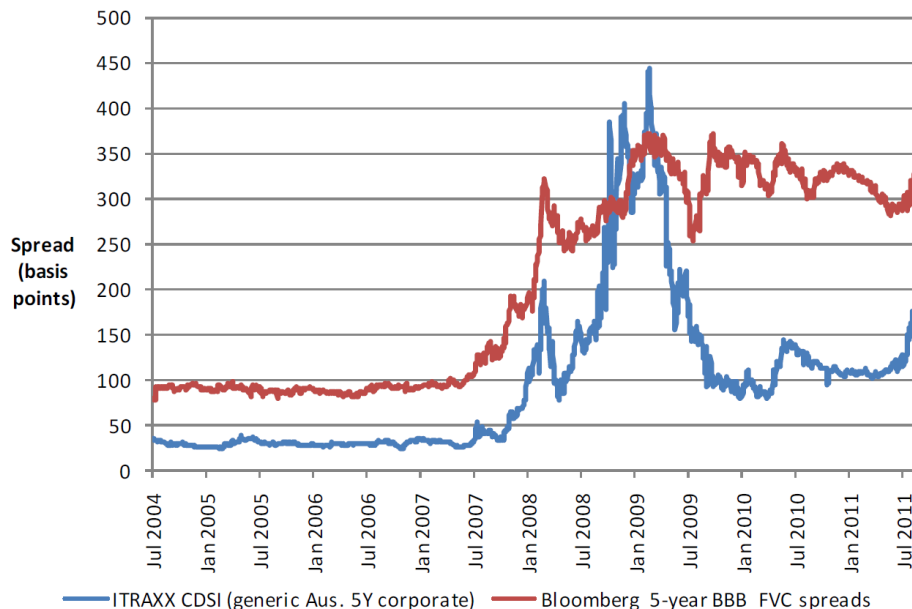
⁵³ Ibid, pp. 244-246

⁵⁴ See for example AER, *Final decision: Access arrangement for the SA gas network*, June 2011, pp. 204-26

⁵⁵ Application by Envestra Limited (No 2) [2012] ACompT 4 (11 January 2012), para. 81.

Figure 22: Figure 9.6 from the AER's Aurora report

Figure 9.6 Perceptions of default risk—iTraxx CDSI compared to the Bloomberg 5 year BBB rated FVC



Source: Bloomberg, RBA, AER analysis.

Source: AER

265. Before discussing this figure, it is important to note that one should not expect the DRP based on the Bloomberg fair value curve to be at the same level as the iTraxx index. This is because writing a CDS contract does not involve the same transfer of risk as buying the bond that the CDS is written against (eg, if the purchasers of a bond are exposed to interest rate risk and a CDS insured bond only provides adequate insurance if the CDS issuer also does not default). Moreover, the Itraxx index is not solely based on BBB to BBB+ bond issues.
266. One can expect the iTraxx and BBB fair value curve to move in the same direction for a given economic shock. It may also, depending on the nature of the shock, be reasonable to assume that the two series would settle at levels relative to their pre-shock level that are broadly consistent. That is, if a shock doubles the iTraxx series it may be reasonable to assume that it also doubles the BBB fair value series.
267. With this in mind the above figure shows that during the GFC the Bloomberg fair value estimates did not 'spike' in the same manner as iTraxx (or for that matter CBASpectrum). It is interesting to note that during this period, the AER's methodology

at that time selected Bloomberg's fair value curve as preferable to CBASpectrum's on the basis of evidence provided by a handful of bonds.⁵⁶

268. Subsequent to the crisis, the iTraxx CDSI declined substantially, whilst Bloomberg's fair value estimates were variable but approximately constant and considerably higher than iTraxx. However, this is entirely consistent with the pre-crisis period in which the iTraxx index was also much lower than Bloomberg's fair value estimates. Indeed, the relativities between the two series appear approximately the same pre and post crisis. In each period Bloomberg's fair value curve is around three times the value of the iTraxx series. It is only during the 2008/09 crisis that this relativity is disturbed – with the iTrax series briefly spiking above the Bloomberg series. This suggests that the behaviour of the Bloomberg fair value curve was anomalous in that period and not in the post crisis period.
269. In conclusion, the evidence put forward by the AER appears consistent with an interpretation that the Bloomberg fair value estimates reacted insufficiently to the GFC. Although the AER has provided some evidence that conditions for debt raising have eased since the worst of the GFC, this provides no basis to disregard current Bloomberg fair value estimates.

C.7. Fair value estimates may be unreliable at 10 years

270. The AER notes that, in general, the reliability of fair value estimates may be questionable at long maturities:

Both Bloomberg and CBASpectrum had ceased publication of their 10 year FVCs, which might indicate a lack of confidence in the reliability of the FVC estimates for long-term debt.

271. I note that the AER's statement applies equally to its own estimate of DRP, since this is simply another fair value estimate, albeit less sophisticated and relying on less data than Bloomberg's or CBASpectrum's estimates. Hence I do not regard this comment as supporting a preference for the AER's methodology over that of Bloomberg's.
272. I agree that fair value estimates at long maturities are likely to be less precise than at shorter maturities where there is more data. My opinion, as set out elsewhere in this report, is that these estimates can be cross-checked by reliance on:
- a methodology that uses the information from shorter-dated bonds to inform long-dated yields; and/or
 - additional yield data sourced from bonds issued by Australian companies into overseas markets.

⁵⁶ See AER, *Final decision: New South Wales distribution determination*, 28 April 2009, pp. 227-229



273. That is, the reliability of the fair value estimate can be established (or otherwise) by reference to a wider range of information. In conducting these tests at sections 3 to 5, I find that this information supports the estimates produced by the extrapolated Bloomberg BBB fair value curve.

C.8. Extrapolation methodology for Bloomberg is unreliable

274. In its Aurora draft decision, the AER expresses doubt about the method for extrapolation of the Bloomberg BBB fair value curve used by Aurora, specifically the use of Bloomberg's AAA fair value estimated dating from June 2010.⁵⁷ Although the method applied by Aurora was originally proposed by me in 2010,⁵⁸ I did not envisage that it would remain appropriate to apply without review for an extended period into the future.

275. I do not consider, and I do not read the AER as suggesting in its Aurora draft decision, that the need to extrapolate the Bloomberg BBB fair value curve from seven years to ten years to meet required 10-year benchmark is a valid reason for not having regard to the information contained within the Bloomberg BBB fair value curve.

⁵⁷ AER, *Draft Distribution Determination: Aurora Energy Pty Ltd*, November 2011, pp.246-249

⁵⁸ CEG, *Use of the APT bond yield in establishing the NER cost of debt*, October 2010, pp. 49-56



Tom Hird is a founding Director of CEG's Australian operations. In the four years since its inception CEG has been recognised by Global Competition Review (GCR) as one of the top 20 worldwide economics consultancies with focus on competition law. Tom has a Ph.D. in Economics from Monash University. Tom is also an Honorary Fellow of the Faculty of Economics at Monash University and is named by GCR in its list of top individual competition economists.

Tom's clients include private businesses and government agencies. Tom has advised clients on matters pertaining to: cost modeling, valuation and cost of capital.

In terms of geographical coverage, Tom's clients have included businesses and government agencies in Australia, Japan, the UK, France, Belgium, the Netherlands, New Zealand, Macau, Singapore and the Philippines. Selected assignments include:

Recent

Advice to Everything Everywhere in relation to the cost of capital for UK mobile operators – including appeal of regulators decision.

Expert evidence to the Australian Competition Tribunal on the cost of debt for Jemena Electricity Networks.

Advice to Integral Energy on optimal capital structure.

Expert evidence to the Australian Competition Tribunal on the cost of debt for Jemena Gas Networks.

Advice to ActewAGL on estimation of the cost of debt

Advising NSW, ACT and Tasmanian electricity transmission and distribution businesses on the cost of capital generally and how to estimate it in the light of the global financial crisis.

Advice in relation to the appeal by the above businesses of the AER determination - quoted in Australian Competition Tribunal decisions.

Expert testimony to the Federal Court of Australia on alleged errors made by the Australian Competition and Consumer Commission (ACCC) in estimating the cost of capital for Telstra.

Advice to T-Mobile (Deutsche Telekom) on the cost of capital for mobile operators operating in Western Europe.

Advising Optus and TERRiA on the cost of capital to be used in developing their tender to build the next generation fibre to the node (FTTN) broadband network in Australia.

Advising Vivendi on the correct cost of capital to use in a discounted cash flow analysis in a damages case being brought by Deutsche Telekom.

Advising the Energy Networks Association on cost of capital issues in the context of the Australian Energy Regulator (AER) five year review of the cost of capital in the NER.

2007

Advising the Victorian gas distributors in relation to their response the ESCV's draft decision on the cost of capital (four reports).

Advising the Energy Networks Association on the appropriate estimation technique for the risk free rate used in CAPM modeling (two reports).

Earlier

Advising the Australian Energy Regulator on the cost capital issues in relation to the RBP pipeline access arrangement.

Advising the ENA on the relative merits of CBASpectrum and Bloomberg's methodology for estimating the debt margin for long dated low rated corporate bonds.

Advising the Australian Competition and Consumer Commission, Australia on the correct discount rate to use when valuing future expenditure streams on gas pipelines.

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Detailed Project Experience

Market Design and Competition Analysis

- 2011** **ACCC, Australia**
Advice on merger in media and entertainment industry
Advice on merger in media and entertainment industry
- 2011** **ACCC, Australia**
Advice on a concentration in ownership in the television industry
Advice on merger in media and entertainment industry
- 2010** **Gilbert + Tobin, Australia**
BHPB proposed joint venture with Rio Tinto
Providing expert statements and empirical analysis on the likely impact of the proposed Pilbarra joint venture between BHP and Rio Tinto. The legal and economic teams involved were awarded ‘Deal of the year – Asia Pacific’ by Global Competition Review.
- 2009** **Webb Henderson, Australia**
Setting reserve prices for auction of digital radio spectrum
Provided advice, which was adopted, in relation to the appropriate reserve price for the November 2009 auction of digital radio spectrum across Australia.
- 2009** **AMP, Australia**
Analysis of competition in the market for superannuation services
Providing advice to AMP for submission to the Cooper Review into the governance, efficiency, structure and operations of Australia’s superannuation system. This included as survey of the competitive structure of the industry and an assessment of how, if at all, competition was less effective at serving customer needs in this market than other unregulated markets.
- 2009** **JWS, Australia**
Analysis of a ‘competitive margin’ in contract resetting
Providing expert statements on the appropriate estimate of a risk adjusted margin in the context of services provided by United Water to SA Water where the contract specified that the margin must be reset consistent with what would be found in a competitive market.
- 2009** **Gilbert + Tobin, Australia**
BHPB proposed joint venture with Rio Tinto
Providing expert statements and empirical analysis on the likely impact of the merger on the prices of iron ore and coking coal. Expert statements to be provided to ACCC, European Commission and US regulators. Also providing commentary and advice on the formulation of reports by NERA (in Japan and the US) and Frontier (in Europe).
- 2009** **Chapman Tripp, New Zealand**
Advice on the proper design of a multiproduct imputation test
Providing advice on the conceptual design and practical implementation of an imputation test for a client of Chapman Tripp with multiple retail and wholesale products where a position of dominance in the provision of some, but not all, wholesale products.
- 2009** **AGCOM, Italy**
Design of imputation test
Providing expert advice to AGCOM (the Italian Communications Authority) on the design of an imputation test to be applied in relation to Telecom Italia’s retail and wholesale prices.
- 2009** **Gilbert + Tobin, Australia**
Analysis of proposed transaction in relation to small industrial packaging
Providing expert statements and empirical analysis on the substitutability between different types of small industrial packaging.

- 2009 Chapman Tripp, New Zealand**
Expert testimony in Vodafone appeal of Commerce Commission decision
 Providing expert testimony on the correct economic interpretation of a competitive price level (and price path) in relation to services provided by Telecom New Zealand.
- 2009 Minter Ellison, Australia**
Interpretation of ‘promotion of economically efficient use of infrastructure’
 Advice on the proper interpretation of ‘promotion of economically efficient use of infrastructure’ in the context of Telstra’s claim that it should be exempted from supplying regulated wholesale services to Optus in areas where Optus, it was argued, could commercially extend its competing HFC cable.
- 2009 Van Bael & Bellis, EU**
Proposed transaction between GSK and Astra Zeneca
 Provided market modelling of the effect of a concentration between Glaxo Smith Kline and Astra Zeneca in relation to certain common pharmaceutical product lines.
- 2008 Gilbert + Tobin, Australia**
BHPB proposed merger with Rio Tinto
 Providing expert statements and empirical analysis on the likely impact of the merger on the prices of iron ore and coking coal. Outputs included submissions made to the European Commission, the ACCC and the KFTC (Korean competition regulator) and responses to detailed questions from the European Commission.
- 2008 Scottish Power, UK**
Purchase of British Energy Nuclear Power Plants
 Providing electricity market modelling, to inform a competition law assessment, of the impact on competition if Scottish Power were to purchase various combinations of British Energy’s nuclear power plants.
- 2008 Gilbert + Tobin, Australia**
Industrial Packaging
 Providing an expert report to Gilbert + Tobin on the competitive implications of a merger involving large industrial packaging.
- 2008 Vivendi, European Union**
Damages in Mobile Telephony Market
 Providing expert critique of a proposed damages claim being brought by Deutsche Telecom against Vivendi in relation to alleged unlawful activity in a Polish mobile telephony joint venture.
- 2008 MGF Webb, Australia**
Mobile Termination
 Advising on a range of competition matters relating to mobile termination including an assessment of the potential basis for company specific exemptions from regulation of mobile termination.
- 2007 “G9” Group of Telecommunications Carriers**
Regulatory Undertaking to Build and Operate a FTTN Network in Australia
 Advising the G9 on competition analysis associated with the construction and operation of a FTTN network. Developing an regulatory Undertaking under the Australian Trade Practices Act describing the proposed operation of the FTTN. Providing an expert report on the economic benefits associated with the proposed undertaking.
- 2007 Gilbert + Tobin, Australia**
Merger Analysis – New Steel Drum Manufacture
 Providing expert opinion to Gilbert + Tobin on the competitive implications of a merger involving new steel drum manufacture.

- 2006 Melbourne Water Industry, Australia**
Market Design – Bulk Water Sector
 Developing reform proposals to facilitate the introduction of tradeable bulk water rights to the Melbourne system – including the specification of operational market rules.
- 2006 Australian Competition and Consumer Commission, Australia**
Merger Analysis – Electricity Industry
 Advising the Australian Competition and Consumer Commission (ACCC) on the competitive implications of a proposed merger in the electricity sector.
- 2006 Minter Ellison, Australia**
Section 46 of the TPA - Telecommunications
 Providing expert opinion in relation to an action under Section 46 of the Trade Practices Act.
- 2005 Philips Fox, Australia**
Merger Analysis - Telecommunications Industry
 Advising the merging firms on the competitive implications of that merger.
- 2005 AirServices Australia (ASA), Australia**
Review of Pricing Conduct
 Providing expert opinion to ASA on pricing for its services at Australian Airports. Including an examination of allegations that pricing contravened National Competition Agreements.
- 2001-05 TransGrid, Australia**
Market for transmission
 Analysis of the design of the National Electricity Market (NEM) and its implications for efficient investment in generation and transmission assets. This work has involved providing private advice to TransGrid as well as public policy documents such as drafting TransGrid's submission to the US energy regulator (FERC) on market design.
- 2005 Confidential, Australia**
Competition Assessment of Pricing Strategy
 Advising a large corporate on the economic implications of the Trade Practices Act for its pricing conduct.
- 2005 Australian Competition and Consumer Commission, Australia**
Competition Assessment of Electricity Generation Merger
 Advised the ACCC on the competition concerns (and potential remedies) associated with a specific proposed merger of electricity generation interests.
- 2004 Australian Competition and Consumer Commission, Australia**
Competition Impact of Exclusive Rights to Content
 Provided a public report to the ACCC on the competition concerns (and potential remedies) associated with the use of exclusive rights to content by incumbent telecommunications infrastructure owners.
- 2004 Australian Competition and Consumer Commission, Australia**
Empirical Evidence of Predatory Pricing in Telecommunications
 Provided the ACCC with an expert report that developed an imputation test framework and empirical model to test allegations of predatory pricing of broadband services.
- 2003-04 Singtel Optus, Australia**
Expert Report on Market Definition and Existence of Market Power in Mobile Termination
 Provided Optus with an expert report on the appropriate market definition to use in analysing competition between mobile network operators in providing terminating access.
- 2003-04 Singtel Optus, Australia**
Expert Economic Advice on Competition Complaint

Providing Optus advice on a confidential competition complaint relating to the exercise of market power by one of Optus' competitors.

2001-03

Qantas

Advice on Competition Law and Predation Allegations

Provided input into NERA's advice in relation to allegations of anticompetitive behaviour under section 46 of the Trade Practice Act.

2002

National Competition Council (NCC), Australia

Exploitation of Market Power by a Gas Pipeline

Provided a report to the NCC in which we developed a number of tests for whether current transmission prices were evidence of the exploitation of market power by a gas transmission pipeline. Also provided a separate report that applied these tests. This analysis was used to inform the NCC's decision on whether to recommend the pipeline in question be subject to regulation under the Australian Gas Code.

2002

Screenrights, Australia

Advice on methodologies used to estimate the value of retransmitting copyright content contained in local free-to-air broadcast.

Cost of Capital Issues

- 2011** **Gas pipeline owners, Australia**
Cost of Capital
Advising Jemena Gas Networks on estimation of the cost of debt in an appeal of the Australian Energy Regulator's (AER) decision. Expert testimony requested by the Australian Competition Tribunal.
- 2010** **Victorian Electricity Distribution, Australia**
Cost of Capital
All Victorian distribution businesses response to an AER consultation paper on estimating the cost of debt.
- 2010** **Integral Energy, Australia**
Capital structure
Advice to Integral Energy on managing its capital structure.
- 2010** **ActewAGL, Australia**
Cost of Capital
Advising ActewAGL on estimation of the cost of debt and subsequent appeal of the Australian Energy Regulator's decision. CEG evidence favourably quoted in Tribunal decision.
- 2010** **Gas pipeline owners, Australia**
Cost of Capital
Advising on the appropriate cost of capital under the National Gas Code.
- 2010** **Gas pipeline owners, Australia**
Cost of Capital
Advising the ActewAGL on an appeal of the AER's decision in relation to the cost of debt under the National Gas Code.
- 2010** **DHA, Australia**
Cost of Capital
Advising the DHA on the cost of capital it should use in assessing the NPV of potential projects.
- 2010** **T-Mobile, France**
Cost of Capital
Advising the T-Mobile on the appropriate cost of capital for mobile telecommunications services in France.
- 2010** **Gas pipeline owners, Australia**
Cost of Capital
Advising on the cost of capital for gas distribution business and AER's Final Determination.
- 2010** **Citipower and Powercor, Australia**
Cost of Capital
Advising on the cost of capital for electricity distribution business.
- 2009** **ETSA, Australia**
Cost of Capital
Advising ETSA on the cost of capital for its South Australian electricity distribution business.
- 2009** **NSW, Tasmanian and ACT electricity businesses, Australia**
Cost of Capital
Advising NSW, ACT and Tasmanian electricity transmission and distribution businesses on the cost of capital generally and how to estimate it in the light of the global financial crisis.

- 2009** **Gilbert and Tobin, Australia**
Cost of Capital
 Advice in relation to the appeal by the above businesses of the AER determination. With expert advice quoted approvingly in the ACT judgment in favour of the applicants.
- 2009** **Philips Fox, Australia**
Cost of Capital
 Expert report submitted to the AER on the issue of how to estimate the cost of 10 year BBB+ debt (as required under the NER) given divergence between fair value estimates from the Bloomberg and CBASpectrum data services. The context was a decision in relation to Advanced Metering Infrastructure.
- 2009** **Gas pipeline businesses, Australia**
Cost of Capital
 Advice on a range of factors relating to the cost of capital including debt and equity. .
- 2009** **Herbert Geer and Rundle, Australia**
Cost of Capital
 Expert testimony to the Federal Court of Australia on alleged errors made by the Australian Competition and Consumer Commission (ACCC) in estimating the cost of capital for Telstra (the incumbent telecommunications provider). Testimony quoted approvingly in the judgment.
- 2009** **T-Mobile, European Union**
Cost of Capital
 Advice to T-Mobile (Deutsche Telekom) on the cost of capital for mobile operators operating in Western Europe.
- 2009** **Joint Industry Associations, Australia**
Cost of Capital
 Advising the Energy Networks Association on cost of capital issues in the context of the Australian Energy Regulator (AER) five year review of the cost of capital in the NER. Multiple reports covering issues such as: dividend growth estimates of the market risk premium, appropriate selection of the risk free rate, appropriate term for the measurement of equity and debt costs, impact of the financial crisis on the cost of capital, empirical testing of the accuracy of the capital asset pricing model (CAPM), conceptual discussion of the theoretical purity of the implementation of the CAPM in AER analysis.
- 2009** **Telecom New Zealand, Australia**
Cost of Capital
 Advising Telecom New Zealand on cost of capital issues associated with the cost of providing the New Zealand universal service obligation (TSO).
- 2009** **Queensland Rail, Australia**
Cost of Capital
 Advising Queensland Rail on its cost of capital submission to the QCA.
- 2009** **Gilbert + Tobin, Australia**
Cost of Capital
 Advising Gilbert+Tobin/Japanese Steel mills on competitive impact of proposed transactions between BHPB and Rio Tinto. Including analysis of the impact of the global financial crisis on this analysis. Reports provided to both Australian and European regulators.
- 2009** **Gilbert and Tobin, Australia**
Cost of Capital
 Advice on estimation of the cost of capital in the context of the AER's regulatory review of revenues for ETSA, Ergon and Energex.
- 2008** **Optus/TERRiA, Australia**
Cost of Capital

Advising Optus and TERRiA on the cost of capital to be used in developing their tender to build the next generation fibre to the node (FTTN) broadband network in Australia.

- 2008 Vivendi, Poland**
Cost of Capital
Advising Vivendi on the correct cost of capital to use in a discounted cash flow analysis in a damages case being brought by Deutsche Telekom.
- 2008 The Energy Networks Association, Australia**
Cost of Capital
Advising the Energy Networks Association on cost of capital issues in the context of the Australian Energy Regulator (AER) five year review of the cost of capital in the NER.
- 2008 Telecom New Zealand, Australia**
Cost of Capital
Advising Telecom New Zealand on the appropriate estimation of the cost of capital associated with capital assets used to provide its universal service obligations.
- 2008 Queensland Rail, Australia**
Cost of Capital
Advising QR on the appropriate estimation of the cost of capital associated with capital assets used to provide rail transport services
- 2008 Transend, Australia**
Cost of Capital
Advising Transend on the appropriate estimation of the cost of capital associated with capital assets used to provide electricity transmission services.
- 2008 Energy Australia, TransGrid, Country Energy and Integral Energy, Australia**
Cost of Capital
Advising on the appropriate estimation of the cost of capital associated with capital assets used to provide electricity transmission and distribution services.
- 2008 ActewAGL, Australia**
Cost of Capital
An expert report describing the appropriate method for deriving a real risk free rate in the CAPM.
- 2007 Electranet, Australia**
Cost of Capital
An expert report describing the appropriate method for deriving a real risk free rate in the CAPM.
- 2007 Gas pipeline owners, Australia**
Cost of Capital
Three expert reports in response to the Victorian Essential Services Commission's cost of capital decision for Victorian gas distributors. Issues covered included: estimation of the appropriate equity beta, the appropriate form of the CAPM to be used, the use of non-CAPM asset pricing models, the estimation of the risk free rate from Government bond data.
- 2007 Energy Networks Association, Australia**
Cost of Capital
Two expert reports with Professor Grundy identifying and quantifying the existence of a bias in the use of Australian Government bond yields as a proxy for the CAPM risk free rate.
- 2006 ACTEW Corporation, Australia**
Cost of Capital
Advising on the cost of capital for ACTEW's water and waste water operations.
- 2006 AER, Australia**

	Cost of Capital Advising on the cost capital issues in relation to the RBP pipeline access arrangement.
2006	Integral Energy, Australia Cost of Capital Advising on the cost of capital for Integral's retail operations.
2006	Telecom New Zealand, New Zealand Cost of Capital Advising on the cost capital issues in relation to TSO.
2005	Energy Networks Association, Australia Debt Margin Advising on the relative merits of CBASpectrum and Bloomberg's methodology for estimating the appropriate debt margin for long dated low rated corporate bonds.
2005	The Victorian ESC, Australia Cost of Capital Advice on the cost of capital for electricity distribution network assets.
2005	Prime Infrastructure, Australia Weighted Average Cost of Capital Provided a report for Prime Infrastructure critiquing the QCA's draft cost of capital decision for Queensland electricity distribution.
2004	The Australian Competition and Consumer Commission, Australia Cost of Capital Provided a report advising on the correct discount rate to use when valuing future expenditure streams on gas pipelines.
2004	ETSA Utilities, Australia Weighted Average Cost of Capital Provided a report for ETSA examining the use of historical proxy betas.
2004	ActewAGL, Australia Weighted Average Cost of Capital Provided a report for ActewAGL estimating its weighted average cost of capital for regulated activities (gas distribution).
2004	TransGrid , Australia Debt Margin Provided a report critiquing CBASpectrum's methodology for estimating the appropriate debt margin for long dated low rated corporate bonds.
2004	Prime Infrastructure, Australia Weighted Average Cost of Capital Provided a report for Prime Infrastructure the weighted average cost of capital for its regulated activities (coal shipping terminal).
2004	ActewAGL, Australia Debt Margin Provided a report for ActewAGL advising on the appropriate calculation of debt margins for BBB+ ten year bonds.
2003	Electricity Transmission Service Providers, Australia Expert Report on the Use of Historical Proxy Betas Critique of the ACCC's statistical interpretation of historical proxy beta in its review of the Statement of Principles for the Regulation of Transmission Revenues.
2003	Orion, New Zealand

Cost of Capital

Critique of Associate Professor Lally's advice on the Cost of Capital for New Zealand Electricity Distribution.

- 2003 TransGrid, Australia**
Expert Report on TransGrid's WACC
Advising TransGrid on the appropriate weighted average cost of capital (WACC) for its regulated assets
- 2003 EnergyAustralia, NSW, Australia**
Advice on Financial Capital Maintenance
Advising EnergyAustralia on issues relating to its appropriate WACC and the modelling of cash flows to ensure the expected present value of future net revenues was equal to the value of the regulated asset base.
- 2002 Rail Access Corporation, Australia**
Hurdle Rates of Return
Advising rail access corporation on the appropriate hurdle rates of return that should be applied when assessing competing investments.
- 2002 Integral Energy, Australia**
Return on Capital
Advising Integral Energy on what risk adjusted regulatory return on capital is necessary to provide sufficient incentive to invest in new infrastructure assets.
- 2001 TransGrid, Australia**
Advice on ACCC's Powerlink WACC decision
A report critically appraising the ACCC's decision regarding Powerlink's weighted average cost of capital (WACC).
- 2001 Optus, Australia**
Affidavit on Telstra's PSTN WACC
Providing expert testimony to the Australian Competition Tribunal on Telstra's use of the CAPM model to determine an appropriate rate of return on PSTN assets.
- 2001 Australian Competition and Consumer Commission, Australia**
International Comparison of WACC Parameters
Preparation of a report on international and domestic WACC parameters and the potential impact of variations in declared WACCs on incentives to invest in various regulatory jurisdictions.

General Regulatory Analysis

2011	SingTel Optus, Australia Cost modelling Advice on the Australian regulator's fixed line cost model including fixed interconnection cost structures.
2010	Telecom New Zealand, New Zealand Cost modelling Advice on cost modelling of mobile termination in Samoa.
2010	Digicel, Vanuatu Cost modelling Econometric benchmarking of mobile termination costs.
2010	Digicel, Tahiti Cost modelling Developing a cost model for Digicel in relation to the cost of providing mobile termination in Samoa.
2010	SingTel Optus, Australia Cost modelling Construction of a cost model to estimate unbundled local loop costs.
2009	ETSA, Australia Cost modelling Advice to ETSA on modelling of its cost of service.
2009	Digicel, Samoa Cost modelling Developing a cost model for Digicel in relation to the cost of providing mobile termination in Samoa.
2009	ActewAGL, Australia Cost modelling Advice to ActewAGL on modelling of its cost of service including in relation to forecasts for costs faced by its gas distribution business over the forthcoming regulatory period.
2009	Country Energy, Australia Cost modelling Advice to Country Energy on modelling of its cost of service including in relation to forecasts for costs faced by its gas distribution business over the forthcoming regulatory period.
2009	Vodafone, Fiji Cost modelling Developing a cost model for Vodafone in relation to the cost of providing mobile termination in Fiji.
2009	Jemena, Australia Cost modelling Advice to Jemena on modelling of its cost of service including in relation to forecasts for costs faced by its gas distribution business over the forthcoming regulatory period.
2009	Integral, Australia Cost modelling Advice to Integral on whether their pricing structure was consistent with the requirements of the National Electricity Rules in relation to, inter alia, consistency with reflecting long run marginal cost and each tariff being set at a level between standalone and avoidable cost.
2008	Telecom New Zealand, New Zealand

	USO Reform Advise Telecom NZ on all aspects of universal service obligation reform, including: the appropriate level of obligations; the use of contestable models of provision, alternative funding models, costing of the obligations.
2008	Envestra, Australia Related party transaction Expert statement assessing the reasonableness of an alleged related party transaction entered into by Envestra to outsource its operating and maintenance activities to Origin Energy.
2008	Energy Australia, TransGrid, Country Energy and Integral Energy, Australia Cost modelling Advice to these businesses on modelling of its cost of service including in relation to forecasts of costs over the forthcoming regulatory period.
2008	Digicel, PNG Cost modelling Developing a cost model for Digicel in relation to the cost of providing mobile termination in Fiji.
2008	Transend, Australia Cost modelling Advice to Transend on modelling of its cost of service including in relation to forecasts for costs over the forthcoming regulatory period.
2008	Electranet, Australia Cost modelling Advice to Electranet on modelling of its cost of service including in relation to forecasts for costs over the forthcoming regulatory period.
2007	T-Mobile, UK Mobile termination cost modelling Advise T-Mobile on BT's appeal of the UK Commerce Commission's determination on the cost of mobile termination (specifically in relation to the treatment of 3G spectrum).
2008	SingTel Optus, Australia Mobile cost modelling Advise SingTel Optus on the (TSLRIC) cost of mobile termination in Australia. This involves detailed telecommunication cost modelling and conceptual analysis. CEG's cost model is to be used to underpin SingTel Optus' price undertaking to the Australian Competition and Consumer Commission.
2007	GSME, Europe USO reform Developing and drafting of submission to the European Commission by the GSME on all aspects of universal service obligation reform, including: the appropriate level of obligations; the use of contestable models of provision, alternative funding models, costing of the obligations.
2007	SingTel Optus, Australia FTTN Advise SingTel Optus on all regulatory and competition issues associated with the construction of a FTTN network. Issues include – costing, form of price controls, capital raising and the cost of capital, drafting of undertakings, expert reports submitted to the regulator (Australian Competition and Consumer Commission).
2007	Communications Alliance, Australia USO reform Developing and drafting of submission to Government by the Communications Alliance (an industry body covering incumbent and new entrant fixed and mobile carriers) on all aspects of

universal service obligation reform, including: the appropriate level of obligations; the use of contestable models of provision, alternative funding models, costing of the obligations.

- 2006-07** **GDSE, Macau, SAR PRC**
Efficient Electricity Tariff Reform
Advise the Macau regulator (GDSE) on efficient tariff reform for the vertically integrated generation and network provider. This involved estimating the LRMC on maximum demand and translating this into efficient tariff designs given relevant constraints (eg, metering constraints).
- 2005-06** **Integral Energy, Australia**
Efficient Electricity Tariff Reform
Advise Integral Energy on its LRMC of meeting growing network demand and on how this could be reflected in efficient tariff design (including design of critical peak pricing).
- 2005** **Telecom New Zealand, New Zealand**
Modelling of New Entrant Costs for TSO
Provide expert reports on the correct methodology for calculating the cost of providing the TSO (universal service obligation) using new entrant costs.
- 2005** **Telecom New Zealand, New Zealand**
Operating Cost Benchmarks
Advised Telecom on appropriate operating cost benchmarks for telecommunications services
- 2005** **TransGrid, Australia**
Capital Expenditure Indexation
Advised TransGrid on the development of a price index to reflect movements in the unit costs of inputs into its capital expenditure program.
- 2005** **TransGrid, Australia**
Forecast of Capital Expenditure
Advised TransGrid on appropriate adjustments to forecast capital expenditure to take account of material increases in demand for investment in future Australian electricity infrastructure.
- 2005** **TransGrid, Australia**
ACCC's Capital Expenditure Regime
Advised TransGrid on the ACCC's proposed regulatory regime to apply to capital expenditure.
- 2005** **Actew, Australia**
Financing of New Infrastructure
Advised Actew on options for financing new infrastructure.
- 2004** **Telecom New Zealand, New Zealand**
Avoided Retail Cost Study
Developing an avoided cost study associated with Telecom's fixed line retail activities.
- 2004** **TransGrid, Australia**
Fair Sharing of Efficiency Gains
Provided a report to TransGrid advising on whether the ACCC's draft decision was consistent with the National Electricity Code's requirement that there be a 'fair sharing' of efficiency gains.
- 2004** **Australian Competition and Consumer Commission, Australia**
Asset Valuation Report
Provided an expert report to the ACCC on the calculation of depreciated optimised replacement cost (DORC) in the context of the EAPL's appeal of the ACCC's valuation of its Moomba to Sydney pipeline.
- 2004** **ESCOSA, Australia**

Incentive Regulation

Provided ESCOSA with a report on the appropriate mechanism to provide ETSA Utilities with an incentive to achieve cost reductions in operating and capital expenditure.

- 2004** **Perisher Blue Ltd, Australia**
Review of Municipal Services
Assisted PBL with its submission to IPART on the review of municipal services (roads, waste, water and sewerage) at the Perisher Blue Resort.
- 2004** **TransGrid, Australia**
ACCC Regulatory Review
Assisted TransGrid in drafting its Application to the ACCC for regulated revenues and in its response to the ACCC's draft decision.
- 2003** **Telecom New Zealand, New Zealand**
Expert Report on Efficient Recovery of CSO Costs
Provided Telecom with a report stepping through all the information necessary to administer SO costs in a manner consistent with "Ramsey efficient" pricing. The purpose of this was to inform the NZ Commerce Commission of the practical difficulties associated with pursuing such an outcome.
- 2003** **EnergyAustralia, NSW, Australia**
Advice on Financial Capital Maintenance
Advising EnergyAustralia on issues relating to its appropriate WACC and the modelling of cash flows to ensure the expected present value of future net revenues was equal to the value of the regulated asset base.
- 2003** **Optus, Australia**
Critique of Telstra's Access Undertaking for PSTN Services
Advising Optus in relation to the reasonableness of Telstra's cost modelling assumptions underlying its access undertaking for PSTN services.
- 2003** **Optus, Australia**
Indicative Pricing Principles
Advising Optus in relation to appropriate pricing principles the ACCC should adopt when establishing indicative prices for access to PSTN services.
- 2003** **Optus, Australia**
Estimation and Recovery of Telstra's Access Deficit
Provided a report to the ACCC on behalf of Optus addressing the appropriate measurement of any 'access deficit' that may exist between the cost to Telstra of its access network and the revenues associated with that network. Also examined the most appropriate recovery methodology for any access deficit.
- 2003** **Rail Infrastructure Corporation, NSW, Australia**
Expert Report on Hurdle Rates of Return
Advising RIC on the appropriate WACC each division should use as a hurdle rate of return when assessing competing capital projects.
- 2003** **Telecom New Zealand, New Zealand**
Expert at Commerce Commission Hearing
Provided expert testimony to the NZ Commerce Commission on the appropriate calculation of a wholesale discount for regulated services.
- 2002** **Telecom New Zealand, New Zealand**
'Intelligent' Wholesale Benchmarking Report
Carried out a benchmarking survey and provided a report to the New Zealand Commerce Commission on behalf of Telecom New Zealand. This report adjusted wholesale prices in the United States for differences in cost drivers (in terms of the cost of capital and labour) compared to New Zealand.

- 2003 TransGrid, NSW Australia**
Submission to the ACCC's Review of the Regulatory Test
 Advised TransGrid in response to the ACCC's Discussion Paper on the review of the regulatory test. Tom prepared a report which commented both on the ACCC's proposal to amend the regulatory test to improve clarity and to ensure consistency with the provisions in the National Electricity Code, and also on the ACCC's proposed options for incorporating 'competition benefits' in the regulatory test.
- 2003 Clayton Utz, TransGrid, NSW, Australia**
Murraylink's Application for Regulated Status
 Tom advised TransGrid and Clayton Utz in responding to Murraylink's Application to the ACCC for regulated status, and, in particular, Murraylink's use of the regulatory test to derive a regulatory asset value.
- Tom also advised TransGrid in responding to the ACCC's Preliminary View on Murraylink's Application, and helped draft a further report commenting on aspects of the ACCC's approach.
- 2001-03 TransGrid, NSW, Australia**
Application of the regulatory test to network augmentation in the Western Area
 Advised TransGrid on the application of the regulatory for intra-regional network augmentation planned for the Western Area of NSW. The application highlighted issues in applying the regulatory test in a situation where an agreed reliability standard is not currently met.
- 2002 Telecom New Zealand, New Zealand**
Interconnection Pricing
 Advised Telecom New Zealand on the potential forms of price control the New Zealand Commerce Commission could adopt in regulating PSTN interconnection prices.
- 2002 Telecom New Zealand, New Zealand**
'Intelligent' Interconnection Benchmarking Report
 Carried out a benchmarking survey and provided a report to the New Zealand Commerce Commission on behalf of Telecom New Zealand. This report adjusted interconnection prices in Europe, Australia and the United States for differences in cost drivers (in terms of switching and transmission economies of scale, transmission link lengths and the cost of capital and labour) compared to New Zealand.
- 2002 SPI PowerNet, Australia**
Design of Efficiency Carryover Mechanism
 Advised SPI PowerNet on the appropriate design of an efficiency carryover mechanism intended to share efficiency gains between a regulated business and its customers.
- 2002 SPI PowerNet, Australia**
ReOptimisation of Transmission Assets
 Advised SPI PowerNet on the appropriate approach to calculating the value of assets previously optimised out of its regulatory asset base and now being "un-optimised" due to greater utilisation levels of those assets.
- 2002 SPI PowerNet, Australia**
Adviser on Revenue Reset Application
 Advised SPI PowerNet on a range of high level issues in relation to their regulated revenue reset application, including appropriate drafting and consistency of argument throughout the document. Presented aspects of SPI PowerNet's application to the ACCC and in an ACCC sponsored regulatory public forum.
- 2002 Telecom New Zealand, New Zealand**
Review of Interconnection Benchmarking Report
 Advised Telecom New Zealand on issues arising out of an Interconnection Benchmarking report commissioned by the Commerce Commission of New Zealand for the purpose of

setting interim interconnection charges. This role included the submission of a report to the Commerce Commission and presentation of the findings of that report at a Commerce Commission hearing.

- 2002** **Australian Pipeline Trust, Australia**
Expert Advice on CPI Indexation
Advised APT in relation to a dispute with customers on the appropriate CPI indexation adjustment of prices for the impact of the GST required under the Trade Practices Act.
- 2002** **EnergyAustralia, Australia**
Pricing Strategy Under a Price Cap
Advised EnergyAustralia on the commercial implications for pricing strategies under a weighted average price cap.
- 2001** **IPART, Australia**
Minimum Standards in Regulation of Gas and Electricity Distribution
Advised the NSW regulator on the appropriate role of minimum standards in regulatory regimes and how this could be practically implemented in NSW.
- 2001-03** **Rail Infrastructure Corporation, New South Wales**
Preparation of access undertaking
Advised on all economic aspects arising in the preparation of an access undertaking for the New South Wales rail network. Issues arising include: pricing principles under a 'negotiate and arbitrate' framework, asset valuation, efficient costs, capacity allocation and trading, and cost of capital.
- 2001** **Australian Competition and Consumer Commission, Australia**
Determination of Local Call Resale Prices
The ACCC's expert regarding the determination of local call resale prices from Telstra's fixed line network. This involved the application, and manipulation, of the Australian incumbent's (Telstra's) regulatory accounting framework to determine appropriate wholesale prices.
- 2001** **All NSW electricity distribution businesses, Australia**
Form of Price Control
Advice on the economic efficiency implications of various forms of price control that can be applied under the National Electricity Code.
- 2001** **Wesfarmers, Australia**
Expert Advice on Reasonable Cost Recovery
Advising Wesfarmers in relation to a dispute with customers on reasonable recovery of costs of coal production.
- 2001** **Integral Energy, Australia**
Pricing Strategy Paper
Advising on appropriate pricing strategy for Integral's electricity distribution business, including advice on an appropriate regulatory engagement strategy.
- 2001** **TransGrid, SPI PowerNet and GPU GasNet, Australia**
CPI Indexation Adjustment
Advice on the appropriate CPI indexation adjustment for the impact of the GST required under the Trade Practices Act.
- 2001** **All NSW gas and electricity distribution businesses, Australia**
CPI Indexation Adjustment
Advice on the appropriate CPI indexation adjustment for the impact of the GST required under the Trade Practices Act.
- 2000** **One.Tel, Australia**
ULL Pricing

Advising OneTel in their arbitration with Telstra on pricing for access to the unbundled local loop.

- 2000 Electricity Supply Association of Australia and Australian Gas Association, Adjusting the Regulatory Regime for the Impact of Tax Reform**
Advised the peak energy bodies on the implications of tax reform on their members under the Trade Practices Act.
- 2000 Victorian Department of Treasury and Finance, Australia State Business Tax Reform**
Advised the Department of Treasury and Finance on State business tax reform including in relation to the relative economic costs associated with payroll, stamp duty and other transaction taxes.
- 1999 Independent Pricing and Regulatory Tribunal of NSW Various energy regulation issues**
Advice on a range of issues in regulation of the NSW energy sector.
- 1990-99 Commonwealth Treasury, Australia Various economic policy issues**
Provided input in the formulation of a number of economic policies. These included: the year 2000 reforms of the Australian indirect and corporate tax regimes; reform of the social security system and labour market regulation; economic forecasting and monetary policy monitoring; reform to the regulation of the Australian financial system.

General Policy Analysis

- 2007 Brotherhood of St Laurence, Australia (*pro bono*) Analysing disadvantage by electorate**
An analysis of the social disadvantage by Australian federal electorate. The objective was to promote a program (“HIPPY”) aimed at tackling disadvantage. The then opposition Labor party (now Government) announced it would fund the program the same afternoon as our report released.
- 2007 Menzies Institute, Australia Hidden Costs of Stamp Duty**
An analysis of the hidden economic costs of state government stamp duty on residential property transactions – including in terms of labour force mobility.
- 2003 Betfair, UK The Impact of Internet Betting Exchanges on the Racing Industry**
This project involved estimating bounds for the price elasticity of demand for wagering in Australia and using these to determine the likely impact of licensing internet betting exchanges to compete with existing TAB wagering operations. This project also involved modelling the impact on wagering tax rates required to achieve revenue neutrality under various price elasticity scenarios.
- 2002 Marsh, Australia The Impact of Taxation on Levels of Property Insurance**
This project involved estimating the number of uninsured households destroyed in the recent NSW bushfires that would otherwise have been insured if the only tax insurance premiums were subject to was GST. The methodology used was based on evidence from studies of the price responsiveness of demand for property insurance in the US and Australian evidence on the proportion of people without home or contents insurance.

Educational Services

- 2006** **RMIT University, Australia**
Economics Unit for MBA
Developed the course materials for the economics unit in RMIT's MBA course.

Speeches and presentations

- 2010** **Energy Networks Association, Melbourne**
Setting the cost of debt for Australian energy businesses
- 2007** **Energy Networks Association, Melbourne**
Setting the cost of capital for Australian energy businesses
- 2005** **International Telecommunications Society regional Conference, Perth**
Stepping over the Competitive Line
- 2005** **ACCC Regulatory Conference, Gold Coast**
Exclusive Rights to Content and Competition in Telecommunications
- 2004** **Office of the Water Regulator, Perth**
Cost Benchmarking – Practical Pitfalls
- 2004** **Macquarie Bank, Terrigal**
Internal presentation on regulatory risk across jurisdictions and industries
- 2003** **ACCC Regulatory Conference, Gold Coast**
Anticompetitive Pricing in Telecommunications
- 2003** **ACCC Conference on SPI PowerNet Regulatory Decision**
Operation of the efficiency carryover
- 2002** **International Telecommunications Society regional Conference, Perth**
TSLRIC Regulation and Leverage of Market Power



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29th March 2012

Our Reference: MN.PG.10.02

By email: Tom.Hird@ceg-ap.com

Dr Tom Hird
Competition Economists Group (CEG Asia-Pacific)
Suite 201
111 Harrington Street
SYDNEY NSW 2000
Australia

Dear Dr Hird,

Expert report in relation to the debt risk premium

The purpose of this brief is to set out the nature, scope and purpose of the work that you have been requested to perform in connection with the debt risk premium for the following businesses: The APA Group, Envestra, Multinet and SP AusNet.

The businesses' current regulatory control period is due to expire on 31st December 2012 and the next regulatory control period will commence on 1st January 2013 and run until 31st December 2017.

The businesses must submit their revised access arrangements, for the forthcoming regulatory control period, to the Australian Energy Regulator (AER) by 31st March 2011. One of the considerations in preparing the respective revised access arrangements will be the proposed methodology to calculate the DRP.

Background

The legislative requirements for calculation of the DRP are contained in the National Gas Law and the National Gas Rules.

The National Gas Law requires that:

- A regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs in providing reference services; and
- A reference tariff should allow for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates.

The National Gas Rules require that the rate of return on capital is:

- To be commensurate with prevailing conditions in the market for funds and the risks involved in providing reference services; and
- In determining a rate of return on capital:
 - It will be assumed that the service provider meets benchmark levels of efficiency and uses a financing structure that meets benchmark standards as to gearing and other financial parameters for a going concern and reflects in other respects best practice; and
 - A well-accepted approach that incorporates the cost of equity and debt, such as the Weighted Average Cost of Capital, is to be used; and a well-accepted financial model, such as the Capital Asset Pricing Model, is to be used.

For the calculation of the DRP this has been interpreted in previous regulatory decisions as meaning:

- It must be determined using the 'observed annualised Australian benchmark corporate bond rate for corporate bonds' or some proxy thereof.
- The bonds must have a BBB+ credit rating.
- The bonds must have a maturity period of 10 years; and
- It is the margin over the annualised nominal risk free rate and by implication is measured over the same period as the nominal risk free rate.

Questions

The businesses are seeking your opinion on whether the Bloomberg fair value yield curves (extrapolated to 10 years using the methodology proposed by PWC in the report entitled "Estimating the benchmark debt risk premium") can be relied upon to reasonably meet the legislative requirements.

If the Bloomberg BBB rating fair value curve, (BFV), is not suitable, then please propose an alternative methodology for calculating the DRP that best meets the legislative requirements.

In either case, you should perform your analysis in respect of the 20 business days from 21st November to 16th December 2011.

In providing the advice, you should take into consideration the outcomes of recent AER decisions and relevant judgments handed down by the Australian Competition Tribunal.

Expert Witness Guideline

The businesses emphasise that the report prepared by you will be provided to the AER in support of the businesses' revised access arrangements. Accordingly the report may become a public document.

The report may also be relied upon in any subsequent appeal proceedings. For that reason, the businesses have attached a copy of the Federal Court's "Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia".

Please read and familiarise yourself with the Code of Conduct and comply with it at all times in the course of your engagement.

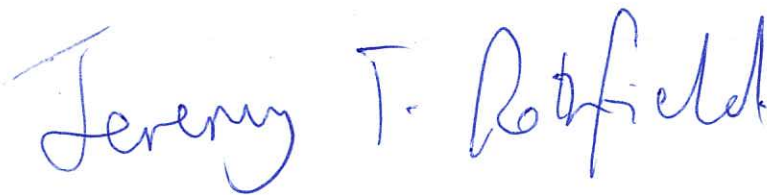
The report must contain the following:

1. The terms of reference.
2. The qualifications of the person(s) preparing the report.
3. Identify any pre-existing relationship the person(s) have with the businesses.
4. Clearly and fully set out all the relevant facts.
5. Set out each of the expert's opinions separately from the factual findings or assumptions.
6. Explain the person's (persons') process of reasoning and reasons for the expert's opinions.
7. Reference any documents relied on by the person(s).
8. Include specified wording at the end of the report stating that "[the person(s)] has made all the inquiries that [the person(s)] believes are desirable and appropriate and that no matters of significance that [the person(s)] regards as relevant have, to [the person's (persons')] knowledge, been withheld"; and
9. State that the person(s) have been provided with a copy of the Federal Court's "Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia" (Attachment 1) and that the Report has been prepared in accordance with those Guidelines.

Contact

Jeremy Rothfield will be the day to day contact for you while you prepare your report.

Yours sincerely,



Jeremy Rothfield
Network Regulation and Compliance Manager