RULE CHANGE SUB-COMMITTEE OF ENERGY USERS ASSOCIATION AUSTRALIA
ESTIMATING THE DEBT MARGIN

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DISCLAIMER:

1. INTRODUCTION

Cambridge Economic Policy Associates (CEPA) have been hired by the Rule Change Committee of the Energy Users Association of Australia (EUAA) to consider the existing approach to estimating the debt premium and whether there are alternative approaches that better reflect the true cost of debt for network companies. We were asked to consider:

- the objectives and implementation of the National Electricity Rules (NER);
- approaches adopted by the Australian Energy Regulator (AER) and other regulators in Australia;
- approaches adopted in other countries; and
- economic and financial theory.

In addition to these concerns we were asked to consider the specific question of the treatment of state owned companies and whether they should be treated the same as privately owned companies when estimating the allowed debt premium.

This report is structured as follows:

- section 2 provides a set of criteria by which any reforms can be assessed;
- section 3 characterises the debt premium and provides an overview of possible reforms;
- section 4 discusses the options in more detail and assesses them against the criteria;
- section 5 summarises the assessments and provides a proposed way forward, which is also reviewed against the criteria; and
- section 6 provides an example of the rules that would be required to implement the proposed way forward.

Several annexes provide supporting material.

The remainder of this Introduction discusses the debt premium and the current problem in Australia.

1.1. The debt premium

Before considering the specific issues related to the way that the debt premium is calculated, it is worth briefly discussing what the debt premium is and the role that it plays in regulation.

Establishing a debt premium is a key element to the determination of the return on debt, one element of the weighted average cost of capital, used to remunerate the capital invested in the network company and also provide signals about future investment. The return on debt is defined as:

$$\text{Return on debt} = \text{Risk-free rate} + \text{Debt premium}$$

The debt premium reflects the additional return required by investors to accept the greater risk inherent in lending to a company rather than the "risk free" asset.

1.2. The existing problem

As explained in detail elsewhere, the regulatory allowances for the return on debt, and specifically the debt premium, based on 10 year BBB+ bond yields are high.[1] This is relative to:

- the existing return on debt for companies;
- previous regulatory determinations for the energy sector in Australia;
- recent regulatory determinations in other sectors in Australia; and
- debt premium decisions in other jurisdictions.

The problems with the approach to estimating debt premia in Australia have been high-lighted by recent regulatory consultations undertaken in New South Wales and Western Australia (IPART and ERAWA respectively being the regulatory bodies).

Clearly underlying this estimation problem is the fact that:

- there is a high dependence in the market generally but especially marked for non-financial corporate offerings, on short- to medium dated bonds in Australia, mostly less than 10 years;
- network utilities have tended to be rated above BBB+; and
- a significant amount of network utility debt is non-AUD denominated.

This means focusing on 10 year BBB+ debt has proven difficult to estimate, leading to a situation where the allowed return on debt is above the actual cost to the companies. This issue is even more marked when the cost paid by government owned companies is taken into account since they tend to be even higher rated and/or receive money directly from their respective state treasuries.

[1] See for example *Proposal to change the National Electricity Rules in respect of the calculation of the Return on Debt*, October 2011.

2. EVALUATION OF THE ALTERNATIVE APPROACHES

This section presents a set of high-level criteria by which any solutions to the problems identified in section 2 can be evaluated.

2.1. Developing the criteria option evaluation

In coming to its determination on the debt premium the AER is required to make determinations that are consistent with the existing Australian regulatory framework. This regulatory framework is set out in AER (2009) review of WACC parameters.[2] In that paper the AER states that its determinations on the different WACC parameters are implemented to ensure consistency with Australia's overarching National Energy Objectives (NEO) ; i.e. to promote efficient investment by the network operators for the long-term interests of consumers.

The report sets out a range of criteria which are stated to be particularly important when the AER is setting the risk premium, to ensure consistency with NEO requirements. These are specified in Table 2.1 below.

Table 2.1: AER regulatory requirements

AER Regulatory requirements when setting the risk premium
• The rate of return needs to be forward looking and commensurate with prevailing conditions in the market for funds and the risk involved in providing the given network services. • The determination needs to be consistent with incentivising an efficient level of investment. • The risk premium has to give the utilities a reasonable opportunity to recover, at least, efficient costs. • The determination has to take account of the economic costs and risks implied given the potential for both under and over investment. • The previous approach should be used unless persuasive evidence is presented to the AER to justify an alternative.

The above criteria present a sensible set of guidelines for facilitating the determination of the risk premium. However we would make the following observations:

- It is not clear that the rate of return should be commensurate with the prevailing market conditions, given that the regulator is making a decision on the risk premium over a five-year period.
- In addition, although we acknowledge the need for consistency with the NEO, it would be useful if the criteria set out more explicitly the need for the regulator to support the interests of the consumer when determining the risk premium.

It is useful to draw on the criteria used by the AER when formulating the evaluation criteria for the different options, as if our analysis shows that one of the options best fits with the AER criteria it may help to smooth implementation in the future. However, given the above observations we will focus on the following criteria for the purposes of this report.

[2] AER (2009). Electricity transmission and distribution network service providers. Review of the weighted average cost of capital (WACC) parameters.

Table 2.2: Evaluation criteria for different options

Evaluation criteria
• **Incentives** – the extent to which the option provides incentives for efficient investment. • **Cost recovery** – the option needs to ensure that the risk premium gives the utilities a reasonable opportunity to recover efficient costs and so be financeable. It also needs to take account of the risk of both under and over investment. • **Consumer interest** – the option should support long-term consumer interests. We take this to mean that prices should be sustainable, i.e. at efficient levels so that services are provided in the long-term without windfall gains for companies. Further, price predictability is often an important concern, especially when the charge is a significant element of the final price. • **Consistency** – the extent to which the option differs from existing precedent. This reflects the fact that regulatory risk is likely to be minimised when a track record exists. • **Practical** - Can the option be implemented in practice? This relates both to the establishment of the approach, i.e. are changes to the NER needed, and to the ongoing implementation, i.e. data requirements etc.

We believe these criteria capture the key concerns of both good regulation and the objectives established for the Australian energy sector.

3. ALTERNATIVE APPROACHES TO ESTIMATING THE DEBT PREMIUM

A general taxonomy for classifying elements involved in the estimation of debt premia/Return on Debt is developed in this section based on the main defining characteristics of potential approaches.

3.1. General taxonomy of Return on Debt options

Approaches to assessing the allowed Return on Debt can be classified using a set of defining features based around the inputs used and treatment of regulatory issues. Any approach to the Return on Debt needs to choose an option for each of the elements to build an overall approach.

The defining features identified, which are discussed in more detail in this section, include:[3]

- scope of comparators;
- maturity of debt;
- averaging period;
- forward looking versus historic information; and
- actual versus notional.

These characteristics will be the same whether considering state-owned or privately owned companies.

3.1.1. Scope of comparators

Typically regulated companies are required to maintain an investment grade credit rating under the terms of their operating licence or by statute. The exact level of rating required is seldom explicitly specified but can be inferred from the choice of credit rating that is then used by the regulator for the purposes of assessing an appropriate allowed Return on Debt.

The precise choice of credit rating is a somewhat inexact science with regulators commonly using terms like "solid" or "comfortable" without providing definitions as to what they mean by this. However, it can be reasonably assumed that the credit rating should be sufficient to provide reassurance to investors that a company's financial profile is able absorb downside shocks in the context of the risk profile facing the businesses. As articulated by the UK Competition Commission, it is a judgement about the choice that would be made by an efficient [airport] company looking to act in the interests of both current and future customers—a judgement that is inevitably subjective.[4]

For the purposes of this report, the point is that the credit rating for determining the Return on Debt is a choice and robust arguments can be made as to why BBB+ is preferable to BBB or, indeed, why a range is appropriate rather than a single rating level. Further, it could be expected

[3] We have excluded the issue linked to debt issuance costs since this tends to be handled in Australia through a separate cost allowance.

[4] Appendix L Stansted Airport Ltd – Q5 price control review, Competition Commission, 2008.

that an efficiently operated company would expect its rating to change over time – during periods of relatively high investment a lower rating might be sought than during periods of relatively low investment. This is a development of the financeability argument proposed by Ofgem as part of the RPI-X@20 review – Ofgem argued that a company would need to inject equity to maintain a rating as the relative level of investment changed but it is more likely that both changing the target rating and injecting smaller amounts of equity would be a route chosen by companies.

Australian and international examples[5]

Whether a broader set of evidence rather than just that generated by BBB+ bonds has been an issue debated by AER as well as other regulators in Australia. AER has shifted between using BBB and just BBB+ ratings when determining a debt premium. IPART in its 2010 decision on measuring the debt premium has decided to use a broad BBB definition.

In the UK regulators have tended to be less precise. Broad A and broad BBB evidence has been used – Ofgem has especially considered broader ratings in its recent electricity distribution decision and in its proposed first decisions under RIIO.

International data

An extension of the discussion around the scope of comparators is the geographic markets from which data is drawn. Interest rate parity and exchange rate risk means it is usually limited to debt markets in the same country as the market in which the regulated business operates. Although there is precedent for regulators acting within smaller markets to look beyond currency borders when considering the return on debt this is not normal practice.

IPART in its 2010 decision has decided to focus on Australian network company bonds issued in AUD and US$. UK regulators have considered international information when considering primary bond issues but have focused only on sterling bond evidence from secondary trading.

3.1.2. Maturity

The long lived nature of the asset bases of regulated businesses coupled with the relatively low risk, stable cashflows these generate makes them well placed to raise long dated bond finance. An efficient company would tend to try to match its maturity of the assets and liabilities – although in the case of energy networks this would suggest liabilities with a maturity well in excess of 10 years. However, fair market value indices incorporating long dated debt often either do not exist or lack robustness due the relatively small number of contributing issues.

Additionally, there are a number of factors that may distort data observed for a particular maturity. In its review of the allowed WACC for Bristol Water, the UK CC noted that shorter-dated yields have fallen significantly over the last five years, reflecting action by the authorities to address the credit crunch and recession[6]. Similarly, policies requiring pension funds to hold certain asset classes have been acknowledged to distort the long end of the market.

[5] More information on these examples is available in annexes 2, 3 and 4.

[6] Para 65, Appendix N, Bristol Water

Consequently, regulators typically select a maturity that does not necessarily reflect how they believe a regulated company will precisely structuring its debt profile or even ought to. Instead, maturities based on robust datasets and giving consistent (allowing for structural adjustments to debt markets) are usually selected. Adjustments, say using a longer maturity risk-free rate with the shorter-maturity debt premium can then used when setting the regulatory allowance. Of course, in many circumstances there is still an element of judgement being applied by the regulator, say through the way that the risk-free rate is chosen.

Term premium

The inclusion of a term premium in the Return on Debt so that the maturity of the observed data is extended to the required overall maturity is a binary (yes/no) decision and closely linked to the choice of debt maturity. For the reasons noted above, regulators often use debt market evidence from maturities of less than that which they expect an efficiently financed network business to raise finance on. An adjustment is then made such that the final Return on Debt reflects a desired tenor. Often this is just a simple consideration of taking a debt premium estimated on whatever maturity is available and then adding this to a longer-dated risk-free rate – implicitly assuming that any term premium is adequately rewarded through the risk-free rate and not reflected in the debt premium (or is sufficiently small to be lost in the "noise" of the estimation process).

Term premia can be either explicitly allowed for through a point estimate or implicitly through being an influencing factor in where in the estimated relevant range for the Return on Debt the regulator chooses to allow.

Australian examples[7]

The debate about whether a five or 10 year remaining maturity focus should be employed has been underway in Australia for some time. Recently the IPART and ERAWA consultations and decisions in Australia have again reviewed this issue. The result of these consultation is that IPART has decided to focus on a five year maturity benchmark while the ERAWA is considering bonds with at least two years remaining life.

3.1.3. Averaging period

Over what period should the debt premium be estimated? The focus to date in Australia has been to take an average of 15-20 working days over the recent past to provide an estimate of the premium.[8] This approach is seen to mix the focus on recent information providing the "best" estimate from an efficient market while accepting that day-today volatility may be irrational.[9]

[7] More information on these two examples is provided in Annex 2 to this report.

[8] This is driven by the requirements of the Rules.

[9] The fact that companies within one state got to choose their averaging period and there was no requirement that the same averaging period be used provides an interesting outcome of different risk-free rates and debt premia being used by the AER for companies being regulated over the same period and which ostensibly face the same risk. Examples of this approach are rare, except in cases where clearly identifiable differences in risk (say due to significant differences in the relative size of companies) exists. However, the Rules allow this to take place.

There is no right or wrong answer to the averaging period question. In part it depends on the perceived volatility of a market and in part on the overall approach being adopted. Regulators in the UK tend to look at longer historical periods when setting rates – this is especially true with the shift to a 10-year indexed approach being adopted by Ofgem. As such, we see this aspect as a sub-set of the following characteristic.

3.1.4. Forward looking versus historic information

In regulated markets the allowed Return on Debt is often expected to play two roles:

- provide a signal for new investment, since it sets the return available to persuade investors to lend new money to the company to either fund new investment or to refinance existing investments; and
- remuneration of existing investments, since it provides the cash-flow to make payments on existing debt.

During normal periods, i.e. throughout a standard business cycle, and when a company/ industry is close to the steady-state level of investment/ replacement of assets there is no real problem with expecting a single Return on Debt to meet both roles – although it is standard practice for the signal for new investment to be the deciding factor. Within a normal business cycle allowing existing assets to be either over- or under-remunerated (depending on where the current estimate of the WACC is relative to the average over the cycle) should not matter since over the whole cycle the assets are appropriately remunerated, although consumers may of course have different preferences.

This situation will only hold if the amount of investment in any price control period is at a steady state – otherwise the position in the cycle would matter. This is because some of the asset base would be over- or under-remunerated during the economic cycle – if a disproportionate amount of the asset base is funded when interest rates are above the average rate then the company will be unable to fully remunerate the borrowing during the economic cycle. Further, structural breaks mean previously funded investment may be over- or under-remunerated.

UK regulators have, until recently, addressed this issue implicitly through either allowing a blended Return on Debt or by choosing a point estimate relatively higher or lower in the relevant range than they would otherwise. More recently however attempts have been made to address it more mechanistically with Ofwat assigning a fixed weighting to the backward looking (historic) and forward looking Return on Debt and Ofgem opting for an annually updated 10 year trailing average approach. These are discussed in further detail in the following section.

One concern raised when considering the implementation of "backward looking" systems is that the use of historic information does not reflect forward looking market rates. This is not the case. Well designed systems, an example of which is provided later in this report, use historic evidence on forward market rates. So, at any point in the averaging period it is the efficient forward looking rate being considered. For clarity, we are not advocating here that actual borrowing rates be used (that question is addressed in the following sub-section). Consequently companies still have an incentive to borrow efficiently as they will be subject to the forward

looking efficient rate, it is just that an average of those efficient rates is being considered which reflects the fact that the company has raised the funds used for investment across several years.

3.1.5. Actual versus notional

The building block approach to determining the allowed revenues, as used by AER, requires for each block a decision over whether it should be the actual level of cost that is allowed or some notional cost based on that incurred by a hypothetical efficient provider.

With respect to the Return on Debt, it is usually a notional financing cost allowed on the grounds there is little persuasive evidence that network companies cannot finance themselves efficiently. Where companies are unable to access the best rates available, specific uplifts are often included in the package, e.g., a small company premium.[10]

The guiding principle here, equally applicable to the other regulatory building blocks, is that the notional level should reflect what an efficient provider in a competitive environment would incur. In time the notional cost and the actual cost should converge as the company moves towards its efficient frontier. Where this does not happen, it may be necessary to reconsider the level at which the notional cost has been set and / or explore the reasons preventing the company moving from its current cost.

The alternative approach to this characteristic is to allow the actual return on debt to be passed-through to consumers. While the "notional" approach is often considered the standard approach for incentive based regulation there are examples of pass-through being used – such as with Northern Ireland Water (described in annex 2). In addition, while debt pass-through was the standard for US rate-of-return regulation it is also used when multi-year determinations, are used in states like Massachusetts (some evidence on this is provided in annex 2).

3.2. Options

The options presented in this section bring together the characteristics set out in Section 4.1 in various combinations. Each option is in turn described and evaluated against the criteria set out in Section 3 – in cases where there are variants within a characteristic we have considered sub-options as appropriate. Since there is high degree of overlap between each the discussion will centre on the ways in which each differs and it is this that is evaluated. Table 3.1 provides a summary of the options and the key features of each. For comparison we include our characterisation of the current approach used by AER. It should be noted that option 5 is a composite option unlike the other ones.

[10] As used by Ofwat for the water-only companies relative to the larger water and sewerage companies and by Ofgem when considering small independent service providers rather than incumbent traditional providers.

Table 3.1: Summary of options

Options	Scope	Maturity	Forward / Backward	Actual / Notional
Current AER	Aus BBB+	10 Year	Forward	Notional
Option 1A	Extended range	10 Year	Forward	Notional
Option 1B	Extended range incl. International	10 Year	Forward	Notional
Option 2A	Aus BBB+	5 Year	Forward	Notional
Option 2B	Aus BBB+	5 Year + Term Premium	Forward	Notional
Option 3	Aus BBB+	10 Year	Forward & Backward	Notional
Option 4	-	-	-	Actual
Option 5	Extended range	5 Year	Forward & Backward	Notional

4. DISCUSSION OF THE OPTIONS AND THEIR EVALUATION

This section considers alternative approaches to assessing the key characteristics underlying the return on debt that might be employed by the AER. The options are assessed against the criteria developed in section 2. Only the options that involve a change to one characteristic are included in this section. Option 5, a composite option involving changes to several of the characteristics is discussed in the following section.

4.1. Option 1A (Extend coverage beyond BBB+)

Description

As identified, one of the central issues facing the AER in determining a debt premium and Return on Debt in accordance with the NER is a lack of observable corporate bonds that meet the NER criteria of BBB+ rated by credit rating agencies.

This influences both the direct market evidence the AER is able to draw upon as well as the accuracy of any composite index.

Indeed, the primary reason the APT Pipelines 10 year bond issue of 2010 was so notable was due to it being the first 10 year bond issued by a 'BBB' rated issuer in the Australian market. Furthermore, it was one of only six issuances in the Australian market of 10 years or more in 2010 with APT and Telstra being the only non bank issuers.[11]

One option to address the lack of data issue is to broaden the criteria to 'any relevant bond issue' so that issues of different ratings can also be considered. In the recent Bristol Water decision, for example, the UK CC chose to consider evidence from issues with BBB, BBB+ and A- for this reason.[12] Further, as noted in Section 3, it is appropriate to expect an efficiently operated company to see its credit rating change within a range over the investment cycle.

The impact of extending the accepted measure of credit-rating, based on our assessment of data available from Bloomberg, is shown in table 4.1. This information is based on the bond information provided in annex 1.

Table 4.1: Impact of broadening the credit-rating considered for AUD denominated bonds

	Broad BBB	Broad A
Bonds	3	8
Bonds with recent pricing information	1	6
Maturity issues	The recent APT long-dated issue	Of the six bonds: Two bonds have under one year remaining; Three bonds have between four and six years remaining; and One bond is long-dated

[11] The DCM Review 19 July 2010.

[12] Competition Commisson (2010), 'Bristol Water Plc – A Reference under Section 12(3)(a) of the Water Industry Act 1991: Report'.

Evaluation

This option does not contravene any of the criteria established in Section 3 and, relative to the current approach, it enhances the practicality and cost recovery criteria in that it partially addresses the lack of data problem and allows a cost to be assessed that more closely reflects the financing costs incurred by a provider.

However, it does not completely address the lack of data issue. As Table 4.1 shows the number of 'relevant' bonds increases from one to seven (if maturity issues are ignored, one to two if only long dated bonds are considered). The former is an improvement but since maturity will matter this is not a strong basis on which to draw conclusions.

Table 4.2 below assesses the existing approach and the option of extending the credit-rating range considered against the five criteria developed in section 2. In our opinion extending the range of credit-ratings considered will be beneficial for consumers and is a more practicable approach than the existing one.

Table 4.2: Evaluation of option 1A

Criteria	BBB-	Extended range
Incentives	Company has an incentive to borrow at a lower rate than that allowed.	While the benchmark rate will be lower than current, there will still be an incentive to "beat" that rate. Better reflects the actual ratings that energy networks have. Also captures the fact that utilities tend to be viewed as less risky than other non-financial corporate with the same rating.
Cost recovery	Not a concern given the "headroom" in the existing rate. If rates have changed significantly over time then there may be some risk to the company as all debt is remunerated at the forward looking rate.	Provided that the rate is set appropriately this should not be a concern (especially as utilities tend to be viewed as less risky than other non-financial corporate with the same rating). If rates have changed significantly over time then there may be some risk to the company as all debt is remunerated at the forward looking rate.
Consumer interest	While a long term sustainable industry is facilitated – good for consumers – this comes at the cost of prices that are too high and potentially perverse incentives for companies to over-invest.	The industry should be sustainable in the long-term but with a lower cost to consumers and less incentive to over-invest.
Consistency	Consistent with existing AER approach.	Consistent with international experience and the underlying objectives for energy regulation in Australia.
Practicality	Limited data makes application difficult.	A broader range of credit ratings will extend the data base available and so reduce the implementation problems. Will require some changes to the implementation of the Rules but is not a significant change.

4.2. Option 1B (Extend coverage beyond AUD denominated bonds)

Description

A notable feature of the debt structure of many of the regulated companies (and Australian companies in general) is that a significant portion of it is raised offshore, principally in US$ and denominated markets and also in Euros, Sterling and the Hong Kong $ as highlighted in Table 4.3 below.

Table 4.3 Summary of information held on Australian bonds

	Total Amount raised (AUD)	% of finance in forex	AUD Total	US$ debt	Other (Euro, Sterling, HK$ and Swiss Francs)
Utilities sector	14.0bn	35.7%	9.1bn	3.3bn	1.6bn
Energy sector	5.0bn	63.9%	1.8bn	1.1bn	2.1bn
Industry sector	12.0bn	48.9%	6.1bn	5.2bn	0.7bn
Material sector	39.2bn	97.9%	0.8bn	34.6bn	3.8bn

Source: Bloomberg

**Current exchange rates to convert foreign currency bonds into $AUS*

It is not clear to us whether this is done due to the lower rates achievable offshore or due to liquidity issues with the Australian domestic debt market. In any event, the high proportions of debt being raised shown by Table 4.3 makes it a characteristic of Australian corporate debt structures that needs to be, at least, considered when discussing assessment of financing costs.

Table 4.4 considers the available evidence on international bond issues by Australian network companies on the same basis as table 4.1 above.[13]

Table 4.4: Impact of broadening the credit-rating considered for international bonds

	Broad BBB	Broad A
Bonds	2	12
Bonds with recent pricing information	1	11
Maturity issues	Between four and six years remaining maturity	Of the 11 bonds: Two bonds have less than four years remaining; Five bonds have between four and six years remaining; and Four bond are long-dated

Evaluation

The main argument in favour of including international data in the Return on Debt assessment is that it reflects how companies are actually choosing to finance themselves and so to not consider

[13] If insufficient network bonds exist it would be possible to use any rated non-financial corporation bond.

international data risks allowing a Return on Debt that significantly diverges from the costs being incurred. Further, it would significantly increase the pool of available bonds (although only if the rating is expanded to include Broad A).

To attempt to factor in debt costs from money raised outside of Australia would add a significant layer of complexity to the regulatory process as the AER would be required to opine on capital markets and associated risk-free rates that it is unlikely to be as familiar with. Additionally it would be required to estimate an additional parameter in the form of hedging costs – this would also require a decision on the proportion of the costs that should be hedged.[14]

Further, if a regulator is seen to choose specific international markets this may limit management choices and their ability to exploit efficient borrowing options as regulatory "approval" of certain currencies may make them preferred currencies. Also, if one of the specific currencies has short-term problems, having been seen to endorse borrowing in that currency the regulator may be pressured to "bail out" companies that borrowed in that currency by allowing any additional costs arising from borrowing in that currency to be passed-through to customers rather than being a risk faced by management. This presumption that greater protection might exist for those specific currencies could then limit management choices as other currencies could be perceived as being riskier.

When the ERAWA considered its revised approach to the debt premium it considered the IPART decision to expand coverage to include US$ denominated bonds. It decided, however, that it was better to focus on ways of expanding the AUD denominated bonds rather than trying to expand into other currencies.

Linked to this, even if we adopt international bonds and overcome the issues noted above, while we would expand the database of bonds it is far from clear that we would add sufficient information to be able to use the utility bond data by itself.

Table 4.5 below assesses the option and what it would replace against the five criteria developed in section 2. While we believe that this reform would improve the database of available bonds the broader implementation problems and possible incentive issues linked to a regulator choosing currencies for funding outweigh the benefits.

Table 4.5: Evaluation of option 1B

Criteria	BBB-	Extended range incl international
Incentives	Company has an incentive to borrow at a lower rate than that allowed.	While the benchmark rate will be lower than current, there will still be an incentive to "beat" that rate. Better reflects the actual ratings that energy networks have. But the fact that a regulator may be seen as endorsing certain currencies for borrowing could create perverse incentives for companies if they believe a regulator would have to underwrite financing costs in the event of a significant foreign exchange risk event.

[14] While a simple rule could be designed for this, it is probably an area where significant debate would arise.

Cost recovery	Not a concern given the "headroom" in the existing rate. If rates have changed significantly over time then there may be some risk to the company as all debt is remunerated at the forward looking rate.	Provided that the rate is set appropriately this should not be a concern. Costs may not decrease as much if hedging costs have to be incorporated. If rates have changed significantly over time then there may be some risk to the company as all debt is remunerated at the forward looking rate.
Consumer interest	While a long term sustainable industry is assured – good for consumers – this comes at the cost of prices that are too high and potentially perverse incentives for companies to over-invest.	The industry should be sustainable in the long-term but with a lower cost to consumers and less incentive to over-invest. As noted above, the reduction may not be as great as with option 1A.
Consistency	Consistent with existing AER approach.	A significant change and consequently issues about consistency – although IPART has implemented this change. Little international support for this approach.
Practicality	Limited data makes application difficult.	Extended data base of bonds but insufficient additional information to make a utility bond only calculation viable. Further, some additional complexity owing to the need to determine rules about hedging, which currencies to consider and the treatment of significant foreign exchange movements.

4.3. Option 2A (Reduce target maturity from 10 years to five)

Description

As noted in the introduction and discussed more fully in annex 1, the regulated companies have a debt profile of shorter than corporate finance theory would otherwise suggest. Table 4.6 highlights this where the average remaining life of bond debt is just under five years.

Table 4.6: Maturity of network bond issues

Company	Total Debt (AUD) m	No. of bonds issued	Average debt maturity (yrs)	Weighted average debt maturity (yrs)
Citipower	875.0	3	4.36	4.32
ETSA Utilities	850.0	3	5.64	5.68
Jemena Ltd	569.2	4	5.29	5.29
Powercor	1,130.0	3	8.11	9.08
Spi Aust Fin Ltd	235.0	2	0.17	0.17
Spi Australia As	1,097.2	3	6.08	6.05
Spi Elect & Gas	2,623.5	9	5.04	4.83
United Energy	879.5	3	4.11	3.75

While it may have been the case that prior to the GFC more longer dated issues were being made, the recent focus has been on shorter dated issues. Consider the evidence in Figures 4.1 and 4.2. The first figure, from Standard & Poor's shows the 60:40 split between below five year and above five year bond debt while the second figure shows the fact that a company with a significant portfolio of bonds still has the majority of its bank and bond debt with a maturity of under five years and very little at the 10 year end.

Figure 4.1: Australian rated utilities debt profile (2011)

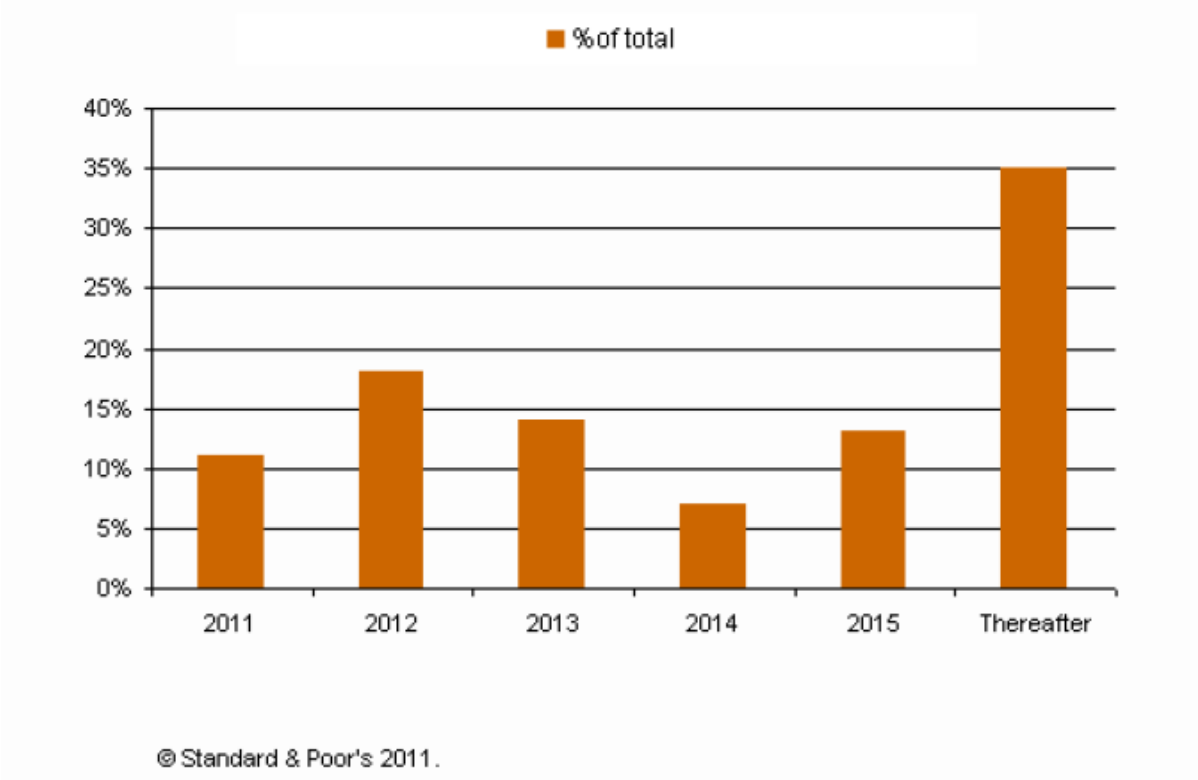
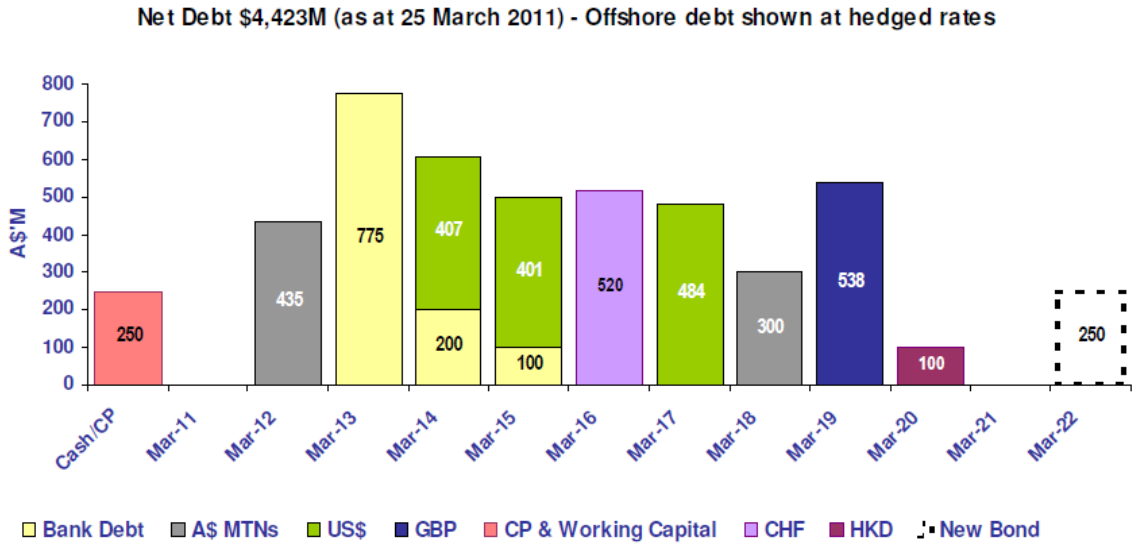


Figure 4.2: Maturity profile for SP AusNet (2011)



Source: SP AusNet press release, March 2011

This evidence suggests that the average age of debt is significantly below the 10 years specified in the NER for setting the Return on Debt – this would have been true even when 10 year bonds were being raised as bank debt is likely to have a shorter-profile as per Figure 4.2. This means that, currently at least, any approach to setting the allowed Return on Debt based on a 10 year maturity will not reflect how the companies structure their debt and subsequently the allowed debt costs will be very unlikely to match accrual debt costs.

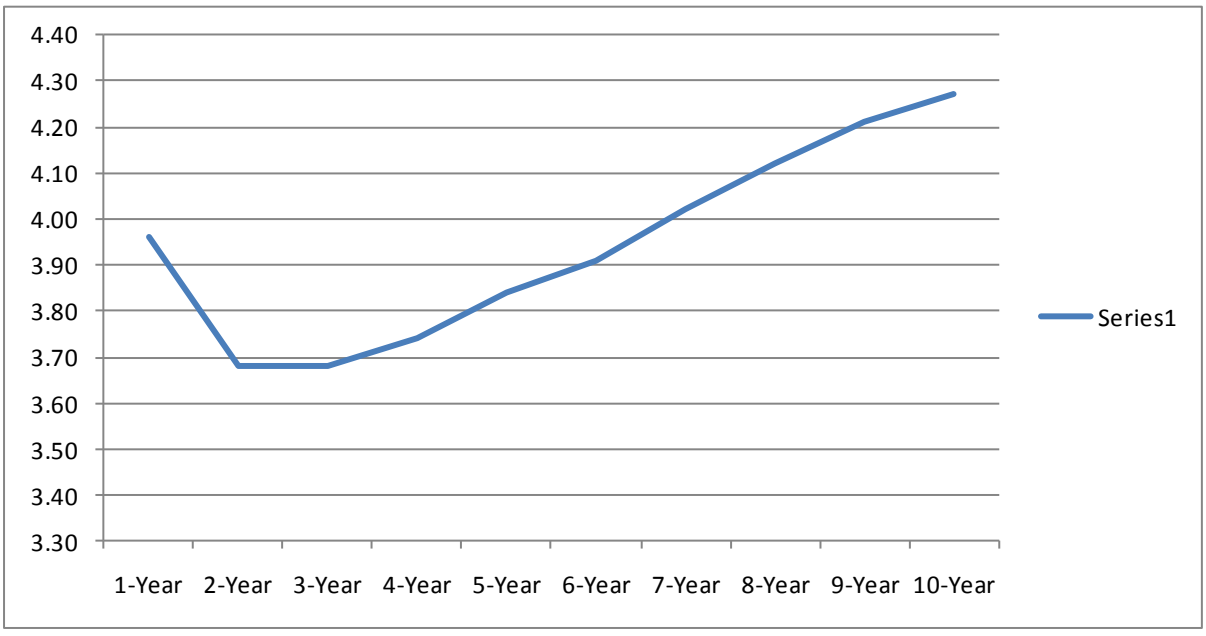
Consequently any allowed 10 year Return on Debt will differ from the actual Return on Debt incurred resulting either in:

- consumers paying more than is necessary if the allowed Return on Debt exceeds the actual Return on Debt; or
- the companies not responding to investment signals if allowed Return on Debt is less than the actual Return on Debt.

Given the current upward sloping Australian yield curve shown in Figure 4.3, the companies will be incurring actual financing costs less than the allowed financing costs albeit taking on additional refinancing risk. Currently the spread on 10 year government bonds over five year ones is approx 50bp. In the absence of a robust yield curve for corporate debt a reasonable assumption is that the gradient of the corporate yield curve will follow that of the government yield curve. As an illustration of the impact, a 50bp overstatement in the Return on Debt will lead to customers overpaying for services by approximately AUD 200m per annum. This is based on the 2010 total RAB of AUD 66 billion and an assumed level of gearing of 60% (giving a level of debt funding of almost AUD 40 billion).

A natural response to this issue is to base the allowed Return on Debt on debt instruments and types that are more closely aligned to those that the companies actually employ, for example, issuing five year debt for which the market is significantly more liquid than for 10 year.

Figure 4.3: Australian yield curve



Source: Bloomberg

Mechanistically, the approach could be to determine a five year Return on Debt based on yields on five year sovereign debt and drawing upon both yields on observed five year corporate bonds and composite indices, such as the five year Fair Market Value (FMV) curve developed by Bloomberg. As noted earlier, IPART has announced that it will focus on five year maturity in its future decisions and ERAWA has announced a focus on anything with greater than two years remaining maturity. Tables 4.1 and 4.3 illustrate the impact on the number of comparator bonds if the maturity constraint is relaxed (for either the existing broad BBB or a wider definition of acceptable bonds).

Alternatively, a bespoke composite index could be developed and maintained by AER – we discuss the way in which this could be developed in Section 6.

Evaluation

This option would go a significant way to overcoming the data issues currently experienced and thus be computationally simpler fulfilling the practicality criteria. More importantly, however, it would largely remove concerns that the companies are being over rewarded for their financing costs.

The primary argument against the option is that could be viewed as enshrining and endorsing the raising of five year money rather than 10 year which, given the long lived nature of the regulated asset bases being financed, would be contrary to strict application of textbook corporate finance theory. Of course, even longer dated borrowing could be more in line with the long-lived assets that are being developed. It must, however, be remembered that the average maturity of borrowing will probably be less than the asset life since equity tends to take the role of very long lived funding. Consequently, assets with a 30 year life may be funded by borrowings which have an average maturity of closer to 10 to 15 years.

In rebuttal, however, if the 10 year market is illiquid with companies simply unable to raise 10 year money it seems overly rigid to straitjacket the regulator within the confines of a theoretical constraint that is at odds with current market realities. Further, it is far from clear, however, that regulatory decisions have such a significant influence over the commercial decisions being made by companies – evidence on this point in both Australia and the UK is thin on the ground. Rather it the ability of management to exploit aspects of the financial markets and raise funds as efficiently as possible, no matter what maturity of borrowing is involved, that help structure the debt portfolio of the company – the market for long dated index linked debt was strong in the UK for a while and utilities were able to exploit the opportunities this offered, especially as it is a type of debt favoured by insurance and pension funds but where the primary source of bonds is Government issues where other concerns will influence the level of debt issuance.

Table 4.7 below assesses the option and what it would replace against the five criteria developed in section 2. While this approach does raise some concerns, we believe that the increase in data and precision of the estimation provides net benefits.

Table 4.7: Evaluation of option 2A

Criteria	10 year	Five year
Incentives	The use of 10 year maturity debt is relatively well aligned with the expected average maturity of borrowing for long-lived infrastructure.	Using five year bonds may create an incentive for companies to fund themselves with shorter maturity debt than would be expected. This could create a re-financing risk for companies and is a perverse outcome. Evidence shows that companies primarily use shorter dated AUD issues and so while this is a theoretically correct risk, it is unlikely to actually arise (or be significant if it does arise).
Cost recovery	Not an issue.	If refinancing risk arises then this could increase costs and so lead to higher prices. As noted elsewhere, this risk already exists owing to the way that the companies fund themselves and does not cause concerns for cost recovery. Also, the upward sloping yield curve means that lower bond yields help offset any re-financing risk.
Consumer interest	Not an issue.	Given the discussion above, this does not seem to be an issue and the greater availability of five year bonds should lead to a better estimate of the debt premium and consequently greater cost reflectivity in prices.
Consistency	Not an issue.	While this approach is inconsistent with the existing AER approach it is consistent with the developments in debt cost measurement for ERAWA and IPART.
Practicality	Difficult to implement given the lack of long dated debt leading to the need to use "black box" estimation approaches like the fair market curves.	Will require changes in the Rules and has a knock-on effect owing to the link with the risk free rate and the need for consistency with the cost of equity estimation. But will provide greater and more reliable information for setting the rates than currently employed.

4.4. Option 2B (Use a term premium to extend a five year calculation)

Description

Option 2A addressed the dual (albeit not unconnected) issues of poor quality data for 10 year debt and a divergence between how companies actually finance themselves with the notional approach set out in the NER. In evaluating the option of focussing on five year debt over 10 year money, we noted that a concern with the option is that it could be viewed as supporting a debt profile that is at odds with the principle of matching asset lives to age of debt.

Option 2B addresses this concern through establishing a Return on Debt based on market data from five year issuances and then adding a term premium to put the allowed Return on Debt on to a 10 year basis. The addition of a term premium recognises long dated money is typically more expensive than short dated money (the future is more uncertain than tomorrow and investors require a premium reflecting this) – although there are instances of an inverted yield

curve. The shape of the current Australian yield curve for sovereign debt shown in Figure 4.1 above illustrates the fact that a "normal" yield curve exists and that a term premium exists.

As for Option 2B, the first step for such an approach would be to establish a 5 year Return on Debt. Subsequently a five year term premium would be determined and added to put the Return on Debt on to a 10 year basis. One option for determine the term premium would be to take the spread from two corporate indices of differing maturity, if available. Alternatively, a term premium based on the shape of the yield curve for Australian government yield curve could be used.

Evaluation

Determining a Return on Debt based on five year market data and then adding a five year term premium would help to address the concern over a lack of 10 year corporate bonds whilst remaining more consistent with the theoretical concern about companies seeking to match the maturity of assets and liabilities. However, it does not address the problem that the regulated companies do not finance themselves using 10 year debt so leading to an outcome where the allowed Return on Debt and actual deviate. Further, determining the term premium is going to require either significant additional information which might not be available (Bloomberg no longer provides a 10 year FMV and CBASpectrum no longer produce any FMV estimates) or a significant assumption about whether corporate term premia match government ones.

Table 4.8 below assesses the option and what it would replace against the five criteria developed in section 2. The problems associated with estimating the term premium to move from five year to 10 year debt means that we believe that this approach is not as strong an improvement as 2A although other implementation aspects are easier (re the Rules).

Table 4.8: Evaluation of option 2B

Criteria	10 year	Five year plus term premium
Incentives	The use of 10 year maturity debt is relatively well aligned with the expected average maturity of borrowing for long-lived infrastructure.	Effectively ten year data being used so no different to the existing approach. This suffers from the fact that companies are not accessing such long dated debt.
Cost recovery	Not an issue.	Not an issue if term premium is correctly calculated.
Consumer interest	Not an issue.	Given the discussion above, this does not seem to be an issue and the greater availability of five year bonds should lead to a better estimate of the debt premium and consequently greater cost reflectivity in prices. This might be weakened if estimating the term premium is an issue.
Consistency	Not an issue.	Not an issue.
Practicality	Difficult to implement given the lack of long dated debt leading to the need to use "black box" estimation approaches like the fair market curves.	Removes the issue re the Rules but raises concerns about the practicality of implementing this approach if estimating the term premium is an issue. Probably an improvement over the existing approach but not as good as 2A.

4.5. Option 3 (Incorporate historic information)

Description

Earlier we described how the allowed Return on Debt serves the dual role of incentivising new investment *and* rewarding past investment. Given business cycles there is no reason to expect that a forward looking Return on Debt should exactly equal a backward looking Return on Debt and, typically, the need to attract debt finance in order for investment in the asset base to take place wins out with greater emphasis being placed on the forward Return on Debt.

This means that, in theory, at any given time existing investment is either being over or under compensated. In practice it is usually overcompensated as regulators tend to build in 'headroom' in the forward looking Return on Debt to protect against unexpected movements in debt markets during the regulatory price control term (usually, but not always, five years).

Across normal business cycles and asset lives this creates differing cash flow profiles, however, the NPV of the cashflows should be broadly neutral with the value of the headroom, where it exists, providing a benefit to the companies[15]. However, when there are underlying structural breaks in the debt market which go beyond regular business cycles there becomes a risk of systemic over or under rewarding of existing investment with consequences for long term dynamic efficiency. Figure 2.4 provided some evidence on the level of real risk-free rates and the likely structural break in the late 1990s.

As with the non-steady state investment concern discussed in section 4.1 this will lead to a part of the asset base being out of sync – if the structural shift was downwards then the previous investment will be under-remunerated and vice versa.

While it is too early to say if the credit crunch of the last 18 months has led to a structural shift, this clearly has to be a concern. There are several ways in which regulators can respond to this type of problem:

- utilise the financeability correction options to ensure that the company is able to finance itself;
- take no action; or
- establish a form of differential Return on Debt (and by extension WACC) with either an embedded debt premium or discount.

Companies do not refinance themselves at the beginning of every regulatory period. Rather debt is raised in tranches of varying maturity over a period of time. Typically within a regulatory period a company will: i) raise new debt capital to finance new capital investment, ii) refinance existing debt as it matures; and iii) have embedded debt that remains throughout much, or all, of the period.

How should embedded debt be measured? In principle it would seem that the right approach is:

- establish the amount of remaining fixed-term debt from each of the last price determinations;

[15] In the Australian context, it appears the AER, due its mechanistic approach, makes no deliberate allowance for headroom.

- determine an appropriate allowed return on debt for each of the tranches of embedded debt; and
- establish a weighted cost of embedded debt to apply to the proportion of embedded debt in the capital structure.

Based on this type of approach there are three questions:

- How far back in terms of price determinations should one go?
- What is the basis for determining an appropriate return on debt to allow for each tranche?
- What proportion of the capital structure should be treated as embedded?

Each is addressed in turn.

In principle, since regulated utilities tend to have long lived assets you would expect a high degree of liability matching and consequently a proportion of long lived debt. This could be twenty or even thirty-year debt and consequently there could be debt stretching back three or more price control periods that needs to be considered.

It is important that any proposed approach retain the right incentives for companies to fund themselves efficiently. Consequently, any allowed cost of embedded debt should be based on an efficient return on debt at the time at which the debt was borrowed. However, this should not necessarily be the headline allowed cost of forward looking debt from that price determination, since that will incorporate the uncertainty premium (headroom) for both inflation and underlying interest rates. That premium should be removed since some, if not all, that uncertainty has been removed. But what is clear is that the allowed cost of embedded debt should not be based on the actual ex post borrowing rates since that would affect incentives.[16]

Finally, as with the allowed cost of embedded debt, the amount of debt included in each tranche should be based on the efficient structure of borrowing and gearing rather than actual. As noted above, companies will utilise a portfolio of different maturity securities – some of which will imply refinancing the funding of an asset. Consequently, only a proportion of debt should be treated as embedded and this would include five year and upwards maturity debt, meaning that the proportion that survives to each new price determination will drop at each review.

While this approach is correct it is quite data intensive, and much of that data will not be publicly available – especially as companies often use a mix of bank and bond (including both fixed and variable issues) for their funding. The few examples of embedded debt calculations (discussed below) have adopted much simpler calculations. That does seem appropriate and consequently a realistic position might be to put greatest weight on the last determination and limited weight on the one before that when coming to a decision about an appropriate allowed rate and amount of embedded debt. These approaches continue the standard regulatory approach of setting the benchmark Return on Debt for a fixed rate bond and then allowing management to decide the appropriate choice of different actual debt instruments with the presumption that all instruments are priced off the fixed rate bond return on debt.

[16] The financeability test is still available to handle any divergence between actual and efficient costs of embedded debt.

Two of the British regulators have adopted approaches to embedded debt while at least one other has considered the issue. Box 4.1 provides a summary of the approaches adopted, significantly more information is available in annex 2 of this report.

Box 4.1: Ofwat, Ofgem and embedded debt

In PR99, Ofwat introduced an adjustment to the cost of capital to take account costs of existing fixed rate debt which could not be refinanced except at equivalent cost. Ofwat calculated an embedded debt premium of between 0.0% and 0.4% from the industry average cost of fixed rate debt and the actual value of fixed rate debt on their balance sheets. In PR04 Ofwat removed this allowance except in certain extreme circumstances, arguing that a single rate should be sufficient for a company with an efficient debt portfolio. This was as their allowed cost of debt premium was relatively backward looking, negating the need for a premium. Ofwat rejected the use of an explicit split cost of capital in PR09 as they did not believe that it would be necessary to increase marginal returns to facilitate new investment or assign a lower rate to sunk investment. They did, however, provide a split cost of debt with the backward looking value being lower than the forward looking one.

Ofgem, the energy regulator for mainland UK, recently undertook an extensive review of its approach to regulation, RPI-X@20. As part of this financing and financeability issues were central to the review and the subsequent revised regulatory framework known as RIIO. Ofgem is yet to make a determination under the RIIO framework, however it has indicated that it intends to allow companies a cost of debt based on a 10 year trailing average which is updated annually. Whilst not yet put into practice, it is our understanding that what is proposed by Ofgem is broadly as follows:

- *The Return on Debt index:* As part of the RIIO-GD1 and T1 price review process, Ofgem has announced that it intends to apply a Return on Debt based on:
    - a simple 10 year trailing average;
    - 10 year maturity "all in" corporate debt cost i.e. not for example just the risk-free rate or debt premium; and
    - based on costs for investment-grade corporate bonds.
- *Debt base:* Although not made explicit by Ofgem, it is our working assumption that indexation is to apply to the total notional debt base. That is, debt defined by the RAB * notional gearing.

Evaluation

The option of financeability corrections is not tenable when the company could be faced with losses, and while it may work for a period when companies could be making additional returns it could create a non-sustainable situation *vis-à-vis* customers, especially when those returns would be earned during a period of heightened price sensitivity. This also places a significant degree of discretion in the hands of the regulator unless very clear rules about financeability exist.

The second option of no action overcomes the disadvantage of the first with respect to losses but since some form of action is probably likely, this may be done in a non-transparent and potentially net present value positive way for the company (at the expense of customers). It suffers the same concerns as the first approach for periods of windfall profit.

The third option of a differential Return on Debt allows flexibility to respond to both potential under- and over-recovery periods and should be able to do this in a transparent way. So, it seems to be better than the two alternatives, although the issue is raised as to whether a predictable approach can be developed.

Table 4.9 below assesses the option and what it would replace against the five criteria developed in section 2. While there are significant implementation issues linked to changing the Rules and establishing an appropriate historic index, in our opinion the greater cost reflectivity and benefits for consumers outweigh these issues.

Table 4.9: Evaluation of option 3

Criteria	Forward looking	Forward looking but also utilising historic data
Incentives	Company is incentivised to beat the rate but may face windfall gains or losses given the actual funding approach adopted relative to the assumption of all debt effectively being refinanced close to the beginning of the price control period.	There is still an incentive to beat the allowed rate and benefit from cost savings. However, this approach also accepts that some, or the majority, of the debt base is outside the control of management once the debt has been raised and so subject to possible windfall gains or losses. This is partly controlled for through the use of a trailing average approach that reflects "market" changes.
Cost recovery	The assumption of effective refinancing means that costs are not fully reflected and allowed revenues may differ from actual costs, leading to possible financeability concerns.	The reflection of something closer to the way that the company actually funds itself reduces the financeability problem as windfall gains and losses are minimised relative to the existing approach.
Consumer interest	The financeability issue may expose consumers to the risk that companies fail, or more likely that financeability adjustments are made which increase costs.	The lower risk of financeability problems means that ex ante or ex post adjustments are less likely and so consumers are likely to face more appropriate costs than would otherwise be the case.
Consistency	Is consistent with the standard Australian approach.	Examples of approaches incorporating embedded debt are becoming more prevalent, especially in the UK. However, only Ofgem has now incorporated a specific clear approach, Ofwat has made use of ad hoc adjustments but in a less consistent way.
Practicality	Not an issue.	This would require significant changes to the Rules, although the benefits of the approach are such that these changes are worthwhile. Writing clear rules for implementation will be challenging but achievable and once the guidance is clear ongoing implementation should not be an issue.

4.6. Option 4 (Use actual information)

Description

One of the reasons given above for moving from a return on debt based on 10 year maturity to five year maturity is that it more accurately reflects what regulated companies actually do and reduces the scope for windfall gains on debt costs. If this line of reasoning is taken to its logical conclusion then the option of simply treating debt costs as a cost pass-through arises. That is, treating them in much the same way as costs such as business rates and taxation costs. This would effectively eliminate the possibility for companies to enjoy windfall gains from an allowed return on debt that exceeds their actual debt financing costs.

US regulation has adopted this approach of treating debt as a pass-through. Consider the statement in box 4.2 from the 2006 book *New Regulatory Finance*, authored by Roger Morin, a frequent witness at utility rate hearings in the US. Although this does talk about possible future costs, it is very clear that these aspects need to be known and measureable.

Box 4.2: Typical US approach to debt cost pass-through

The return on debt and preferred stock is the least controversial element. Interest payments on bonds and dividends on preferred stock are embedded costs, clearly stated on the bond and preferred stock certificates. The embedded cost of debt and preferred stock is simply the total interest payments divided by the book value of the outstanding debt, and preferred dividends divided by the amount of preferred outstanding, respectively. If future interest rates are expected to differ from the interest rates on the existing debt, and the utility is expected to issue fixed-cost financing in the near future, such known and measureable costs should be incorporated into the embedded cost calculation to the extent possible.

Recently one of the UK regulators, NIAUR, also adopted a cost pass-through approach with respect to its determination of water prices. This is discussed in more detail in annex 2.

Evaluation

The common feature of costs that passed through to customers is the degree of *controllability* they exhibit. Costs that are generally considered to be beyond the control of management can reasonably be expected to be passed through to consumers. Costs within management's control are generally subject to some form of incentive, e.g. a forecast level for the cost is allowed by the regulator which the company is then incentivised to beat through retaining some portion of the outperformance and / or being exposed to extra cost from underperformance. In the absence of such a mechanism there is little incentive on the company to attempt to minimise costs and consequently cost creep regularly occurs.

There are also ways in which incentives could still be created, for example:

- demonstrating that some form of competition for the provision of funds was undertaken so that costs are kept as low as possible; or
- placing a cap on the level to which automatic pass-through is allowed (this approach is used in the Hong Kong scheme of control for electricity).

Table 4.10 below assesses the option and what it would replace against the five criteria developed in section 2. While there are benefits to cost pass through of debt we do not believe that for the majority of cases in Australia these benefits outweigh the incentive problems associated with this approach. However, we believe that serious consideration of this approach should be given to setting the return on debt for government owned companies.

Table 4.10: Evaluation of option 4

Criteria	Notional company	Actual company specific costs
Incentives	Company has an incentive to beat the allowed revenue.	Company does not have an incentive to beat the allowed rate and so may allow costs to rise above efficient levels. It may be possible to create additional incentives/penalties to mitigate this – but at the cost of complexity.
Cost recovery	Not an issue.	Not an issue since the actual cost is being allowed.
Consumer interest	Not an issue.	The lack of incentive may increase costs above efficient levels, at the expense of consumers.
Consistency	Not an issue.	Is consistent with the approach adopted in Victoria and also in some international examples (such as the US and for some government owned companies in the UK).
Practicality	Sufficient data is needed to estimate the notional efficient company rate – is an issue for the current approach in energy in Australia.	Not an issue.

5. SUMMARY OF EVALUATIONS AND WAY FORWARD

This section draws together the evaluation of the options provided in Section 4 and then proposes a way forward through a fifth option which combines the positive elements from the analysis in the previous section. This option is, we believe, only applicable to privately owned network companies. Government owned companies face a situation best addressed through option 4 set out above, direct cost pass-through of debt costs.

5.1. Summary of evaluations

In Table 5.1 below we present a high-level summary evaluation of the different options that we have considered for assessing the return on debt that might be employed by the AER. This builds on the individual assessment tables provided in this section. Given these evaluations we then consider option 5 which draws together the elements that we believe deliver net benefits for consumers while ensuring a long term sustainable industry.

5.2. Option 5 – A combined approach for private network companies

Description

Option 5 presents a strawman option bringing together the elements of the taxonomy and the options discussed above into a workable option that addresses the issues set out previously.

The key features include;

- increases scope of the comparator data to include Broad BBB and Broad A reflecting an appropriate range over the investment cycle (although not international data);
- considers debt with a remaining maturity of five years (without a term premium);[17]
- includes a backward looking element built around an Ofgem style annually updated index based approach (which also removes the concern about averaging period). This could be through the use of:
  - a bespoke network bond index; or
  - the Bloomberg five year FMV index; and
- is set on a notional all-in basis (i.e. no separation of the risk free rate and debt premium).

Evaluation

The advantages of this approach over the existing approach would be:

- a closer link to the reality of the funding choices being made by the companies;
- a reflection of the embedded return on debt; and
- a wider pool of actual evidence available on which to base the estimate (if a bespoke index is used) or better information from the Bloomberg FMV since it is not having to extrapolate to a maturity at which few if any bonds exist.

[17] A consistent approach is assumed to be employed between the risk-free rate and the debt premium

Table 5.1: Summary evaluation of the different options

Criteria	Incentives	Cost recovery	Consumer interest	Consistency	Practicality
Option 1a: Expanding coverage by expanding ratings considered	Improves incentives as making use of more information would enable the return on debt to more accurately reflect market prices improving the efficiency of investment decisions	May expose the firms to marginal increase in risk of financing new debt.	Supports long-term consumer interest as incentivises network investment at the market price.	Only marginal change but may provide regulator with greater discretionary powers. This potentially creates uncertainty. Still suffers to a degree from the data problems of the existing approach.	More practical than the status quo as makes better use of the available market data on bond issuances.
					
Option 1b: Expanding coverage by expanding currencies of issue	Improves incentives as making use of more information would enable the return on debt to more accurately reflect market prices improving the efficiency of investment decisions	May expose the firms to marginal increase in risk of financing new debt.	Supports long-term consumer interest as incentivises network investment at the market price.	Only marginal change but may provide regulator with greater discretionary powers. This potentially creates uncertainty.	Raises some implementation issues owing to questions about hedging and how this would be taken into account.
					
Option 2a: five-year debt	Return on debt determination would be based on the debt instruments more regularly used by utilities.	Firm may have to rely on five-year debt to fund long-term investments, which might not be optimal in terms of ensuring that investments are financed adequately over the long-term.	Options reduce / eliminate the scope for utilities to make windfall gains on debt costs.	Involves move from status-quo. Benefits need to be greater than increased risk and uncertainty faced by utilities. But those risks are limited owing to the actual funding decisions taken.	Involves amendments to the NER, which may involve significant initial work to implement. Rules need to be very clear or precise to limit appeals.
					

Criteria	Incentives	Cost recovery	Consumer interest	Consistency	Practicality
Option 2b: Term premium added to five year debt estimate	Return on debt determination would be based on the debt instruments more regularly used by utilities but then adjusted for the term premium. Ought to provide a better signal, if the term premium adequately measured.	The addition of the term positive premium is likely to lead to ongoing over recovery when compared to actual costs incurred.	Prices stay higher than they need to and over-investment may still occur.	Continues the 10 year focus of the existing approach.	Involves amendments to the NER, which may involve significant implementation problems. Estimating the term premium may just offer new opportunities for appeals unless very precise/clear rules agreed.
					
Option 3: Inclusion of historic looking debt costs	Still provides a forward looking debt premium on which investment decisions are taken.	Provides greater cost reflectivity and should consequently be closer to cost recovery. Company is protected against movements in the return on debt.	Consumers pay a price that reflects both forward and backward looking rates. Charges should be less volatile and more cost reflective.	Involves a significant change from the existing approach. But this is clearly an improvement over the existing approach. So involves change, but it is beneficial change.	Will involve amendments to the NER, which may involve significant initial work to implement. Rules need to be very clear or precise to limit appeals.
					
Option 4: Debt pass-through	Provides no incentives for the utility to manage investments efficiently as all costs are passed to the consumer, may lead to over-investment. For private companies can be mitigated but by making the regime more complex. For Government owned companies the existing investment rules are likely to provide the necessary investment mitigation.	Utility would have certainty that it could recover investment costs.	Option eliminates the scope for utilities to make windfall gains on debt costs. However, consumers may face higher costs given potential incentive for higher investment and less efficient funding decisions.	Involves move from status-quo. Benefits for customers from a reduced return on debt need to outweigh the reduced cost efficiency incentive faced by the company.	May involve amendments to the NER, which may involve significant initial work to implement. Rules need to be very clear or precise to limit appeals.
					

This should lead to a more representative return on debt and consequently improved cost reflectivity of prices for consumers. While in the short-term this may reduce consumer prices, this is done on the basis of protection for the network companies through the automatic and mechanistic annual updating of the rolling index.

There will, however, clearly be implementation challenges. If the Bloomberg FMV index is used then the challenges are limited, but if a more representative bespoke index is developed then ensuring that rules by which bonds are chosen to be incorporated into the index are clear and unambiguous will be important to ensuring that the change is perceived as an improvement over the existing approach. There is further discussion about the Bloomberg FMV at the end of this section.

Table 5.2 below assesses the option and what it would replace against the five criteria developed in section 2. We believe that this new approach would be beneficial for consumers while not raising significant problems. It is, however, less relevant for government owned companies where option 4 above would be more appropriate – this is discussed further in the following section. We return to the elements of this strawman later in this report.

Table 5.2: Evaluation of option 5

Criteria	Existing AER approach	Broad credit rating, five year maturity and incorporating historic information
Incentives	Company has an incentive to beat the allowed rate but also faces the risk of windfall gains or losses.	Company has an incentive to beat the forward looking rate for new debt and is insulated to some degree against windfall gains and losses on existing debt.
Cost recovery	Windfall losses arising from changes in rates could be a problem.	The company has greater protection against windfall gains and losses and so this concern is mitigated to a significant degree.
Consumer interest	Windfall gains and losses may create concerns. Current allowed revenues appear significantly too high.	Windfall gains and losses are less of an issue and the better estimate of the return on debt should limit the degree to which revenues are too high. This means consumers are better off while the sector is still viable/sustainable in the long-term.
Consistency	Not an issue.	There are some concerns with consistency although the elements are employed either in other sectors in Australia or internationally, but not all together (especially the five year maturity). But this is also a reflection of the realities of the Australian bond market.
Practicality	Lack of long term BBB+ data means that other approaches such as fair market curves have to be employed which lead to the concern about a too high debt allowance.	The Rules will need to be changed and implementation guidelines will need to be developed. However, more data will be available and consequently the existing implementation concerns and "black box" approach will be replaced.

6. IMPLEMENTING THE PREFERRED APPROACHES

6.1. The preferred approaches

We believe that the evidence presented in this report very clearly illustrates that the existing approach to estimating the debt premium/return on debt employed by the AER is inappropriate because it focuses on a part of the debt market that is illiquid with few examples of network company bonds of the right credit rating to test the robustness of results. This is because:

- the 10 year bond market is limited with the majority of non-financial debt having issued maturity of less than 10 years and consequently even shorter remaining maturity; and
- few BBB+ bonds are issued by network companies, especially at the longer maturities.

Consequently the AER has had to base its determinations on a limited data base and the use of fair market values derived from limited data, with at least one of the estimation approaches being a "black box". Given the need to ensure companies can finance themselves and the use of the appeal system by companies, rates have tended to be higher than necessary. Our evidence shows that for privately owned companies this could be well in excess of 100 basis points, possibly even 200, with an even greater divergence for government owned companies.

All this suggests that change is necessary. Two of the state regulators (IPART and ERAWA) have, within the last 18 months, reviewed this question and come to the same conclusion.

There are a range of options for reform which build on the underlying characteristics of the debt premium/return on debt. We considered these in section 4 of this report and evaluated them against a set of appropriate criteria.

Given our considerations we believe that the approach to be adopted for privately owned companies should be one that:

- focuses on remaining five year maturity bond issues;
- encompasses broad BBB and broad A rated bonds to ensure as large a base of appropriate bonds as possible and which reflects the mix of underlying ratings Australian network companies have and what would be expected over an investment cycle;
- focuses only on AUD denominated issues; and
- incorporates historic information through a five year rolling mechanism that is mechanically updated annually.

Implementing the last aspect of this raises some issues. Two options exist:

- using the Bloomberg five year fair value index;[18] or
- establishing a bespoke network company (or broader) index.

[18] Annex 3 provides a discussion of the Bloomberg fair value index as well as other "econometric" approaches to estimating debt premia.

Either of these approaches should be considered. In an ideal world, a bespoke index of network company bonds would be used. However, as shown below, there are still data availability concerns relating to both the number of bonds available and the time series. As such, we have considered both a bespoke index and the FMV – our concerns with this approach are discussed later in this section. Having considered both approaches we then take a view as to which is likely to be the most robust solution going forward.

We do not believe that this approach is appropriate for Government owned companies owing to the way that these companies are funded by their respective State Treasuries and the governance structures that are in place. Rather, these companies should face a direct cost pass-through of debt costs. These concerns are discussed in more detail in the October 2011 *Application to change the requirements in relation to the return on debt as specified in the National Electricity Rules*.

6.2. Rules for implementation

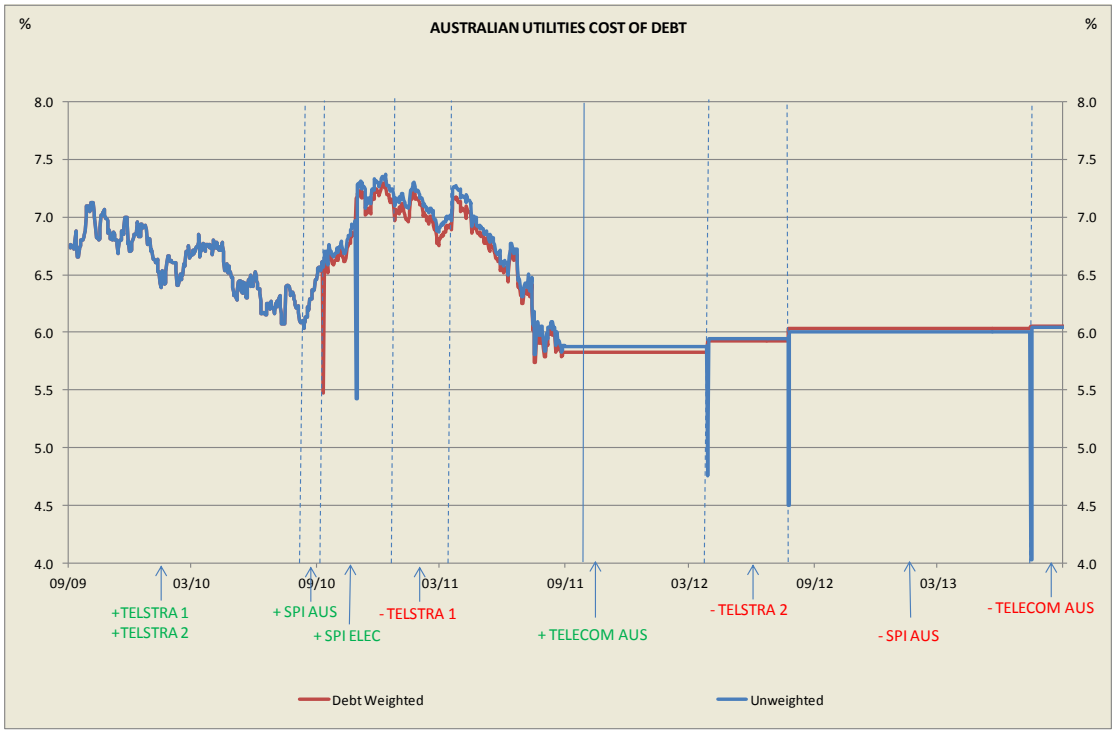
For private companies the rules to determine the allowed return on debt, using the bespoke index approach, would be:

1) Select those [network utility] bonds that meet the following criteria:
   - The issue is denominated in AUD;
   - Daily yield to maturity information is provided by Bloomberg;
   - The remaining maturity is between [three] and [seven] years;
2) Calculate an average yield for each day that is [weighted by the size of issue] of the individual bond yields;
3) On January 1st (or the first working day in the New Year [in the new tax year]) calculate the yield to maturity over the five year period ending on December 31st [appropriate date if tax year]; and
4) Apply this yield as the return on debt for this calendar year.
5) At the end of the year the bond index needs to be updated by:
   - Including bonds where the remaining maturity is now within the determined range;
   - Exclude bonds where the remaining maturity is now less than [three] years; and
   - Include any new bond issues made during the year where the remaining life is within the determined range.

Building on the bonds listed in annex 1 but also including other network company issues (such as telecoms issues), the following example of how such an index of bond yields could be developed is shown in Figure 6.1. This is based on six bonds that meet the criteria, although the number decreases as historical information is considered – the graph shows when bonds join and leave the composite owing to the remaining maturity requirement. Given this limited dataset thought could be given to using an even broader definition of network companies or some non-financial corporate

bonds that meet the criteria should be included – such an option is described below. Also, the figure shows two ways of estimating the yield, a simple average of the individual bond yields and a weighted average of yields where the weights are provided by the size of the bonds.

Figure 6.1: An example of the daily yield to maturity for a composite of network company bonds



A note on timing. The actual period over which the calculation is made will probably actually depend on the charging periods of the companies. If charges are updated annually on April 1st but with one or more months notice of the new charges being provided to users then the recalculation of the composite yield to maturity would need to be undertaken at an appropriate time to be incorporated into the charges determination. This might be three months before the new charges come into effect.

6.2.1. FMV approach

As discussed above, there is an alternative approach to the bespoke index, which would be to use the Bloomberg FMV. Our concerns about the use of this approach is the fact that:

- the constituent parts are not clear and, as such, this is a "black box"; and
- for a long period there was quite clear evidence that although a utility and another non-financial corporation may have the same rating, the yield to maturity on the utility would be below that of the other company.

The benefits of using the FMV are:

- simpler rules are needed since Bloomberg updates the bond constituents as necessary;

- a broader base for the calculation; and
- a closer match to the five year maturity.

The fact that a divergence in yields exists between utility and non-utility bonds of the same rating needs to be considered. Evidence for this, taken from a significant US historical yield database is presented by Duffee (1998) where both the average spread and the standard deviation of the spread is lower for utility bonds compared to industrial bonds of an equal credit rating.[19] Should this difference be captured in the estimate of the return on debt? One possible approach would be to weight the average towards the yield on A bonds which is lower than that of the BBB bonds. Pre the GFC this might have been appropriate as the difference between A and BBB five year bonds was on average below the impact of being a utility. Since the GFC the divergence between A and BBB bonds has widened and while it has reduced from the heights reached in 2009, it is still significantly above the impact of being a utility that was observed in the 1990s. However, as noted earlier, we would expect company ratings to move within the range of A and BBB ratings during an investment cycle and consequently a simple averaging would be appropriate.

For private companies the rules to determine the allowed return on debt, using the Bloomberg FMV index approach, would be:

1) Collect the daily yield information over the past five years on the Bloomberg A and BBB five year FMVs;
2) Calculate an average yield for each day that is a simple average of the two individual yields;
3) On January 1st (or the first working day in the New Year [in the new tax year]) calculate the yield to maturity over the five year period ending on December 31st [appropriate date if tax year]; and
4) Apply this yield as the return on debt for this calendar year.

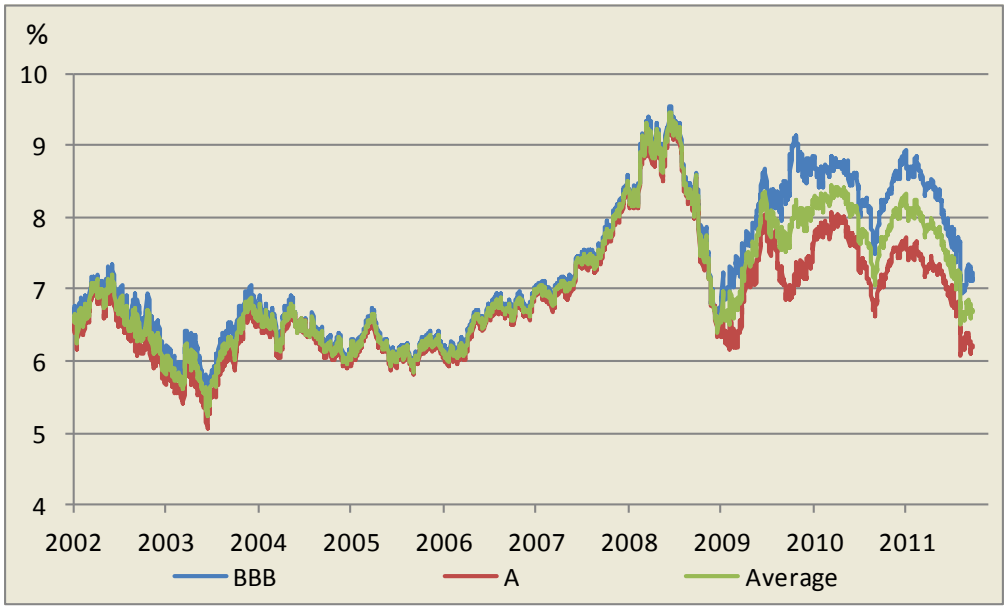
Using the broad A and BBB indices for non-financial corporate five year bonds provides the broadest base for calculating the FMV and does not face the problem of "picking" specific bonds for the FMV calculation or having to establish potentially arbitrary criteria for selecting bonds to include. Further, the data limitations mean that even using the full range of bonds does not provide that large a base on which the average yield is being calculated.

Figures 6.2 and 6.3 illustrate how such an approach would work. Bloomberg also allows us to show what the historical values would be since sufficient data is provided from the system.

It is possible to calculate the values that would be used in the price determination process. Table 6.1 sets out values that could have been applied annually from 2007. As can be seen, while these are increasing over time, they lack the volatility seen in the daily figures. Unsurprisingly these figures are significantly below the allowed return on debt from AER decisions.

[19] The difference in spreads ranged from under 10 basis points to almost 25 basis points. This is in line with anecdotal evidence from the UK in the early 1990s where an approximate 30 basis point difference existed between utility and other non-financial corporate bond yields.

Figure 6.2: An example of the daily yield to maturity for the individual Bloomberg indices and the average



Source: Bloomberg and CEPA analysis

Figure 6.3: An example of the daily yield to maturity to be used in the calculations based on Bloomberg data

Source: CEPA analysis

Table 6.1: Five yearly averages (%)

Five years to:	31/12/2006	31/12/2007	31/12/2008	31/12/2009	31/12/2010
BBB	6.46	6.61	7.05	7.37	7.81
A	6.26	6.44	6.92	7.08	7.35
Average	6.36	6.52	6.98	7.22	7.58

If an FMV based approach is adopted, there will always be the risk that a publicly available index, like the Bloomberg five year FMV will cease to be available. As such, rules will need to be in place to allow another index to be chosen as a replacement. Those rules would need to be along the lines of the following:

1) Possible alternative indices should be identified – both publicly available and bespoke options;

2) These options should be evaluated with respect to:

- maturity spread around the five year average;
- mix of corporate bonds; and
- availability of historical information.

3) For at least two options the values of the five year rolling average for the last two years (so using seven years of data) should be calculated.

4) The option that has the closest value to the equivalent Bloomberg five year FMV over that comparison period is chosen.

The difference in the yields should be recorded as it may influence the way in which the change is implemented.

How this is then implemented will depend on the circumstances of when the Bloomberg value ceases to exist. Two situations are discussed below.

During a price control period

If the Bloomberg value cases to be available during a price control period and this was unexpected, then the following rules should be used. For the next annual update:

1) If the difference between the new index and the Bloomberg index is less than 10 basis points, the new index is used to fully replace the Bloomberg index with the yield calculated solely using the new index.

2) If the difference between the new index and the Bloomberg index is more than 10 basis points, the approach is to:

- calculate the yield applicable for the following year and the value that would have been calculated 12 months previously;
- determine the percentage change in the yield over that 12 month period;
- apply that percentage change to the Bloomberg value from the previous year;
- use this rule linking the percentage change in the new index to the final value of the Bloomberg index until the end of the price control period.

At the end of a price control period

If it is known that the Bloomberg index will not be available for the next price control period, or would only be available for part of it, then it is better to switch to the new index for the whole of the price control period. For simplicity this should be done with a clean shift to the new index no matter what the difference between the yields on the old and new indices. The rules for this would be:

1) From the beginning of the new price control when it is known that the Bloomberg index will cease to be available (or the first control after the Bloomberg index ceases to be available if the change happens with insufficient warning) the Return on Debt will continue to be calculated as a five year rolling average but based on the new index.

6.2.2. Government owned companies

For government owned companies the rules to implement the preferred approach would be:

1) The average yield on five year maturity borrowing for the appropriate State Treasury is determined (x%) for the previous calendar year.

2) The average outstanding debt for the next year is forecast (RAB_t^d).

3) The forecast level of interest for next year is calculated by x% * RAB_t^d.

Annex 4 provides the algebra for this rule.

6.3. Conclusions

This section has shown that it is possible to turn the proposals for reform of the return on debt into implementable rules.

While our preference would be to have a bespoke index of network bonds, the reality is that there is still insufficient information available to develop this – especially as historic information is limited and at least four years worth of data is needed today if this rule were to be implementable at the next AER price determination. As such, we recommend using a simple average of the Bloomberg FMV A and BBB yields to maturity.

ANNEX 1: AUSTRALIAN DEBT ISSUES

A1.3 Energy companies

According to Bloomberg data there are currently 29 bonds classified as being issued by energy companies; in total those bonds were worth a total of approx AUD 4.97bn. Only 5 out of the 29 bonds have credit rating information available on Bloomberg – one of the bonds issued by Energy Partner was AA rated and two were rated BBB-, while Origin Energy has issued two bonds that were rated BBB+.

A notable feature of the data is that the energy firms have had to pay an average coupon of 8.0% on the bonds that they have issued (based on the bonds for which information on the coupon was available).

Figure 1.1 shows the currency denomination of the bonds currently held by Australian energy companies. It shows that only 36% of bond finance is secured in Australian markets, compared to 39% of bonds financed in the EU and 23% in the US.

Figure A1.1: Currency denomination of bond finance for energy companies

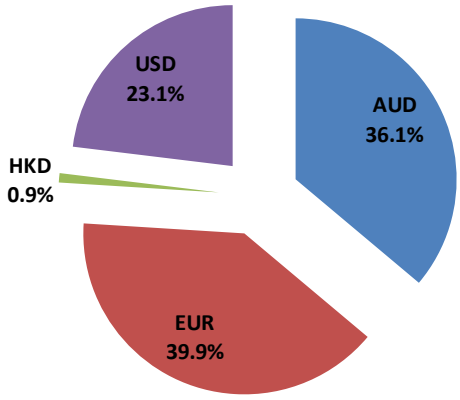


Table A1.2 summarises the information on the bonds held by energy companies as classified by Bloomberg data. It is worth highlighting that although there is only limited information accessible on the credit rating of the energy companies, the table shows that the four S&P rated firms have all achieved an investment grade rating, but they are rated at either BBB+ or BBB-.

Table A1.2: Summary of corporate bonds issued by Australian energy companies

Issuer	Coupon	Currency	Company Credit Rating (S&P)	Bond Credit rating (Bloomberg composite rating)	Total amount raised Aus ($)*
Advance Energy	9.5	AUD			$6,650,500
Aed Oil Ltd	9.0	USD			$19,761,555
Amity Oil Ltd	10.0	AUD			$17,236,278
Clutha Ltd	9.5	AUD			$36,000,000
Didon Tunisia	3.7	USD			$93,138,000
Energy Partner	0.0	AUD	BBB-	BBB-	$100,000,000
Energy Partner	6.4	AUD	BBB-	AA	$150,000,000
Energy Partner	5.2	AUD	BBB-	BBB-	$300,000,000
Firestone Energy	10.0	AUD			$25,000,000
First Australian	15.0	AUD			$2,025
Griffin Coal Min	9.5	USD			$442,405,500
Griffin Coal Min	9.5	USD			$442,405,500
Horizon Oil Ltd	5.5	USD			$74,510,400
Natural Fuel	6.8	USD			$74,510,400
Nexus Energy Ltd	8.5	AUD			$117,500,000
Nexus Energy Ltd	10.5	AUD	BBB-		$110,000,000
Nexus Energy Ltd	0.0	AUD	BBB-		$14,200,000
Origin Ener Fin	7.9	EUR	BBB+		$660,590,000
Origin Energy	5.5	AUD	BBB+	BBB+	$100,000,000
Origin Energy	6.5	AUD	BBB+	BBB+	$100,000,000
Rocklands	0.0	HKD			$46,569,000
Santos Finance	8.3	EUR			$1,321,180,000
Santos Finance	6.3	AUD			$100,000,000
Santos Finance	5.4	AUD			$350,000,000
Snowy Hydro	5.7	AUD	BBB+		$53,000,000

Ltd					
Snowy Hydro Ltd	6.3	AUD	BBB+		$66,000,000
Snowy Hydro Ltd	6.5	AUD	BBB+		$104,000,000
Target Engergy L	12.0	AUD			$650,000
White Energy Co	7.9	AUD			$45,000,000

Source: Bloomberg, Standard & Poor's

**have used current exchange rates to convert foreign currency bonds into AUD*

A1.4 Utility companies

Bloomberg data indicates that Australian Utilities currently make up around AUD 13.9bn of corporate bond issuances, which is around 10% of total corporate bonds. Bloomberg data shows that this finance has been raised through 69 bond issues, which have any average size of AUD 204m. According to the datan AUD 875m of new finance has been issued by utilities in 2011 – over AUD 625m by SPI Australia (an AUD 250m Australian dollar bond and a £250m British sterling bond) and an AUD 250m bond by ETSA Utilities.

Although there are 69 bonds currently issued by utilities, only 15 different utilities have actually accessed bond markets to date. Table 1.3 presents a summary of bond issues by Australian corporates. The table shows that in particular ATP Pipelines, SP (Electricity and Gas) and DBNGP (a Western Australian gas company) have been the most active companies in accessing bond finance.

In comparison to the energy sector the significant majority of the utility bonds were Australian $ denominated with over AUD 9bn of the bonds raised in local markets, about one-third of the bonds were raised overseas with the US the most popular market for the utilities.

There is quite a lot of information available on the credit rating of the various utilities. Table A1.3 shows that all the utilities, for which ratings are available, are rated at investment grade (BBB- and above). However most of the firms are rated at just investment grade; BBB- and BBB, with only four of the twelve rated utilities achieving a A- rating.

It is also clear from the table that a number of the companies have taken some action to improve the credit of the bonds that they have issued, with for instance Envestra and Electranet Ltd able to issue AA rated bonds despite only holding BBB- and BBB company credit ratings respectively. The Electranet issue is also interesting as an index-linked one.

Table A1.3: Summary of corporate bonds issued by Australian Utilities

Issuer	Bond term (Ave)	Coupon (Ave)	Company Credit Rating (S&P)	Bond Credit rating (Bloomberg composite rating)	Total amount raised Aus ($)*	Number of bonds raised
SPI Aust Fin Ltd (Group)	7.6	5.5	A-	A-	$3,871,022,000	14
DBNGP Finance Co	8.0	6.2	BBB-	BBB+ / BBB-	$1,775,000,000	6
APT Pipelines	11.7	6.6	BBB		$1,359,172,620	14
Powercor Australia	12.8	5.3			$1,130,000,000	3
Envestra Ltd (Group)	15.8	5.6	BBB-	AA	$920,000,000	5
United Energy Di	11.3	5.4	BBB	BBB	$872,552,000	3
Citipower (Group)	10.3	5.5	A-		$875,000,000	3
ETSA Utilities	9.3	4.1	A-		$850,000,000	3
Jemena Ltd (part of SPI Group)	16.0	6.1	A-	A-	$558,828,000	4
TXU Australia (Group)	14.7	7.0	BBB	A-	$447,062,400	4
Eastern Energy	20.0	7.3	BBB	A / A-	$352,527,330	4
LOY Yang Pwr I/L	30.0	0.0	BBB-		$350,000,000	1
WA Network Holdings	7.0	5.3	BBB-	AA	$250,000,000	1
Electranet Ltd	14.8	5.2	BBB	AA	$200,000,000	1
Wyuna Water	18.2	1.7			$185,060,000	3

Source: Bloomberg, Standard & Poor's

A1.5 Government bonds

The information that we have accessed on Bloomberg suggests that there are currently AUD 180bn of Central Government bonds outstanding from 22 different bond issues. The vast majority (99.9%) of these bonds are AUD debt, which has attracted an average coupon of 5.1% and been issued for an average term of just below 12 years. As might be expected Government is able to access finance more cheaply than both energy and utility companies, though according to the data the Government bonds have generally been issued for comparable lengths of time as both the energy and utility bonds.

Table A1.4: More detailed information on network company issues

Issuer	Issue date	Maturity	Amount raised	Currency	Coupon	Credit rating	YTM at issue	Spread at issue	YTM 31/08	Spread 31/08
Citipower	12/01/2007	15/07/2017	300,000,000	AUD	0.0					
Citipower	12/01/2007	15/07/2017	275,000,000	AUD	5.1					
Citipower	28/02/2003	28/02/2013	300,000,000	AUD	5.5	BBB+				
Electranet	20/11/2000	20/08/2015	200,000,000	AUD	5.2	AA	6.58	0.36	12.47	8.65
Etsa Utilities	15/07/2005	15/07/2015	300,000,000	AUD	5.4					
Etsa Utilities	29/03/2011	29/09/2016	250,000,000	AUD	6.8		7.89	2.41	6.02	2.10
Etsa Utilities	30/04/2007	15/10/2019	300,000,000	AUD	5.3					
Jemena Ltd	25/09/2003	25/09/2015	150,000,000	USD	5.3	A-			2.46	1.50
Jemena Ltd	25/09/2003	25/09/2015	150,000,000	USD	5.3	A-			2.61	1.65
Jemena Ltd	14/04/1998	15/04/2018	150,000,000	USD	6.9	A-			3.48	1.92
Jemena Ltd	14/04/1998	15/04/2018	150,000,000	USD	6.9	A-			3.51	1.95
Powercor	15/11/2005	15/11/2015	200,000,000	AUD	5.3					
Powercor	15/08/2007	15/08/2021	300,000,000	AUD	5.2					
Powercor	15/08/2007	15/01/2022	630,000,000	AUD	5.3	A-				
Spi Aust Fin Ltd	30/11/2004	30/11/2011	85,000,000	AUD	5.4	A-				
Spi Aust Fin Ltd	30/11/2004	30/11/2011	150,000,000	AUD	6.3	A-	6.09	0.63	5.78	1.87
Spi Australia As	12/08/2010	12/08/2015	500,000,000	AUD	7.0	A-	6.89	2.24	5.90	1.99
Spi Australia As	09/08/2010	09/08/2016	175,000,000	CHF	2.3	A-			1.64	1.00
Spi Australia As	11/02/2011	11/02/2021	250,000,000	GBP	5.1	A-	5.29	1.42	4.13	1.53
Spi Elect & Gas	03/11/2004	03/11/2011	200,000,000	AUD	6.5	A-	6.41	1.10	6.01	2.10
Spi Elect & Gas	10/12/2003	15/11/2013	300,000,000	USD	6.2	A			1.93	1.73

Spi Elect & Gas	04/11/2004	04/11/2014	300,000,000	USD	5.0	A-			2.30	1.98
Spi Elect & Gas	08/03/2010	08/09/2015	475,000,000	CHF	2.4	A-	2.30	1.57	1.52	1.11
Spi Elect & Gas	14/09/2006	14/09/2016	275,000,000	USD	5.8	A-	5.75	1.02	3.02	2.06
Spi Elect & Gas	25/03/2010	25/09/2017	300,000,000	AUD	7.5	A-			6.34	2.23
Spi Elect & Gas	26/06/2008	26/06/2018	250,000,000	GBP	7.1	A-	7.56	2.55	3.61	1.64
Spi Elect & Gas	16/03/2010	16/03/2020	700,000,000	HKD	4.1	A-				
Spi Elect & Gas	01/04/2011	01/04/2021	250,000,000	AUD	7.5	A	6.24	0.98	6.24	1.86
United Energy	31/10/2005	23/10/2014	500,000,000	AUD	5.2	BBB				
United Energy	19/11/2003	15/04/2016	200,000,000	USD	5.5	BBB			3.55	2.59
United Energy	19/11/2003	15/05/2016	200,000,000	USD	5.5	BBB				

Source: Bloomberg

Table A1.5: Summary of corporate bonds issued by the Australian Government

Currency	Issued	Maturity	Coupon (%)	Total amount raised Aus ($)*
AUD	14/12/2006	15/04/2012	5.75	$14,055,000,000
AUD	24/02/2010	15/11/2012	4.75	$8,900,000,000
AUD	25/05/2000	15/05/2013	6.5	$16,699,399,000
AUD	05/05/2010	15/12/2013	5.5	$9,300,000,000
AUD	24/07/2008	15/06/2014	6.25	$11,899,000,000
AUD	10/09/2010	21/10/2014	4.5	$9,150,000,000
AUD	30/05/2002	15/04/2015	6.25	$14,097,000,000
AUD	18/05/1994	20/08/2015	4	$3,196,000,000
AUD	06/07/2011	21/10/2015	4.75	$1,240,000,000
AUD	07/07/2010	15/06/2016	4.75	$11,000,000,000
AUD	10/06/2004	15/02/2017	6	$14,497,000,000
AUD	29/11/2010	21/01/2018	5.5	$4,150,000,000
AUD	19/01/2006	15/03/2019	5.25	$13,947,500,000
AUD	04/05/2009	15/04/2020	4.5	$14,497,000,000
AUD	14/10/1996	20/08/2020	4	$4,223,000,000
AUD	13/09/2007	15/05/2021	5.75	$12,800,000,000
AUD	12/04/2010	15/07/2022	5.75	$7,400,000,000
AUD	23/05/2011	21/04/2023	5.5	$2,490,000,000
AUD	08/10/2009	20/09/2025	3	$4,810,000,000
AUD	21/09/2010	20/09/2030	2.5	$1,900,000,000
USD	18/03/1987	15/03/2017	8.375	$139,707,000
GBP	Not given	07/29/49	3	£5,527,700

Source: Bloomberg

ANNEX 2: INTERNATIONAL REGULATORY PRECEDENT

This annex provides a series of primarily UK case studies but it also briefly considers some evidence from the US and continental Europe. The greatest emphasis is on the UK case studies but the others are briefly covered to provide examples of how the slightly different approaches are being employed elsewhere.

The following table briefly summarizes the key aspects of the longer case studies then presented.

Table A2.1: Summary of international case studies

Case	General approach	Debt premium	Maturity considered	Ratings considered	Averaging period
Ofgem EDPCR5 2009	10 year trailing average informed by wider market evidence	1.3%	10 year	A-/BBB+	10 years
Ofgem RIIO-GD1 and T1, 2011	10 year trailing average updated annually during the control	N/A	10 year +	Broad A and Broad BBB	10 years
NIAUR 2010	Cost pass-through	0.88%	As issued	As issued	N/A
Ofwat PR09	Mix of forward and backward looking rates	1.6%	Range	Range	Unclear
ORR 2008	Charge a guarantee fee in addition to the actual cost of borrowing	0.80%	As issued	As issued	N/A

A2.1 Ofgem

The latest determination by Ofgem was the fifth electricity distribution determination (EDPCR5) completed in 2009 and covering the period from 2010 to 2015. This Ofgem decision was quite explicit about aspects of the cost of debt and how they were incorporated into the cost of capital calculation. After considering this determination some comments are provided from the RIIO proposals and the way they are being implemented in the ongoing determinations for gas distribution and energy transmission.

A2.1.1 EDPCR5

Ofgem's approach to the cost of debt at EDPCR5 was to determine a range incorporating evidence from:[20]

[20] This is explained in *FP5 – Allowed revenues and financial issues* and *Financial Issues – Ofgem Cost of Capital* (a report by PwC). Both are available from the Ofgem website.

- Long-term average cost of debt of companies with a similar credit rating to the regulated companies; and
- A sense check by considering recent evidence on debt issues by regulated companies and general market conditions.

Greatest emphasis was placed on the 10 year trailing average and a cost of debt of between 3.3% and 3.7% was proposed, with a value of 3.6% used in the final calculation. Risk-free rates of between 2% and 2.5% were considered, so this suggests a debt premium of between 1.3% and 1.5% (assuming the lower value of the risk free rate is considered). However, Ofgem was not explicit about this and focused on the final allowed cost of debt. The rationale for choosing a value above the mid-point was the ongoing uncertainty in the financial markets at that time.

Supporting evidence for Ofgem's decision on the cost of debt was provided by PwC. Their approach was quite standard and included a useful summary of UK regulatory debt premium decisions – reproduced as an attachment below.

PwC considered a range of information when proposing a range for the cost of debt. They approached this in the traditional way of considering a risk-free rate and a debt premium. For the debt premium and more generally they considered:

- General market evidence;
- Utility specific evidence – from both primary and secondary markets; and
- Transaction cost evidence.

General market evidence was collected across a range of credit ratings and going back before 2000. A summary of the evidence found is presented in the figure below.

Given the GFC impact, high-lighted on the figures, there was also a concern as to whether regulated companies were affected to a greater or lesser degree. Figures A2.1 and A2.2 illustrate the evidence used by PwC to consider this question. Further evidence was sought from credit default swap and utility specific bond data. Note, bonds with about a 10 year remaining maturity were considered and with credit ratings of BBB and A-.

Figure A2.1: PwC general market evidence, 2009

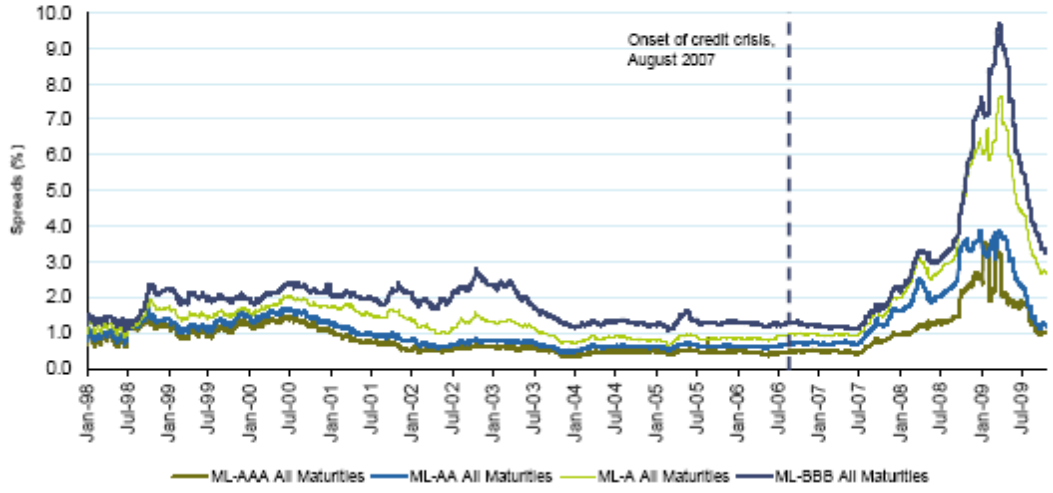


Figure A2.2: A rated bond evidence considered by PwC, 2009

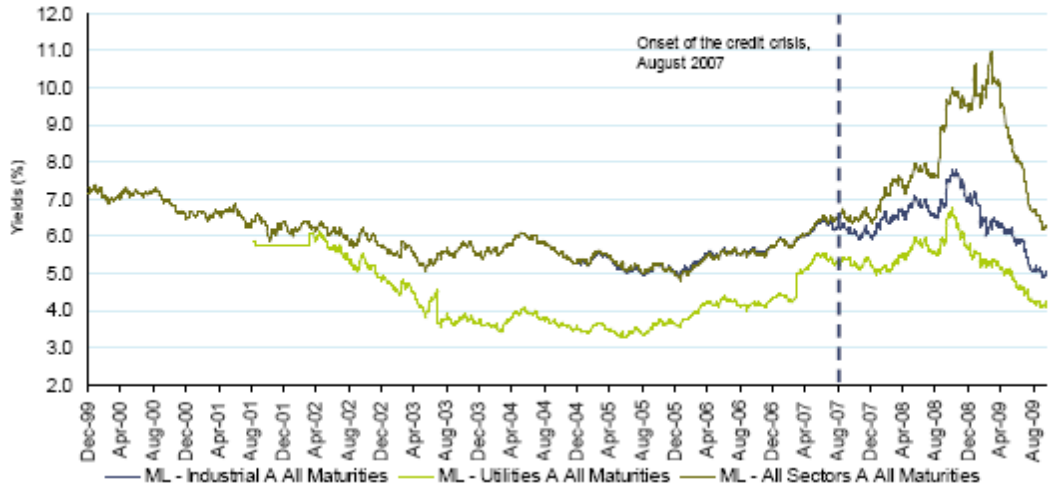


Figure A2.3: BBB rated bond evidence considered by PwC, 2009

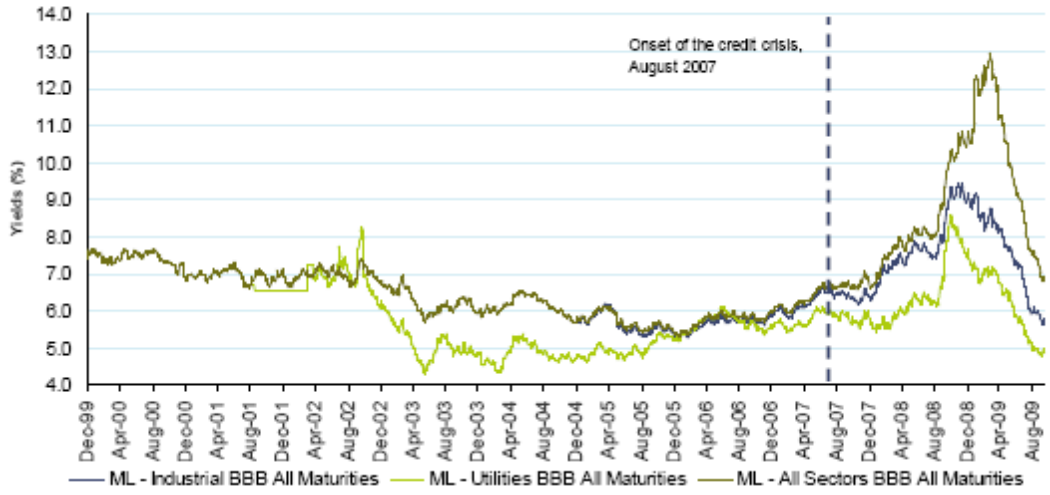


Figure A2.4: Five year credit default swap evidence considered by PwC, 2009

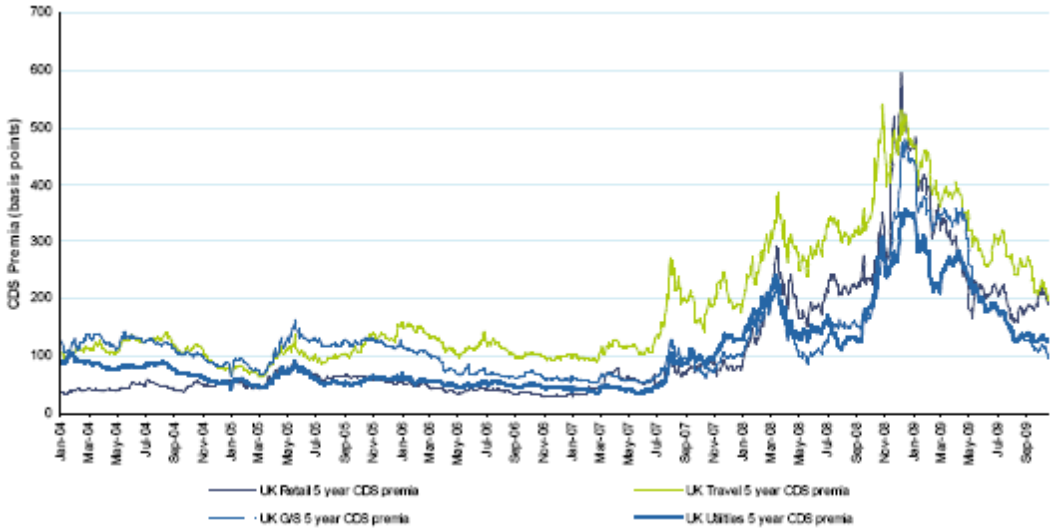
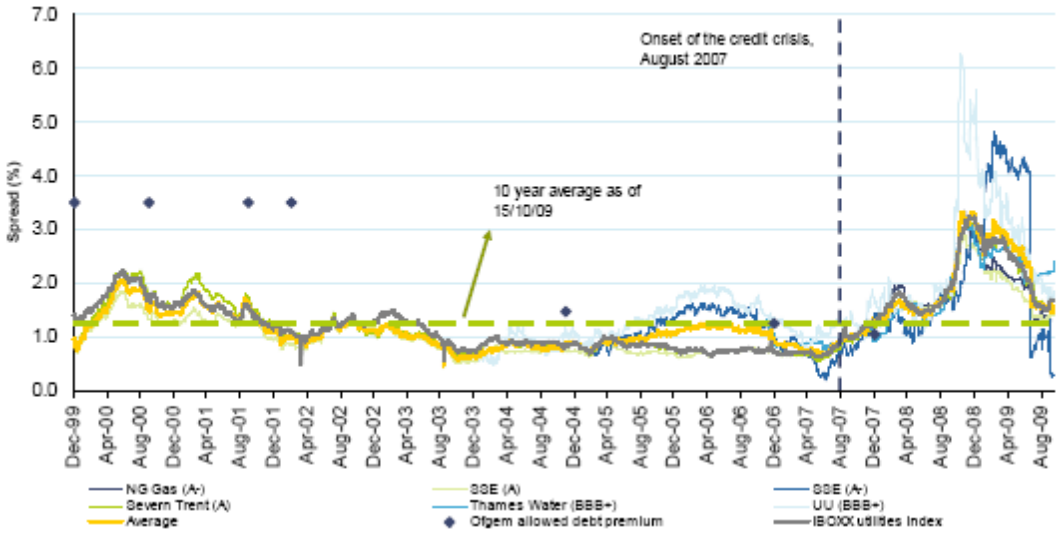


Figure A2.5: Utility specific evidence considered by PwC, 2009



When all this information was brought together by PwC they established the following ranges.

Figure A2.6: PwC ranges for the debt premium

Debt premium	Average across comparators' bonds with credit rating A-/BBB+	iBoxx Utilities Index
Spot as of 15/10/09 (%)	1.6	1.7
Approximate 5 year average (since January 2005 - %)	1.5	1.3
Approximate 10 year average (since January 2000 - %)	1.3	1.3

Since there were concerns that this focus on secondary market information may not reflect the full situation, especially timing issues, a cross-check against primary market evidence was undertaken. The following figure reports the spread at issue evidence considered by PwC. This evidence, on the whole, supported the ranges being proposed by PwC.

Figure A2.7: PwC evidence on primary market issues

Parent	Date of Issuance	Maturity	Tenor (years)	Total Value Issued (£ million)	Launch Rating	Current Rating	Spread to Benchmark
Comparator set							
National Grid	19-Jul-06	01-Aug-16	10	797.3	A-	BBB+	1.27
Eon	21-Sep-07	02-Oct-17	10	3,500	A	A	1.20
Eon	18-Oct-07	30-Oct-19	12	2,150,.5	A	A	1.07
National Grid	18-Feb-08	03-Mar-20	12	396.4	A-	A-	1.70
Severn Trent	04-Mar-08	11-Mar-16	8	700,	A	A	1.59
Eon	23-Apr-08	07-May-20	12	2,500	A	A	1.68
Eon	05-Jun-08	07-May-20	12	400	A	A	1.38
National Grid	08-Jul-08	03-Mar-20	12	74,.7	A	A	1.40
GDF Suez	07-Jan-09	18-Jan-21	12	4,232.7	A+	A+	3.28
Severn Trent	13-Jan-09	22-Jan-18	9	447.6	A	A	2.85
GDF Suez	03-Feb-09	11-Feb-21	12	788.5	A+	A+	2.05
Recent Market evidence (for reference only)							
E.on	17-Mar-09	26-Mar-13	4	750	A	A	1.96
E.on	27-Mar-09	03-Apr-12	3	50	A	A	1.12
E.on	18-May-09	30-Nov-11	2	750	A	A	1.25
E.on	19-May-09	28-Feb-11	2	90	A	A	0.55

Their final summary is presented below, based on this, a range of 1.3% to 1.5% was proposed for the debt premium, which when combined with the risk free rate estimates of 2.0% to 2.5% gave a cost of debt of 3.3% to 4%.

Figure A2.8: PwC summary of findings

Debt premium	Min	Max
Evidence from secondary market (10 year average)	1.3	1.3
Evidence from primary markets	1.1	1.7

Source: PwC analysis

Figure A2.9: Evidence on UK debt premium decisions presented by PwC in its report to Ofgem 2009

Regulator	Review	Debt premium (%)	Comments
ORR (Oct 2000)	Periodic review of Railtrack's access charges: final conclusions	1.5 – 1.8	- Considered recent spreads on Railtrack's current bonds (AA- rated) at 1.4%-1.7%.
CC (Nov 2002)	BAA plc: A report on the economic regulation of the London airports companies (BAA Q4)	0.9 – 1.2	- Considered spread on AA- rated bonds in the transportation sector (ranging from 69 basis points (one year) to 165 basis points (30 years)). - Considered evidence from BAA which suggested that the spread on its bond due in 2031 had increased to 1.3%.
CAA (Feb 2003)	Economic Regulation of BAA London Airports Q4 (Heathrow & Gatwick Q4)	0.9 – 1.2	- Based decision primarily on CC (Nov 2002).
CC (Feb 2003)	Mobile Phone Charges Inquiry	1.0 – 4.0	- Information provided by Oftel indicated that the cost of debt would be lower than spot rates. Oftel estimates (1%) formed the lower bound of the range.
Ofgem (Nov 2004)	Electricity Distribution Price Control Review 4	1.0 – 1.8 (initial decision) 1.5 (final decision)	- For initial decision: noted that the current debt premia for DNOs' UK debt was relatively low, possibly due to increased demand for corporate debt by investment institutions, particularly pension funds. Considered debt premia of DNOs over equivalent government benchmarks over a five-year period to be volatile and hence preferred to use the long-term average of debt premia of DNO's bonds. Preferred to set a wide range for the debt premium given that there was uncertainty surrounding the expected cost of debt. - Final decision: Ofgem estimated an overall cost of debt of 4.1% which is equal to the mid point of its initial determination range. Using an RFR of 2.6 this results in an debt premia of 1.5%.
Ofwat (Dec 2004)	Future water and sewerage charges 2005-10	0.8 – 1.4	- Considered a lower bound set by spreads on A rated bonds (which were historically low) and an upper bound set by spreads on BBB rated bonds.
Ofcom (Aug 2005)	Ofcom's approach to risk in the assessment of the cost of capital (BT copper access network)	1.0	- Considered yields on long term A-rated corporate bonds as at the end of June 2003 (1.0%), June 2004 (0.7%) and June 2005 (0.6%). - Also considered average promised yield on recently issued long term BT debt, as of the end of January 2004.
CAA (Dec 2005)	NATS Price Control Review 2006-2010 (CP2)	1.2	- Considered the cost of debt based on existing debt and debt that NERL might issue during CP2. - Calculated debt premium from the (nominal) cost of debt for A- rated corporate bonds.
Postcomm (Dec 2005)	Royal Mail Price and Service Quality Review	0.5	- Accepted Royal Mail's estimation of a cost of debt of 3.0% at 20% gearing. With Postcomm's RFR assumption of 2.5%, the resultant debt premium was 0.5%.
Ofgem (Dec 2006)	Transmission Price Control Review, 2007-2012	1.3	- Stated DCPR4 as regulatory precedent, and noted that spreads had remained narrow since then. - Considered the average spread (over 5-10 years) of A rated bonds with approximately 10 years to maturity. - Noted that these averages were higher than current yields.

Regulator	Review	Debt premium (%)	Comments
Ofcom (Mar 2007)	Mobile Call Termination Statement	1.0 – 2.0	- Considered spreads of A and BBB rated corporate bonds over 5 year gilts.
Ofgem (Dec 2007)	Gas Distribution Price Control Review 2007-13	1.1 (implied)	- Stated that is has basically used Ofgem (Dec 2006) TPCR cost of debt estimate but has lowered 20 basis points (bps) to reflect an easing in the credit market conditions. - To infer the implied debt premia (which is not stated explicitly in the report), we have assumed that the RFR has remained constant and have applied the 20 bps reduction in the overall cost of debt to the Ofgem (Dec 2006) TPCR debt premia estimate (1.3%).
CAA/CC (Mar 2008)	Economic Regulation of Heathrow and Gatwick Airports (Heathrow / Gatwick)	1.1	- Considered a cost of debt of 3.4% based on the cost of debt that a company with a BBB+/Baa1 rating could be expected to achieve. Also considered refinancing costs and fees (as in the regulatory precedent established by CC (2000) for Mid Kent/Sutton and East Surrey water). Noting that the RFR (2.5%) estimated in their analysis in the current report ignored the lower yields on longer-dated debt, stated that the debt premium estimate must recognise that companies issue long-dated debt. Effective RFR of 2.3% in debt premium estimation. - Considered a debt beta of 0.1.
CC (Nov 2008)	Stansted Price Control Review (2009-14)	1.4 – 1.7	- Considered a weighted average of new and floating debt, embedded debt and an uplift for transaction fees to arrive at a cost of debt figure of 3.4%-3.7%. However, the recommended point estimate of the WACC (7.1%) is consistent with a cost of debt of 3.6%. Using an RFR of 2.0% gives a debt premia of 1.6%.
CAA (Mar 2009)	Stansted Price Control Review (2009-14)	1.7 – 1.9	- Increased the debt premia embedded in the CC (Nov 2008) point estimate of the WACC and increased it by 10 to 30 bps to reflect tighter credit market conditions.

Source: PwC analysis. Further details are provided in Appendix I and V.

A2.1.2 RIIO

Subsequent to EDPCR5 was the final RIIO decisions and the recently commenced RIIO-GD1 and RIIO-T1 price reviews (covering gas distribution and energy transmission respectively). Ofgem used the RIIO process to further develop its approach to the cost of debt. Ofgem was supported in this work initially by CEPA and is now being implemented by Europe Economics.[21]

This work, the conclusions of which are set out in Ofgem's March 2011 document, Decision on strategy for the next transmission and gas distribution price controls – RIIO-T1 and GD1 Financial issues, has taken the trailing average approach from EDPCR5 and further developed it. Specifically, Ofgem has decided to implement an annually updated 10 year simple trailing average real cost of debt. This will be implemented by:

- using the iBoxx GBP Non-Financials indices of 10+ years maturity, with credit ratings of broad A and broad BBB;[22]
- this index will be deflated by the 10 year break-even inflation rate, data on which is published by the Bank of England; and
- no adjustments for debt issuance fees, liquidity management fees, new issue premium or inflation risk premium to be made.

A2.2 Ofwat

Ofwat's approach to the cost of debt is more in keeping with traditional UK approaches than that applied by Ofgem. They build up a cost of debt based on:

- A risk-free rate; and
- A debt premium.

In its decision, Ofwat identified the following ranges.

Table A2.2: Ofwat's decision on the cost of debt

Element	Low	High	Final
Risk-free rate	1.5%	2.2%	2.0%
Debt premium	1.0%	2.5%	1.6%
Cost of Debt	2.5%	4.7%	3.6%

However, Ofwat explain that the 3.6% cost of debt is a weighted average of a forward looking rate of between 4.1% and 4.3% and an existing debt cost of 3.4% - with a ratio of 75% existing and 25% new.

[21] Providing financeability in a future regulatory framework – a report by CEPA for Ofgem and The Weighted Average Cost of Capital for Ofgem's Future Price Control (March 2011 update) – Report by Europe Economics on behalf of Ofgem.

[22] Ofgem had initially suggested using the equivalent Bloomberg index, but respondents preferred the iBoxx option.

The forward looking estimate was based on recent market evidence. In part this draws on work undertaken for Ofwat by Europe Economics.

In its work, Europe Economics considered:

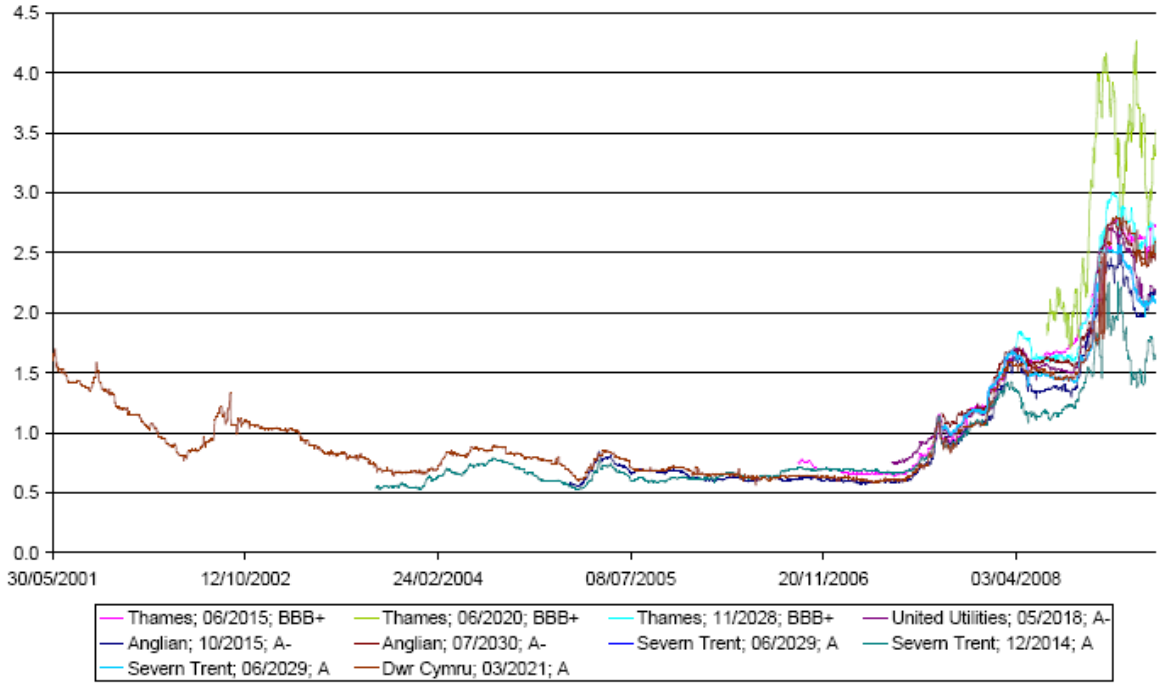
- a credit rating of at least A-;
- both general bond issues as well as water company issues, with a greater weight placed on the water company issues;
- both primary and secondary market evidence; and
- whether a crisis and non-crisis cost should be calculated and then weighted together.

They also considered the embedded debt question which is considered further in this section.

A2.2.1 Utility bond issues

The water company issues that were considered are provided in the figure below. Some evidence was also available on index linked bonds issued by the water companies. This is presented in the second figure below.

Figure A2.10: Water company debt premia



Note: Ratings quoted are those given by Standard and Poor's

Source: Europe Economics calculations using Bloomberg data

Figure A2.11: Debt premia for water company index linked bonds

Note: Ratings quoted are those given by Standard and Poor's

Source: Europe Economics calculations using Bloomberg data

Recent issue information was also considered. The figure below presents the evidence considered by Europe Economics.

Figure A2.12: Recent utility bond issue data

Issue Date	Issuer	Ratings	Size (GBPm)	Tenor	Spread vs UKT
18-Feb-08	Nat Grid Gas	A3/A-	300	12y	170
27-Mar-08	Thames Water	A3/BBB+	400	50y	260
01-May-08	SGN	Baa1/BBB	225	32y	177
06-May-08	Nat Grid Gas	A3/A-	300	30y	153
23-May-08	EDF	Aa1/AA-	500	20y	127
12-Jun-08	SPI	A1/A-	250	10y	195
08-Aug-08	SSE	A2/A-	350	30y	170
09-Sep-08	Centrica	A3/A	300	25y	253
10-Sep-08	Centrica	A3/A	450	10y	250
22-Oct-08	GDF Suez	Aa3/A	500	20y	220
28-Oct-08	EDP Finance	A2/A-	325	16y	370
07-Nov-08	SSE	A2/A-	500	20y	350
02-Dec-08	EDF	Aa1/AA-	400	14y	295
09-Dec-08	ENI	Aa2/AA-	150	10y	250
15-Dec-08	TMS Water Utilities Cayman Finance Ltd	A3/BBB+	50	32y	Index Linked
18-Dec-08	United Utilities Water	A3/A-	250	7y	295
13-Jan-09	Severn Trent Utilities Finance	A2/A	400	9y	285
13-Jan-09	E.ON Int Finance	A2/A/A+	700	30y	280
14-Jan-09	E.ON Int Finance	A2/A/A+	350	5y	245
28-Jan-09	National Grid Plc	Baa1/BBB+	400	5y	335
23-Feb-09	Southern Water Services Finance	A3/A-	300	10y	265
27-Feb-09	Centrica	A3/A/A	250	5y	260
	Centrica	A3/A/A	400	13y	270
25-Mar-09	United Utilities Water	A3/A-	200	13y	240

Source: Collated by Ofwat

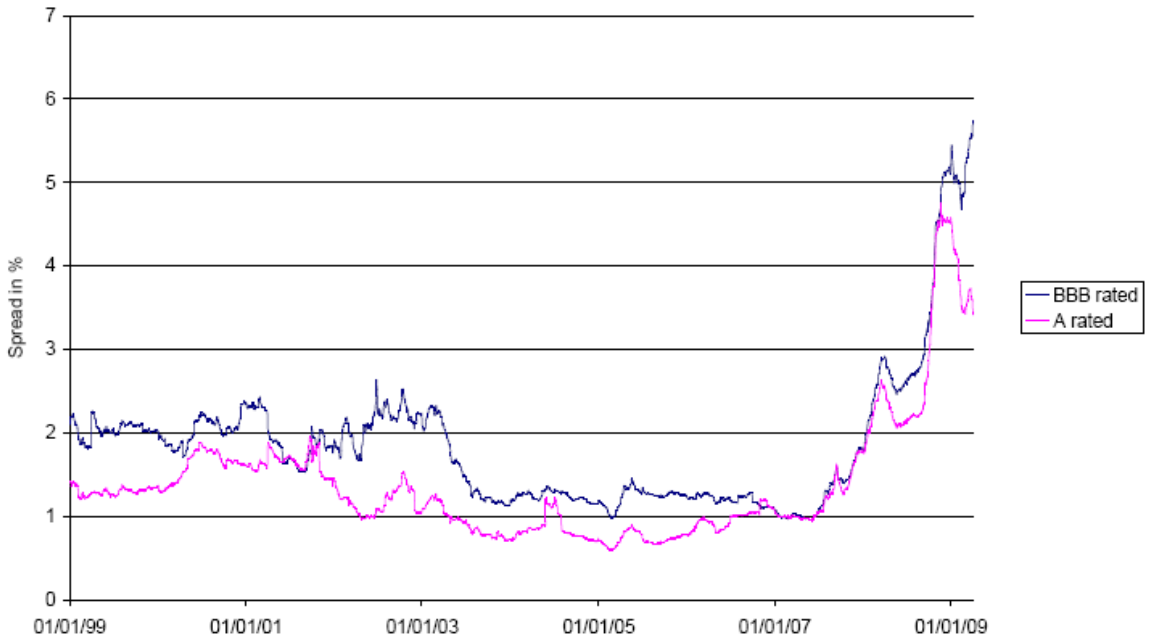
Issue Date	Issuer	Ratings	Size (EURm)	Tenor	Spread vs ms
18-Jan-08	EDF	Aa1/AA-	1,500	10y	70
04-Mar-08	Severn Trent	A2/A	700	8y	115
23-Apr-08	E.ON	A2/A	1500 / 1000	5 / 12y	73 / 110
30-Apr-08	Iberdrola	A3/A-	1000 / 750	5 / 10y	83 / 110
07-May-08	National Grid Gas	A3/A-	750	5y	77
23-May-08	EDF	Aa1/AA-	600 / 1250	6 , 12y	47/ 67
27-May-08	E.ON	A2/A	1000	6y	75
16-Jun-08	Anglian Water	A3/A-	500	8y	120
09-Jul-08	CEZ	A2/A-	600	6y	120
10-Jul-08	SSE	A2/A	600	5y	123
26-Aug-08	E.ON	A2 / A	750 / 1,000	3y / 7y	45 / 72
28-Aug-08	RTE	AA-	1,000	10y	52
17-Oct-08	GDF-Suez	Aa3/A+	1,000 / 900	5y / 10y	200 / 240
23-Oct-08	Gasunie	Aa2/AA-	1,000	5y	195
12-Nov-08	RWE	A1/A	1,000 / 1,000	5y	215 / 255
13-Nov-08	EnBW	A2/A-	750 / 750	5y / 10y	230 / 270
13-Nov-08	Iberdrola	A3/A-	1,000 / 600	3y / 7y	290 / 365
17-Nov-08	E.ON	A2/A	1000	2y	150
18-Nov-08	EDF	Aa1/AA-	2000	4y	210
25-Nov-08	Vattenfall	A2/A-	850 / 650	5y / 10y	230 / 280
01-Dec-08	Nat Grid Electricity	A3/A-	600	5y	330
22-Apr-08	RTE	NR/AA-	1,250	7y	48
27-Nov-08	Centrica	A3 / A	750	5y	380
03-Dec-08	REN	A3/A-	500	5y	325
13-Jan-09	National Grid Plc	Baa1/A-/BBB	500	5y	365
16-Jan-09	EDF	Aa3	2000	6y	205
	EDF	Aa3	2000	12y	255
27-Jan-09	TMS Water Cayman Finance	A3/BBB+	500	4y	330
03-Feb-09	RWE	A1/A	2000	6y	190
	RWE	A1/A	1000	12y	255
20-Mar-09	E.On	A2/A/A	750	13y	155

Source: Collated by Ofwat

A2.2.2 Wider market evidence considered.

Europe Economics also considered wider market evidence. The figure below illustrates the general information on debt premia and how they had developed over time considered by Europe Economics. The focus was on non-financial company bonds with maturities between seven and 10 years. Both BBB and A rated bonds were considered.

Figure A2.13: General bond evidence considered by Europe Economics



Note: data is for bonds with 7-10 year maturity issued by non-financials.
Source: Europe Economics calculations using data from iBoxx and Bloomberg

The final proposal made by Europe Economics with respect to crisis and non-crisis debt premia and allowed cost of debt are shown in the figure below.

Figure A2.14: Europe Economics' proposed ranges

Bond rating	Crisis cost of debt		Post-crisis cost of debt	
	Debt premium	Real cost of debt	Debt premium	Real cost of debt
A	2.1	3.85	1.2	2.95
A–	2.5	4.25	1.5	3.25
BBB +	3.3	5.05	2.0	3.75

A2.2.3 Embedded debt

In their PR09 document for Ofwat, Europe Economics provide an analysis of embedded debt adjustments that can be applied to other regulated industries. They proposed three options, which were analysed in terms of their impact on incentives and risk allocation. This is summarised in Table A2.3. Based on incentive considerations, they recommend that Ofwat should not make any adjustments for embedded debt now or in the future.

Table A2.3: Europe Economics options for embedded debt

Option	Proposal	Incentives	Risk
1	Making full allowance for embedded debt on a company by company basis.	Little incentive for companies to raise finance efficiently.	Impact of poor financing decisions is on consumers.
2	Applying an embedded debt adjustment based on average embedded debt costs across the industry.	Improved incentives as adjustment is based on industry wide financing decisions.	Impact of systematic or industry-wide risks such as interest rates or regulatory risk on consumers.
3	Making no allowance for embedded debt.	Strongest incentives.	Companies bear full cost of financing decision. Higher industry asset beta.

Europe Economics reject option one in Table A2.3 as it provides dull incentives for companies to finance themselves efficiently, with the impact of these decisions resting on consumers. They reject option two given the allocation of systematic and industry-wide risks with consumers. Consequently given the potential to dull financing incentives and the unattractiveness of transferring risks to consumers they recommend that Ofwat should not consider making any embedded debt adjustments.

This is a relatively strong position on embedded debt adjustments and one which Ofwat chose to ignore for PR09 – discussed further below. While it provides a good framework for considering incentives and risks, it is somewhat removed from the reasons why we might want to consider having embedded debt adjustments. When financing costs are rising, not making adjustments means that companies can make a significant margin on their existing debt at the expense of consumers, given the need to set a higher WACC to incentivise new investment. When financing costs are falling, not making adjustments can lead to financeability problems. Embedded debt adjustments closer to option two may be desirable once these impacts are considered alongside financing incentives and risk allocation.

It may be worth considering a blended approach to setting the WACC where historical and current financing costs are given weighting in cost of debt determinations, weighted to take account of industry-wide financing and re-financing requirements. This approach lies between options two and three and may provide a more balanced outcome.

Ofwat did not follow Europe Economics' advice regarding embedded debt adjustments (see Box A6.3). In their draft determinations for PR09, they refer to two separate rates which input into a blended WACC, designed to take account of both new investment and embedded debt. Ofwat has assumed 3.4 percent as an embedded debt allowance. This is relative to an allowed cost of debt of 4.3 percent at PR04 (from the range 3.3 percent to 4.4 percent). Choosing a figure closer to the lower end of the range might have been in response to:

- greater certainty around inflation; and/or

- removal of headroom which should be associated with the uncertainty about forward looking debt rather than the certainty of embedded debt.

A2.2.4 Competition Commission

One of the water-only companies appealed the 2009 regulatory decision, the treatment of financial issues being one of the key concerns. The Competition Commission (CC) published its decision, Bristol Water – A reference under section 12(3)(a) of the Water Industry Act 1991, in August 2010.

The role of the CC is to review the positions of the participants and then take a view as to what the correct answer is. A determination made by the CC is binding on Ofwat.

In its consideration of the cost of debt the CC reviewed:

- general market evidence;
- utility bond evidence; and
- company specific issues such as likely rating and actual cost of existing debt.

While the specifics of the considerations were a little different to those of Ofwat, the final decision was not that different. A forward looking real cost of debt of 4% (for nominal issues, a lower value was estimated for index-linked values but the likelihood of the company being access this element of the debt market was viewed as low for the foreseeable future). This was based on an implicit debt premium of between 200 and 300 basis points (given the risk free rate was estimated at between 1% and 2%).

Actual existing debt costs of the company were estimated at about 3.53% with some future uncertainty owing to the floating rate debt issued by the company. Overall the CC determined that existing debt should be allowed 3.8% and then weighted the forward and backward looking debt 50:50. This gave an overall cost of debt of 3.9%.

A2.3 ORR

A final example of the way in which a regulator has tried to address the difference between the cost of debt for private and government owned companies is to include an explicit charge for the effective guarantee being provided by the Department for Transport for debt issued by a government owned company. This approach has been applied to Network Rail since although the company is not a government owned company it is one limited by guarantee and has a full faith and credit guarantee (called the Financial Indemnity Mechanism or FIM).

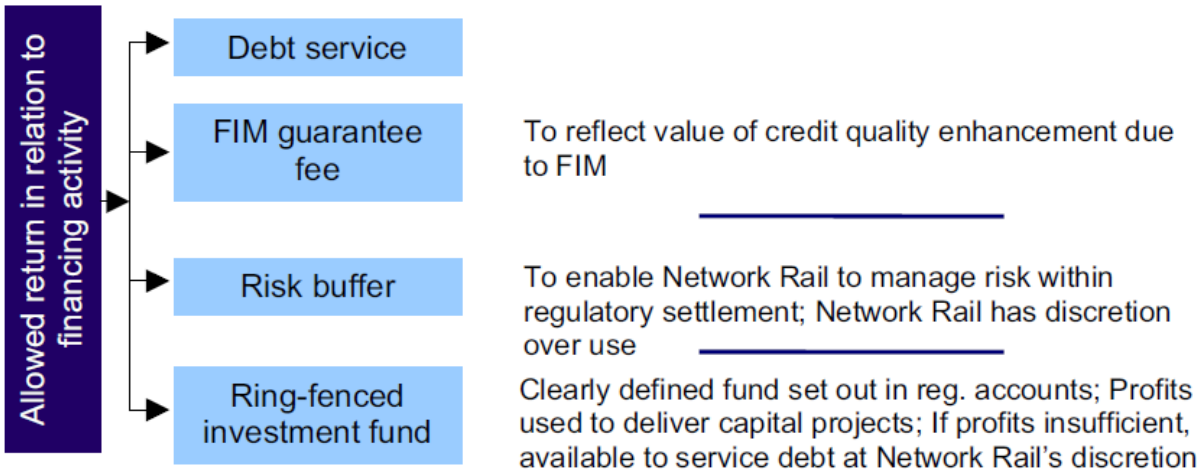
While the FIM had been in place for some time, it was in PR08 (the 2008 determination) that the rail regulator introduced the explicit FIM payment as part of the risk adjusted cost of capital allowance. The various uses of the allowed cost of capital are shown in figure A2.15.

A FIM fee of 80 basis points was established at the determination, no real explanation of the way this was determined was provided, although the following text was included in the determination:

14.37 The fee payable to DfT for the provision of the FIM will be set at 80 basis points (that is, 0.8%) on the outstanding FIM-backed debt. We believe that this fee level broadly reflects the ***long-run value of the credit enhancement*** that Network Rail benefits from as a result of the FIM. (CEPA emphasis added)

In the original CEPA paper that supported the move to including a FIM fee the calculation was simply based on taking the difference between the cost of debt for a private company and the risk-free rate, i.e. the whole debt premium was effectively allocated as the FIM.[23] The last estimate of the debt premium provided by CEPA was 90 basis points, suggesting that the rail regulator may have allowed a small premium for the company over the risk-free rate.[24]

Figure A2.15: Uses of the allowed return for Network Rail



Source: PR08 Final Determination, Chapter 14.

A2.4 NIAUR

NIW has been undergoing a period of reform over the past five years with a move towards a more commercial organisation and the use of public-private partnerships (PPPs) to deliver significant elements of the investment programme. While a gradual shift to direct payment by households has been delayed (about 20% of revenue comes from industrial and commercial users who pay directly with the remainder of revenue coming from government who collects some of the water charge through the local government rates) responsibility for setting the price levels has been shifted to the Utility Regulator.[25] The first price control was determined for 2010 (known as PC10) which was a shorter control than normal – three years.

[23] *The Role of Incentives in the GB rail industry*, CEPA, 2006. It should be noted that this paper also talked about applying the FIM to equity, but the rail regulator chose a different approach inasmuch as establishing the ring-fenced fund etc, as per figure 6.1.

[24] *Risk adjusted cost of capital for Network Rail: Update*, CEPA, 2008.

[25] Now a multi-sector regulator responsible for water, electricity and gas regulation in Northern Ireland.

Four possible approaches to setting the allowed rate of return were considered for PC10, using:[26]

- the allowed rate of return determined by Ofwat at PR09 (a "private" allowed rate of return);
- long-term average real borrowing rates;
- the discount rate suggested by the Treasury's Green Book (rules for appraisal and evaluation of public sector projects, using a "government" cost of capital); or
- a hybrid approach.

NIAUR, the regulator, decided that a hybrid approach was most appropriate, one that reflected:

- Ofwat's determination of the appropriate rate of return for private equity investors (7.1%); and
- the actual cost of debt for the company (2.88%).

A2.5 Other examples

Reforms in ScottishWater have been underway for over a decade, with some significant institutional changes recently implemented to facilitate the introduction of greater competition. However, as with Northern Ireland, privatisation of existing operations has not been an element of this reform, although significant use of private finance through PPPs, joint-ventures etc has taken place.

Several determinations have taken place in Scotland, the most recent being completed in 2009 and applying for the period 2010-2015. While the average allowed rate of return, 2.8% real, appears low this is deemed to be the equivalent of a 4.2% real post-tax return if differences in depreciation allowances between Scotland and England & Wales are taken into account. The 2.8% incorporates a real 3.5% cost of debt. The rate is also deemed to be sufficient to allow an investment grade credit-rating for the company.[27]

The approach adopted in Scotland tackles both the embedded debt and government ownership points through an institutional/governance framework rather than a direct reduction in the allowed return. Any difference between the actual cost of debt and that allowed is credited to the Scottish Water gilts reserve account. This is available to help smooth cost effects as well as provide a buffer if the company is forced to borrow commercially. The gilts reserve account is also a key part of the management incentive plan since it is viewed as a transparent measure of the success of the company in meeting its incentive targets.

[26] This is explained in Chapter 7 of NIAUR's February 2010 publication: *Water and Sewerage Service Price Control 2010-13 Final Determination Main Report.* Annex I provides further details, available from a separate document.

[27] See the 2009 *Draft Determination* and *Final Determination* documents as well as supporting information in *Staff Note 2* and *Staff Note 3*, all available from the WICs website.

ANNEX 3: ECONOMETRIC MODELS

So far we have considered approaches that broadly make use of observed prevailing yields in the bond market. A slightly more esoteric approach would be make use econometric models that analyse historic data to establish which financial or economic variables have a causal relationship with either debt costs directly or indirectly through credit ratings. Econometric models then test the validity of any hypothesis and a relationship can be said to exist or not with the strength and accuracy of the model determined. This allows observers to predict the likely debt premium a company will face for given a set of macro and firm specific factors.

A survey of relevant literature suggests there are four groups of factors which affect the debt costs:

- treasury interest rates;
- firm-level factors;
- macroeconomic factors;
- and other factors.

These are considered in turn below. It should be noted that much of the academic literature in this area is based on US evidence but the lessons are universal. Further, we have not undertaken an exhaustive literature survey but rather provide some key pieces of evidence which illustrate the applicability of this approach. There are important lessons that can be learned from this approach but whether a regulator would base its decisions solely on this sort of approach is far from clear (although the fair market value curves used by the AER are a form of econometric approach).

Treasury Interest Rates

The cost of debt is equal to the risk-free rate plus the debt premium, where Treasury interest rates are used as a proxy for the risk-free rate. However, several authors have proposed that Treasury interest rates *also* have an impact on the debt premium. There is significant support for a negative relationship between Treasury interest rates and the debt premium:

- Longstaff and Schwartz (1995) find that credit spreads (i.e. debt premia) are strongly negatively correlated to the level of interest (on 30-year Treasury bonds). The debt premia change by 5% to 82% (range) of the change in the interest rate (depending on the bond category), and econometric tests show that these results are statistically significant result for almost all bond categories. Furthermore, changes in interest rates account for the *majority* of the variation in credit spreads for most of the bonds in the sample (i.e. more than changes in the value of the firms' assets, which is a measure of default risk).
- Duffee (1998) supports this negative correlation, using 3-month Treasury rates. The change in the debt premia are smaller, with range of 6% to 36% (depending on the bond category).

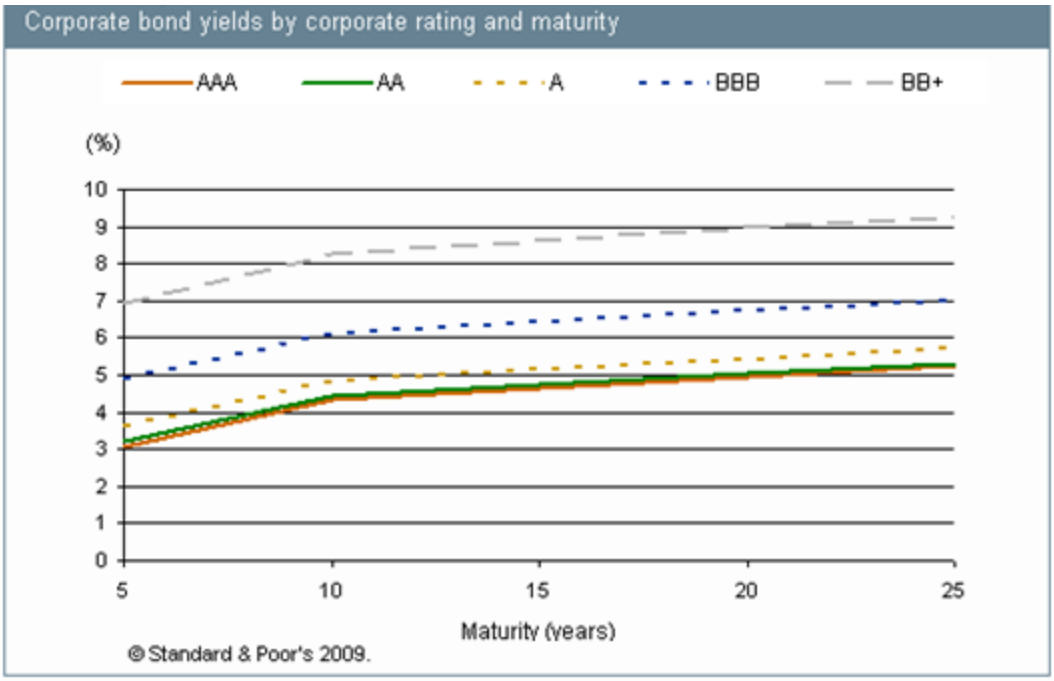
In econometric terms, the relationship is found to be significant for the majority of bond categories, although not in all cases (particularly for AAA bonds).[28]

- Madan and Unal (2000) found that default free interest rates are one of two main factors which drive credit spreads (the other being cash assets), observing a negative relationship. However, they do not provide specific econometric tests to support this. Furthermore, they note that this negative correlation diminishes (and may even reverse to a positive relationship) if the firm has a greater proportion of interest-sensitive assets.

Firm-level factors

Standard and Poor's state that there is a strong negative relationship between ratings and the cost of debt which historically holds up well. The diagram below shows a snapshot (from September 2009) of the difference in the yields of bonds with different ratings. (Interestingly, this diagram above also highlights the positive relationship between the bond maturity and the yield.)

Figure A3.1: Corporate bond yields by rating and maturity



Given that the debt premium is closely related to credit ratings, variations in the debt premium can be understood by considering the factors that affect credit ratings.

A slight variation to considering the level of gearing is to analyse the level of cash assets held by a firm. In an academic study, Madan and Unal (2000) modelled the impact of a firm's level of cash assets on the debt premium and they observed a negative relationship, which supports the figures

[28] Duffee provides an untested explanation for this negative correlation, which is via the corporate bond market. When bond yields (both Treasury and corporate) fall, firms respond by issuing more bonds, but the Treasury does not do likewise. The relative increase in the supply of corporate bonds lowers the price of corporate debt relative to Treasury debt, and hence widens the yield spread (i.e. the debt premium).

above. However, although they state that their model is supported by empirical observations, they do not provide any specific econometric tests to support this.

Macroeconomic factors

Duffee also explored the impact of the business cycle on the debt premium, and found a negative relationship: His results indicate that yield spreads of all maturities and credit ratings fall as economic growth increases. Duffee's econometric regressions imply that a decrease in yield spreads of 50bp corresponds to an increase in GDP economic growth of 1.07 percentage points. However, Duffee also acknowledged that some of his empirical analysis did not fit with the stylised facts of the business cycle, and so the evidence for this negative relationship should be treated with caution.

Other factors

Duffie and Singleton's (1997) econometric analysis found that both liquidity and credit were important factors in causing debt premium variations: Liquidity has a positive impact on the debt premium; whereas credit risk has a significant negative impact on the debt premium (a widening of the credit spread leads to a narrowing between the swap zero and Treasury zero yields).

Over a two-year horizon, these factors explain about 20% (each) of the variation in debt premium for 10 year bonds, but interestingly, the response of the debt premium follows different time paths: Liquidity effects are more immediate, but are short-lived; Responses to credit shocks are weak initially, but then have a growing impact over a horizon of several months. However, after accounting for liquidity and credit shocks (above), a substantial proportion of changes in the debt premium over a two-year horizon (35-48%) are unexplained within the model. This suggests that either Duffie and Singleton were not testing the correct factors, or that the debt premium has a significant random component.

A3.1 Bloomberg Fair Value Curves

The Bloomberg Fair Value (BFV) model used by the AER is a form econometric described above which extrapolates the data points to establish a time consistent curve through generating an objective (or fair) price for a particular bond. The model operates by collecting a group of well-priced bonds with similar characteristics (i.e. currency, market type, industry, and credit rating), and then calculates what the price of a bond *should be*, as opposed to what it actually is. The model then generates a yield curve, based on bonds with different maturity dates, which can be used as a proxy for the cost of debt. Finally, subtracting the risk-free rate from the cost of debt provides the debt premium.

The AER calculates allowed revenues based on "10 year Australian corporate bonds with a credit rating of BBB+": 10 year debt is adopted in order that the benchmark efficient energy network business will not be under-compensated on the cost of debt (and if anything, is expected to be over-compensated). BFV modelling only includes bonds with maturities up to 7 years, and so AER needs

to take the BFV curve and then extrapolate it to a 10-year maturity. This extrapolation can be imprecise and is generally seen as a disadvantage of the BFV approach.[29]

The now defunct CBASpectrum also calculated Fair Value Curves, using a similar econometric approach to Bloomberg. AER's cost of debt calculation methodology involves testing the accuracy of fair value curves to identify the most accurate curve.

A3.2 Alternative Econometric Approaches

The Economic Regulation Authority for Western Australia (ERAWA) has identified further disadvantages with the BFV modelling approach:

- Lack of transparency: Bloomberg's method is confidential, and is impossible to verify. In addition, most bonds are "traded over the counter" so that "High quality executable prices are generally unavailable" (Michael Lee, Bloomberg expert, 2007);
- Ongoing debate with regard to Bloomberg's accuracy:
    - "… Bloomberg's curves are not a reliable indicator of the true value…" (DNSPs/CEG/PwC in August 2010 for the Victorian AMI final determination);
    - "… the most appropriate methodology for setting the DRP (Debt Risk Premium) would be to adopt the Bloomberg fair value estimates…" (DNSPs/CEG/PwC in October 2010 for the Victorian DNSPs final decision);

In light of Bloomberg's disadvantages, the ERAWA has decided to estimate the debt risk premium themselves, using an observed bond-yield approach. They identify a slightly different sample of bonds to calculate the debt premium, by applying a minimum term to maturity of two years, and by removing Bloomberg's maximum maturity term (of seven years). ERAWA have retrospectively compared its own estimates to the debt premium figure which Bloomberg would have provided. Under this comparison, Bloomberg's figures for the debt premium are higher than ERAWA's estimates - the difference is in the range of 13 bps to 134 bps, depending on the dates analysed.

In Australia and New Zealand, this bond-yield approach has been recently adopted by several regulators, including:

- ERAWA (above): Final Decision for WAGN and Draft Decision for DBNGP in 2011.
- Independent Pricing and Regulatory Tribunal of NSW (IPART): Final Report, Feb 2011: Review of prices for the Water Administration Ministerial Corporation.
- New Zealand Commerce Commission (NZCC): Final Determination, Mar 2011: WACC for regulated services, including Electricity Distribution and Gas Pipeline Services.

[29] AER has acknowledged this limitation and indicated that it is investigating a more satisfactory methodology.

A3.3 Academic literature

There are a number of papers which have sought to develop and test this theory, and these are discussed below. These sources propose that a number of factors affect the debt premium (the correlation is shown in brackets): Interest rates (-); Liquidity (+); Credit Risk (-); Treasury term structure (-); Economic growth (-); and Value of Cash Assets (-).

Merton (1973)

Merton observed that the value of a particular issue of corporate debt depends on three factors: The risk-free rate; the form of bond issue and the firm's risk of default. He sought to test the impact of the latter two factors (i.e. the debt premium) by developing a theoretical model. Although his conclusions were not tested empirically via econometric tests, it warrants a mention due to its influence on future work in this area.

Merton's theory states that, for a given maturity, the risk premium is a function of only two variables: (1) the variance (or volatility) of the firm's operations, and (2) the ratio of the present value (at the riskless rate) of the debt to the current value of the firm. He concludes that "required inputs, which are on the whole observable, can be used to price almost any... financial instrument."

Longstaff and Schwartz (1995)

Longstaff and Schwartz develop a simple model for valuing risky corporate debt that incorporates both default and interest rate risk. Their model is more sophisticated than Merton's: (1) Default can occur before assets are fully exhausted, thus increasing the default premium to more realistic levels; (2) Interest rate risk exists, as opposed to fixing the interest rate; and (3) Assets are not necessarily allocated according to strict absolute priority rules if the firm defaults.

Longstaff and Schwartz use Moody's corporate bond yield averages and the corresponding yields for 10-year and 30-year Treasury bonds to test the implications of the model. They find that credit spreads (i.e. debt premia) are strongly negatively correlated to the level of interest. The change in the debt premia are in the range of 5% to 82% of the change in the interest rate (depending on the bond category) with econometric tests showing that these results are statistically significant result for 10 out of 11 bond categories.

Furthermore, changes in interest rates account for the *majority* of the variation in credit spreads for most of the bonds in the sample - in particular, they account for more of the variation than changes in the value of the firms' assets. (This highlights the importance of recognising interest rate risk, in addition to default risk, when valuing risky debt securities.)

Duffie and Singleton (1997)

Duffie and Singleton undertook an econometric analysis of the debt premium for zero-coupon bonds, and found that both liquidity and credit were important factors in causing debt premium variations. However, their results show that the response of the debt premium to changes in these factors follow different time paths: Liquidity effects are more immediate, but are short-lived;

Responses to credit shocks are weak initially, but then have a growing impact over a horizon of several months. The impacts of liquidity and credit are discussed in detail below:

- Liquidity: Duffie and Singleton model the "specialness" of 'on-the-run' 10 year Treasury notes as a proxy for liquidity. They find that a change in the Treasury note has a positive impact on the debt premium - its greatest impact is in the first few weeks, and over a 2-year horizon it explains about 20% of the variation in debt premium for 10 year bonds. However, because it is only able to explain roughly 20% of variation in the debt premium (swap-Treasury zero spreads), Duffie and Singleton conclude that liquidity is not the primary determinant of changes.
- Credit: Duffie and Singleton model the spreads between AAA and BAA commercial paper as a proxy for credit spread (i.e. the market's perception of credit risk). They find that credit risk has a significant negative impact on the debt premium: A widening of the credit spread leads to a narrowing between the swap zero and Treasury zero yields. However, the time horizon for variations in credit spreads in different to that of liquidity shocks. The effect of credit on the debt premium (zero spreads) is weak initially, but increases over time - after 2 years the change in credit risk explains approximately 20% of the change in the debt premium (zero spreads).
- Other: After accounting for liquidity and credit shocks (both above), as well as a proxy for hedging costs, a substantial proportion of changes in the debt premium over a 2-year horizon (35-48%) are unexplained within the model.[30] This percentage would rise to roughly 75% if the time horizon was shortened to 8 weeks.

Duffie and Singleton also conduct a series of alternative statistical tests (F-tests) to assess whether the histories of different variables (i.e. lagged variables) are able to explain changes in the debt premium. The results show that the history of the liquidity variable is statistically significant under a range of sensitivities. In addition, the history of the debt premium is also significant - this implies that the debt premium follows its own trend, to some extent. However, the credit risk proxy is found to have fairly little explanatory power (i.e. it is weakly correlated with the debt premium).

Duffee (1998)

Duffee empirically examined the relationship between the Treasury term structure and the debt premium (spreads of investment grade corporate bond yields over Treasuries), using individual investment-grade bonds included in Lehman Brothers' Bond Indexes from January to March 1995.

Overall he found an inverse relationship between the Treasury term structure and the debt premium. In terms of magnitude, his estimates imply that for a 100 basis point decrease in the three month Treasury yield, yield spreads rise by between 6 (for AAA) and 36 (for BAA) basis points. The

[30] This is calculated by including a lagged version of the debt premium. The coefficient on this variable indicates the proportion of the change in the debt premium which is explained by previous changes in the debt premium (i.e. the extent to which the debt premium follows its own trend).

strength (or "statistical significance") of this relationship depends on the initial credit quality of the bond; it is stronger for BAA-rated bonds (i.e. the relationship is always statistically significant) and weaker for AAA-rated bonds (i.e. it is statistically significant for shorter maturity bonds, but not for longer maturity bonds).

Duffee also explored the impact of the business cycle in generating this pattern, On balance, the results indicate that yield spreads of all maturities and credit ratings fall as economic growth increases. The sum of coefficients for all of Duffee's regressions is 2.13, implying that an decrease in yield spreads of 50 basis points corresponds to an increase in the growth rate of GDP of 1.07 percentage points.

However, Duffee also noted that the inverse relationship between the Treasury term structure and the debt premium (described above) may be inconsistent with the stylised facts of the business cycle. In reality, when the slope of the yield curve steepens, the economy is contracting, so default probabilities should be rising - this would imply a positive relationship, whereas Duffee found an inverse (negative) relationship, as described above.

Given this inconsistency, Duffee proposed an alternative theory to explain his empirics - namely, changing supply and demand for bonds by bond traders. When bond yields (both Treasury and corporate) fall, firms respond by issuing more bonds, but the Treasury does not do likewise. The relative increase in the supply of corporate bonds lowers the price of corporate debt relative to Treasury debt, and hence widens the yield spread (i.e. the debt premium). However, Duffee does not test this possible theory.

Duffee suggests a further possibility by citing Grinblatt (1995), who argues that yield spreads on short-term corporate instruments are more likely driven by the liquidity of Treasury instruments than the risk of default. It is not implausible to believe that the value of liquidity varies with the Treasury term structure. Again though, Duffee does not test this theory.

Madan and Unal (2000)

Madan and Unal built upon Duffie & Singleton's model by developing a refined hazard-rate model to price risky debt. A key feature of this model is the potential for assets to be interest sensitive, as opposed to Longstaff and Schwartz's model where assets assume a fixed interest rate. As a result, the inverse relationship between interest rates and the debt premium - as proposed by Longstaff and Schwartz (1995), and as calculated empirically by Duffee (1998) - may not necessarily hold.

Madan and Unal found that - for a given maturity - the two factor risks driving credit spreads are the value of cash assets and the level of (stochastic) default free interest rates. They observe an inverse relationship between cash assets and credit spreads, and also between interest rates and credit spreads. However, for the latter, they note that this effect is diminished (and may even be reversed to a positive relationship) if the firm has more interest-sensitive assets.

Madan and Udan state that the credit spreads generated by their model are consistent with empirical observations, and state that "by calibrating the model to data on credit spreads... we observe that a

wide variety of realistic credit spread shapes can be generated by the model". However, they do not provide any specific econometric tests to support this.

References

Duffee (1998), Treasury yields and corporate bond yield spreads: An empirical analysis

Duffie and Singleton (1997), An Econometric Model of the Term Structure of Interest-Rate Swap Yields

Longstaff and Schwartz (1995), A Simple Approach to Valuing Risky Fixed and Floating Rate Debt

Madan and Unal (2000), A Two-Factor Hazard-Rate Model for Pricing Risky Debt and the Term Structure of Credit Spreads

Merton (1973), On the Pricing of Corporate Debt: The Risk Structure of Interest Rates

ANNEX 4: DEFINING THE GOVERNMENT OWNED COMPANY RULE

For government owned companies the rules to implement the preferred approach would be:

1) The average yield on five year maturity borrowing for the appropriate State Treasury is determined (x%) for the previous calendar year.

2) The average outstanding debt for the next year is forecast (RAB_t^d).

3) The forecast level of interest for next year is calculated by x% * RAB_t^d.

4) To this is added any difference between the forecast level of interest for the current year and the actual interest paid (C – a correction factor). Note: two elements may drive cause this differential: (i) a difference in the yield on five year maturity debt in the year from the calendar year average used to set prices; and (ii) actual debt funding differs from the forecast level of debt in the RAB; and

5) Companies include in their determination of charges for the next year a Return on Debt that includes an interest allowance and C

Note that this goes beyond what is in Section 6 of the report. Steps 4 and 5 need to be developed and we have outlined one possible way, but others also exist.

Algebraically:

$$\widetilde{RoD}_t = \tilde{x}_t \times \widetilde{RAB}_t^D + C_t$$

Where: *RoD* is the return on debt

x is the average yield on five year maturity State bonds

RAB^D is the level of debt funding within the RAB

C is the correction factor

~ denotes a forecast value

And:

$$\widetilde{RoD}_t = \tilde{x}_t \times \widetilde{RAB}_t^D + \left[RoD_{t-1} - \widetilde{RoD}_{t-1}\right]$$

And

$$\widetilde{RoD}_t = \tilde{x}_t \times \widetilde{RAB}_t^D + \left[(x_{t-1} \times RAB_{t-1}^D) - \left(\tilde{x}_{t-1} \times \widetilde{RAB}_{t-1}^D\right)\right]$$

Consequently a divergence can occur if:

$$x_{t-1} \neq \tilde{x}_{t-1}$$

And/or:

$$RAB_{t-1}^D \neq \widetilde{RAB}_{t-1}^D$$