IPART
New South Wales

Independent Pricing and Regulatory Tribunal

Estimating the debt margin for the weighted average cost of capital

Analysis and Policy Development — Discussion Paper
May 2009

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Invitation for submissions

IPART invites written comment on this document and encourages all interested parties to provide submissions addressing the matters discussed.

Submissions are due by 19 June 2009.

We would prefer to receive them by email <WACC@ipart.nsw.gov.au>.

You can also send comments by fax to (02) 9290 2061, or by mail to:

APD – WACC/debt margin
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Our normal practice is to make submissions publicly available on our website <www.ipart.nsw.gov.au>. If you wish to view copies of submissions but do not have access to the website, you can make alternative arrangements by telephoning one of the staff members listed on the previous page.

We may choose not to publish a submission—for example, if it contains confidential or commercially sensitive information. If your submission contains information that you do not wish to be publicly disclosed, please indicate this clearly at the time of making the submission. IPART will then make every effort to protect that information, but it could be subject to appeal under freedom of information legislation.

If you would like further information on making a submission, IPART's submission policy is available on our website.

Contents

1 Introduction

To calculate a regulated business' costs for the purpose of setting prices, the Independent Pricing and Regulatory Tribunal of NSW (IPART) generally needs to estimate the real weighted average cost of capital (WACC), including debt and equity, for that business. The cost of debt is usually the larger component of the WACC. In principle, it should reflect a commercial cost of debt for a similar, prudent and well-managed business, regardless of whether it is privately, publicly or government owned. To calculate the cost of debt, IPART needs to estimate an appropriate debt margin for the regulated business.

IPART is reviewing the possible approaches for estimating this debt margin, to ensure the approach it uses for future determinations is transparent and robust and results in an unbiased estimate of the cost of debt. The purpose of this paper is to outline IPART's current approach and the concerns associated with it, propose several alternative approaches, and seek comments from stakeholders for IPART to consider prior to deciding on its preferred approach.

1.1 What is the debt margin?

When businesses take on debt to fund capital expenditure, it is often in the form of bonds. These bonds can then be traded in a secondary market. Therefore, the cost of debt depends on the price of these bonds.

The price of a bond comprises the nominal risk-free rate plus a premium that reflects the risk associated with the business taking on the debt (company-specific risk premium).[1] In its simplest form, this premium – or debt margin – is made up of:

- a risk premium related to the probability of the business defaulting on the bond
- a risk premium related to the remaining life of the bond (maturity-specific risk premium) that reflects the increasing probability of default over time, and
- a liquidity premium that reflects the demand and supply the bond in the market.

Thus, the debt margin represents the difference between the cost of debt and the risk-free rate.

1 This premium may also be affected by the type of bond issued, for example, a bond with a call or put option may require an additional premium.

The businesses regulated by IPART generally borrow through T-Corp, which issues bonds on behalf of the state of NSW. T-Corp then lends the money to the business at the rate the state of NSW pays plus a government guarantee fee. This means it is not difficult to approximate the actual cost of debt incurred by the regulated business. However, in line with the competitive neutrality principle[2], the framework under which a government-owned business operates should mirror that of a commercial business. Therefore, when making decisions on the cost of debt, IPART has regard to a commercial cost of debt and not the actual cost.

1.2 What approach does IPART currently use to estimate the debt margin?

IPART currently estimates the debt margin for a regulated business based on the yield on a 'benchmark bond'. IPART establishes this benchmark bond based on a portfolio of corporate bonds that:

- reflect a 10-year maturity, to recognise the relatively long-term nature of the assets being regulated, and
- have a BBB+ to BBB rating, which is the minimum rating for investment grade debt.[3]

Using data from Bloomberg, IPART calculates the yield on the benchmark bond based on the average yield on this portfolio of bonds over the 20 days prior to its determination. It then subtracts the 10-year Commonwealth Government Bond rate (which it uses as a proxy for the risk-free rate) from this average yield to derive the debt margin.

1.3 Why is IPART reviewing the approach for estimating the debt margin?

IPART has recently become concerned about the approach it uses to estimate the debt margin. In particular, it is concerned that the way it establishes the benchmark bond may not result in a reliable, appropriate benchmark for regulated businesses. The ongoing global financial crisis has heightened these concerns. For example, since the onset of the crisis, a company's industry sector appears to be more important than its credit rating in determining its debt margin.

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2 This benchmark ahs also been adopted by COAG, see for example the Competition Principles Agreement – 11 April 1995 (as amended to 13 April 2007), available on the COAG website: http://www.coag.gov.au/coag_meeting_outcomes/2007-04-13/docs/competition_principles_agreement_amended_2007.pdf

3 A summary table of S&P ratings can be found in Appendix B.

Given these concerns, IPART is investigating alternative approaches for estimating the debt margin. In particular, IPART is examining whether an alternative benchmark bond portfolio would better reflect the cost of debt for regulated businesses.

In addition, IPART has noted that there is a widening gap between its target term to maturity for the nominal risk-free rate (10 years) and the term to maturity of the benchmark bonds it uses to estimate debt margins. IPART considers that these terms should match, and has engaged Erik Schloegl[4] to assist it in developing an adjustment mechanism for this.

Further, the Commonwealth Bank of Australia has recently informed IPART that it will close the CBASpectrum accounts of several external parties including IPART. This means that IPART must switch to an alternative data service.

1.4 What are IPART's criteria for an approach for estimating the debt margin?

IPART considers that the cost of debt it uses in making regulatory determinations should reflect the commercial cost of debt for a similar, well-managed, privately owned business. This will lead to efficient investments and ensure best possible prices which fully reflect the efficient cost of providing the service.

To this end, IPART aims to identify a methodology for estimating the debt margin for regulated businesses that meets the following criteria:

- uses reference bond rates based on bonds that should result in a debt margin that reflects utility-specific risks
- allows the debt margin to be adjusted to reflect a 10-year maturity for the bonds
- is robust and transparent, and can easily be replicated by stakeholders.

IPART is seeking submissions from stakeholders on what approach for estimating the debt margin best meets these criteria. The issues on which it particularly seeks comment are listed below. These submissions are due on 19 July 2009. (Details on how to make a submission are provided on page iii at the front of this paper.)

IPART will carefully consider all submissions it receives before making a final decision on the approach for estimating the debt margin, and releasing its report on this decision on 10 July 2009.

4 Erik Schloegl is a quantitative finance consultant. He consulted for financial institutions and software developers in Europe, Australia and in the US.

Table 1.1 Review timetable

Date	Event
19 June 2009	Public submissions due
10 July 2009	Release of final decision

1.5 Issues on which IPART particularly seeks comment

IPART seeks comments on the following

1 Should the benchmark for determining the debt margin be based on a target credit rating (ie, BBB+ or BBB) or on the issuer, ie, utilities?

2 Does the BBB fair yield curve continue to be an appropriate benchmark for regulatory purposes given that other regulators use a higher credit rating?

3 Should bond yields be adjusted to account for the maturity mismatch between the target of 10-years and actual term-to-maturities?

4 If credit wrapped bonds are used, should an allowance for credit wrapping costs be included in the estimate of efficient operating expenditure?

5 Given the restriction on access to CBASpectrum data, is Bloomberg the best available data provider?

6 Should volatility in the corporate bond market be addressed by using a 20-day average of quotes (consistent with the current approach) or should a longer or shorter period be used?

7 Would a change in the target credit rating of the benchmark bonds portfolio impact on IPART's financial ratios analysis and credit rating of the regulated business?

8 How should the benchmark composition of the bonds be adjusted, and should bonds that may be perceived as mispriced on a temporary or permanent basis be excluded?

9 Do you have comments on Erik Schloegl's proposed adjustment methodology set out in the accompanying advice to IPART?

1.6 Structure of this paper

To assist stakeholders in making submission, the following chapters explain the issues IPART will consider as part of this review in more detail:

- Chapter 2 discusses the role of the debt margin in IPART's determinations and explains IPART's current approach to estimating it
- Chapter 3 discusses the problems associated with the current approach for estimating the debt margin, what specific aspects of the approach IPART will review and how the debt margin is estimated in other jurisdictions
- Chapters 4 and 5 outline the alternative approaches for estimating the debt margin, and assesses these options and their potential impacts.

2 Framework for establishing the debt margin

This chapter explains the debt margin and the cost of debt that are used under IPART's approach to regulation. It provides the context for the subsequent assessment of alternative approaches to estimating the debt margin.

2.1 The importance of the debt margin in IPART's determinations

In determining the allowed revenues for the regulated businesses, the regulator has to allow for a return on equity and the cost of debt to the utilities for financing its assets and operations. The cost of debt is generally the larger component of the weighted average cost of capital[5]. IPART determines the cost of debt by adding a debt margin to the risk free rate. This is the convention followed by regulators in Australia and many other jurisdictions outside the US. However, as the debt margin is measured relative to the risk free rate it is equivalent to estimating a benchmark debt cost directly[6]. The debt margin is currently based on yields of BBB+ to BBB rated Australian bonds.

2.2 What is cost of capital?

Given the capital intensive nature of utility and transport infrastructure, the return on the businesses' regulatory asset base (RAB) is a major – and often controversial – component in determining the regulated price. The cost of capital is the level of return required by investors in order to provide capital to a firm. This return must be adequate to compensate the investor for the risk arising form the possibility of different outcomes. The relevant risks are those that the investor cannot manage by diversifying their investments. It is important that the cost of capital:

- reflects the opportunity cost of capital to ensure that prices provide a true signal to users of cost of the services provided, and
- provides a commercially sustainable return.

5 While debt generally has a lower cost than equity it is weighted more highly under the typical regulatory debt-to-equity assumptions.

6 Algebraically: D=RFR+DM, where D is the benchmark cost of debt, RFR is the risk free rate and DM is the debt margin calculated as the benchmark cost of debt minus the risk free rate.

2.3 Calculation of cost of capital

In common with many other regulators, IPART calculates the rate of return on the RAB by reference to the weighted average cost of capital (WACC). This is the expected cost of the various classes of its capital (eg, equity and debt), weighted by the proportion of each class of capital to the total capital of the firm. The cost of equity is calculated using the capital asset pricing model (CAPM).

The WACC plus CAPM approach for calculating the cost of capital for a business is widely used and accepted. It is the method adopted by most financial practitioners and remains the preferred methodology of most regulators outside the US.

The process of calculating the WACC involves applying a series of equations to determine the weighted average of returns to debt and equity in a given market at a point in time. One of these equations is the cost of debt. Currently, IPART determines the nominal cost of debt by adding a debt margin to the nominal risk free rate.

2.4 IPART's current approach to estimating the debt margin

IPART's present approach uses a current benchmark cost of debt for a prudent, well-managed utility. It does not use actual debt costs, although there are precedents for doing this (eg US). Nor does it separately estimate the cost of pre-existing debt (embedded debt), although there are also precedents for this[7]. These options, together with the option of indexing the price cap for changes in debt costs, are being debated in other regulatory regimes. IPART will continue to monitor these developments but this paper examines the basis for estimating benchmark debt costs within the existing framework.

IPART currently bases its debt margin estimates on data from CBASpectrum for a portfolio of investment grade BBB and BBB+ rated Australian corporate bonds with a maturity of up to 10 years and the fair yield curve[8]. IPART averages the yield for twenty days prior to a date close to the time of its decision.

A fair yield curve is a forecast of the yield curve which can be used to assess whether bonds are over-or under-priced, or used to price new bond issues. The 10-year maturity benchmark is used because it matches the 10-year Commonwealth bond yield that is used to calculate the nominal risk free rate in the WACC model.

7 See for example OFWAT, responses to Financing Networks Discussion Paper: http://www.ofwat.gov.uk/legacy/aptrix/ofwat/publish.nsf/Content/pr0903.html

8 The fair yield curve is a bond pricing tool, mainly used by banks to assess whether any particular bond issue is over – or under-priced.

In addition to the fair yield curve, IPART also uses a portfolio of corporate debt issues which most closely match IPART's objective to estimate a commercial cost of debt for the utilities it regulates. In the past IPART's choice of benchmark debt was based on two assessment criteria:

- the credit rating matches BBB+ to BBB
- the maturity profile matches 10-years as closely as possible.

While it has been possible to include corporate bonds that match the first criterion, ie, the credit rating. It has been difficult to find corporate debt issues with a maturity of 10 years. The securities used in the latest debt margin estimate were:

- AGL (15 September 2009)
- Coles (25 July 2012)
- GPT (22 Aug 2013)
- Santos (23 September 2015); and
- Snowy Hydro (25 February 2013).

As part of its 2008 review of CityRail fares, IPART indicated that it is considering changing the selection criteria of its benchmark bond portfolio:

> IPART considers that a re-pricing of/ credit risk may be taking place in the Australian debt market. It considers that the debt margin range generated by IPART's traditional methodology used in the draft decision[9] may currently overestimate the actual cost of debt a competitive public rail transport operator would face in current conditions. In order to cross-check the current approach, IPART constructed an alternative portfolio based on Australian utility issued debt only (excluding telecommunication)[10].[11]

The selection criterion for the new alternative bond portfolio is that a benchmark bond must be issued by a utility regardless of the credit rating and the term to maturity. In practice, utilities may be regulated or unregulated or may operate in several industries including non utility industries. IPART considers that an attempt to restrict bond issues to those of companies that only have regulated utility activities would result in too few benchmarks. While the choice of the credit rating affects the debt to equity ratio (and other financial ratios) IPART notes that some of the debt issued by Australian utilities is credit wrapped and issued under a AAA credit rating. IPART also notes that the term bonds should ideally match the term of the risk free rate benchmark. IPART recognises that Australian regulators in the past had difficulties in basing their credit spread estimates on a 10-year term to maturity basis because of the lack of long-term bonds issued in the Australian market.

9 Based on the BBB and BBB+ fair yield curves and the corporate bond issues from Santos, Snowy Hydro and Coles.

10 Including the telecommunication issues would not affect the debt margin range. IPART was not convinced that telecommunication companies are a good benchmark for the businesses it regulates.

11 IPART, *Final Report–Review of CityRail fares, 2009-2012*, 16 December 2008.

Switching to a new benchmark bond portfolio could further shorten the maximum term to maturity. Current utility issued bonds include:

- AGL (15 September 2009)
- Alinta (22 September 2010)
- CityPower (22 February 2010)
- Electranet (17 November 2009)
- GasNet Australia (20 March 2009)
- Snowy Hydro (25 February 2013)
- Snowy wrapped (25 February 2010)
- SPI electricity and gas (3 November 2011).

In estimating debt margins IPART has previously made an allowance of 12.5 basis points for transaction costs associated with the raising of debt, expressed as an increment to the debt margin.

IPART notes that these bonds were based on CBASpectrum quotes. Bloomberg may not provide quotes on all of these bonds.

3 Why is IPART reviewing its approach to estimate the debt margin?

IPART considers that there is strong merit in maintaining a consistent approach to the cost of capital across regulatory decisions as it reduces regulatory risk and its associated costs. There is a presumption that unless an alternative approach to the calculation of a WACC parameter is demonstrated to be clearly superior, the existing approach should be preferred. However, two factors, the lack of utility issued bonds with credit ratings as low as BBB+ and BBB and the general lack of BBB+ and BBB rated bonds in the Australian market, will make the continuation of the existing approach more difficult. This chapter outlines these concerns and indicates how other regulators in Australia have responded to these concerns.

3.1 Problems with the current approach

IPART has identified two potential issues with its methodology used to estimate the debt margin. These two issues are:

- the limited number and short maturity of securities used to estimate the debt margin; and
- recent trends in the debt margin generated using IPART's traditional methodology which may suggest a change in the market's assessment of relative risk of industry sectors.

IPART is concerned that its current methodology is purely driven by the target credit rating and the term to maturity and does not adequately take into account industry specific factors. While this may not have been an issue before the financial crisis, the flight to quality that is currently occurring in the Australian bond market raises concerns as to what industries should be considered in regulatory debt margin decisions. This is discussed in more detail in Section 5.1.

In principle, the debt margin would be expected to reflect the credit rating and the maturity of a security (debt margins would be expected to be lower for higher-rated securities). The relationship between term to maturity and the debt margin depends on the shape of the underlying yields curve:

- if the yield curve is normal, a longer term to maturity should lead to a higher debt margin; and
- if the yield curve is inverse, a longer term to maturity should lead to a lower debt margin.

Based on the evidence currently available to IPART, this leads it to believe that a set of securities selected on the basis of credit rating may not be the best benchmark for regulated businesses. IPART believes that there is merit in considering options that use a set of securities based on the industry of issuer of a bond.

3.2 What is IPART proposing to review?

Firstly, IPART intends to review the set of bonds used in the estimation of a commercial debt margin. IPART is of the opinion that a set of utility issued bonds may provide a commercial debt margin that more closely matches the risk profile of the businesses it regulates. The options being considered by IPART are presented in section 4.4.

Secondly, IPART also believes that the term to maturity of the bonds used in the debt margin estimate should match the term of the risk free rate. It engaged Erik Schloegl to provide advice on an appropriate methodology (Section 4.2). Presently, IPART is not proposing to review the term of the risk free rate.

Thirdly, a change in the set of securities may involve a change in the target credit rating of the securities used in establishing the benchmark debt margin. For example, in the past IPART used bonds rated BBB+ to BBB. However, utility issued debt in Australia either has a higher credit rating per se, or is issued as credit wrapped debt with a AAA rating. IPART is therefore proposing to review how it uses the financial ratio and ratings in its financial model to assess the target ratio of the probability of default. This is dealt with in section 5.1.

Lastly, the Commonwealth Bank of Australia advised IPART on 6 January 2009 that it will no longer provide access to the CBASpectrum database to non-bank customers including IPART. IPART consequently has to switch to another data provider for its debt margin estimate.

IPART proposes to use Bloomberg as:

- The Bloomberg service has been thoroughly reviewed by other regulators, regulated business and consultants (including NERA and the Allen Consulting Group).
- Other regulators, such as the AER, already use Bloomberg.

Section 4.1 of this discussion paper compares IPART's debt margin generated using CBASpectrum and Bloomberg.

3.3 What has been done in other jurisdictions?

In the recent past, Australian regulators tended to use a target credit rating of BBB+, the exceptions being the ICRC (A to BBB+) and IPART (BBB to BBB+). IPART uses the lowest credit rating of all Australian regulators (BBB to BBB+).

Table 3.1 Debt margin decisions and target credit ratings[12]

Regulator	Sector	Credit Rating
ESC (2008)	Gas	BBB+
OTTER (2007)	Electricity	BBB+
ESCOSA (2006)	Gas	BBB+
QCA (2006)	Gas	BBB+
ESC (2006)	Electricity	BBB+
QCA (2005)	Electricity	BBB+
ESCOSA (2005)	Electricity	BBB+
IPART (2005)	Gas	BBB+ to BBB
ICRC (2004)	Gas	A to BBB+

Most Australian regulators use similar methodologies to estimating the debt margin:

- The ESC adopts a benchmark assumption of a utility business with a BBB+ credit rating and financial gearing of 60 per cent debt to assets and determines the debt margin by observing yields on comparable corporate bonds.
- The QCA sets the debt margin at a point to reflect the margin applying to debt rated at BBB+ at the time of the decision.

While most Australian regulators initially used CBASpectrum as their main data source, recently regulators have given more weight to the yields provided by Bloomberg. In its final decision on SP Ausnet, the AER used an eight year Bloomberg fair yield curve for BBB+ securities plus the yield spread between 8 and 10-year Bloomberg fair yield curve for A rated securities to replicate a 10-year benchmark. This change in methodology was guided by a consultancy report from NERA which argued that CBASpectrum[13] is consistently underestimating actual yields by 25.6 bps.

As part of its 2008-2012 Gas Access Arrangements review, the ESC commissioned ACG to undertake an analysis of the yield predictions provided by CBASpectrum and Bloomberg (which employs a different econometric technique to CBASpectrum) for Australian corporate bonds, as well as yields for a number of actual corporate bonds with a term to maturity of greater than five years. For the analysis undertaken at an effective date of 20 June 2007, the main results were as follows:

- CBASpectrum indicated a fair yield on BBB+ bonds of 92bp over the 10-year Commonwealth Government security rate
- Bloomberg indicated a fair yield on BBB+ bonds of 123bp over the 10-year Commonwealth Government security rate

[12] http://www.aer.gov.au/content/item.phtml?itemId=722312&nodeId=d91f7605b58ef42b64dda8253f2d1b1c&fn=Issues%20paper%20(6%20August%202008).pdf

[13] NERA, *Estimating Debt Margin for ActewAGL*, February 2004, a Report for ActewAGL

- Bloomberg over-estimated the yields across four comparable corporate bonds with terms to maturity of 6.3 to 8.3 years (Investa Property Group, Snowy Hydro, GPT, and Santos) by 6.7bp on average
- CBASpectrum underestimated yields across the four comparable corporate bonds by 20.3bp on average.

3.4 AER review of WACC parameters for electricity transmission and distribution

On 1 May 2009, the AER released its final decision on the WACC parameters it uses in its electricity transmission and distribution network service providers. The NER require the AER to review the WACC parameters every 5 years. This is the final decision of the first of these reviews and the parameters set will apply to all determinations for the next 5 years.

In its draft decision, the AER proposed to increase the target credit rating used in the estimation of the debt margin from BBB+ to A-. The AER argued that there is sufficient evidence to increase the benchmark credit rating from BBB+ to A-. The AER based its analysis on:

- Standard & Poor's ratings process which indicates that qualitative factors in the regulated utilities ratings process result in better credit ratings than BBB[14].
- Quantitative analysis credit ratings of a sample of utility issued debt.

The AER's final statement reversed the draft decision on the benchmark credit rating. The AER notes that after considering the submissions it received on its draft decision, it is not persuaded at this time that the previously adopted credit rating of BBB+ should be departed from. The AER further notes that it believes that a BBB+ credit rating is consistent with the principle that a service provider is provided with a reasonable opportunity to recover at least efficient costs.

IPART notes that credit ratings assigned to utilities by Standard and Poor's range from:

- AA+ to B- in Australia region (Figure 5.11), and
- AA + to BBB – in the Asia Pacific region (Figure 5.12).

This is further discussed in Section 5.4.

[14] http://www.aer.gov.au/content/item.phtml?itemId=722312&nodeId=d91f7605b58ef42b64dda8253f2d1b1c&fn=Issues%20paper%20(6%20August%202008).pdf

4 Alternative approaches to estimate the debt margin

This chapter deals with some of the potential alternatives that are available to IPART to estimate the debt margin. As noted in Section 2, IPART is considering options for estimating debt margins within its current framework. The issues to be considered are:

1. Whether benchmark debt margins should be based on reference rates for a particular credit rating, utilities only, or specific credit ratings for utilities?
2. Whether the reference credit rating should remain at BBB to BBB+ or increased in line with the practice of other regulators?
3. Whether the benchmark debt margins should be adjusted to reflect a 10-year maturity?

Regardless of which methodology IPART will use, it will have to find an alternative data provider than CBASpectrum to obtain its yields on corporate bonds as the latter is not available to IPART any longer. IPART proposes to switch to Bloomberg.

4.1 Should benchmark debt margins be based on reference rates for a particular credit rating, utilities only, or utilities and the fair yield curve?

IPART has identified three options for estimating its debt margin in the future. These options are outlined below.

4.1.1 Option 1- Maintain the current set of securities and a fair value curve

The first option is to maintain the current approach and use the bonds in Table 4.1 to estimate the debt margin. This option uses the target credit rating of BBB+ to BBB to determine which bonds to include in its estimate.

Table 4.1 Traditional set of securities

Name	Bloomberg ticker[a]	Credit rating		Maturity
		S&P	Moody's	
Coles	EF0231854 Corp	BBB+	Baa1	25 July 12
Santos	EF1026097 Corp	BBB+	NA	23 Sep 15
Snowy Hydro	EF0870795 Corp	BBB+	NA	25 Feb 13
General Property Trust	EF109422 Corp	BBB	Baa2	22 Aug 13
AGL	EF6371578 Corp	BBB	NA	15 Sep 09
BBB value yield (8 years)	C3568Y Index	BBB	NA	NA

[a] These tickers identify securities on Bloomberg – similar to the ASX codes on the ASX.

Data source: Bloomberg.

The advantages and disadvantage for this option are summarised below.

Advantages

This methodology has been used in the past and therefore provides the greatest degree of regulatory certainty.

Disadvantages

The industry sectors of the bonds included in this option do not match the industry IPART regulates. This may lead to debt margins that are not consistent with commercial debt margins for utilities. There are only a limited number of bonds in this set and most the bonds mature in the near future. It is uncertain whether there will be any new issues to replace the maturing ones. The term to maturity of the bonds may be adjusted by using Erik Schloegl's proposed methodology.

4.1.2 Option 2-Use a new set of securities based on companies from the utilities sector

The second option is use a new set of bonds (Table 4.2) to estimate the debt margin. This option uses the industry sector (utilities) as the selection criterion. There could also be an argument to select utility issued bonds according to their credit rating. However at this stage, IPART believes that there are not enough utility issued bonds to allow for the imposition for an additional selection criteria based on the credit rating. For example, limiting the set of securities by using only BBB+ rated securities would result in one bond only. If the target credit rating would be all investment grade excluding AAA rated utility issued bonds, then the set of securities would be composed of three bonds only.

Table 4.2 New set of securities

Name	Bloomberg ticker[a]	Credit rating		Maturity
		S&P	Moody's	
SPI Electricty and Gas	EF672423 Corp	A-	A1	3 Nov 11
Citipower	EF874743 Corp	AAA	Baa1	28 Feb 10
Gasnet	EF538766Corp	AAA	Baa1	20 March 09
Electranet	EF233950Corp	AAA	Aa3	17 Nov 09
Alinta	EF1007840 Corp	AAA	Aa3	22 Sep 10
AGL	EF6371578Corp	BBB	NA	15 Sep 09
Snowy Hydro	EF870795 Corp	BBB+	NA	25 Feb 13
Snowy wrapped	EF870791Corp	AAA	NA	25 Feb 10

These tickers identify securities on Bloomberg – similar to the ASX codes on the ASX.

Data source: Bloomberg.

The advantages and disadvantage for this option are summarised below.

Advantages

This set of securities represents a commercial debt margin for utilities in the Australian debt market.

Disadvantages

The term to maturity of most issues is very short but it is likely that debt will be re-issued. Some of the bonds are credit wrapped – this may have to be dealt with separately – for example with an allowance for credit wrapping fees in the opex or an addition to the debt raising costs. The term to maturity of the bonds may be adjusted by using Erik Schloegl's proposed methodology. IPART also recognises that the range of companies in the utilities group is still quite diverse. Most companies in this industry group engage in non-regulated activities but IPART considers that there is little scope to narrow the set of securities further as it would diminish an already small set of comparators.

4.1.3 Option 3- Use a new set of securities based on companies from the utilities sector and the fair value curve based on a benchmark credit rating

The third option is to use a new set of securities and the BBB fair yield curve (Table 4.3). This option uses the industry sector (utilities) as the selection criterion and adds the BBB fair yield curve to the set of securities[15]. As discussed in section 4.2, there may a case for increasing the target credit rating of the fair value curve in line with the practice of other Australian regulators. In particular, the fair yield curve provides a constant input into the debt margin calculation over time. While

[15] Bloomberg provides BBB fair yield curves for maturities of up to 8 years. The maturity of the BBB fair yield curve can be extended using Erik Schloegl's proposed methodology.

individual company bonds mature, new ones are issued and credit ratings change, the fair value does not mature and it does not change its credit rating. In the extreme case where there are no bonds at all for a particular credit rating, it would still be possible to compute a fair value curve.

Table 4.3 New set of securities and BBB fair value curve

Name	Bloomberg ticker	Credit rating		Maturity
		S&P	Moody's	
SPI Electricty and Gas	EF672423 Corp	A-	A1	3 Nov 11
Citipower	EF874743 Corp	AAA	Baa1	28 Feb 10
Gasnet	EF538766Corp	AAA	Baa1	20 March 09
Electranet	EF233950Corp	AAA	Aa3	17 Nov 09
Alinta	EF1007840 Corp	AAA	Aa3	22 Sep 10
AGL	EF6371578Corp	BBB	NA	15 Sep 09
Snowy Hydro	EF870795 Corp	BBB+	NA	25 Feb 13
Snowy wrapped	EF870791Corp	AAA	NA	25 Feb 10
BBB fair value (8 years)	C3568Y Index	BBB	NA	NA

Data source: Bloomberg.

The advantages and disadvantage for this option are summarised below.

Advantages

The addition of the BBB fair yield curve ensures that the risk that utilities are disadvantaged through potentially lower yields (option 2) resulting from a change in the set of securities is minimised. The Bloomberg BBB fair value curve provides a relatively objective view of how a BBB rated bond is priced.

Disadvantages

The disadvantages are the same as in option 2. In addition, it may be argued that the fair value curve provides a biased estimate of the yield of a BBB rated business. For example in the recent past, the fair value curve yields have consistently been higher than the yields used by IPART in its debt margin decisions. This has meant that in many decisions, the fair value curve was the source of the upper bound of the debt margin range. Bloomberg also does not disclose the algorithm used in the calculation of the fair value curve. The term to maturity of the bonds may be adjusted by using Erik Schloegl's proposed methodology. This could potentially also be used to adjust the yield on the fair value curve for a longer maturity. IPART also recognises that the range of companies in the utilities group is still quite diverse. Most companies in this industry group do engage in non regulated activities but IPART considers that there is little scope to narrow the set of securities further as it would diminish an already small set of comparators.

4.2 Should the reference credit rating remain at BBB to BBB+ or be increased in line with the practice of other regulators?

A further consideration under the first and third option is whether the reference credit rating of the fair yield curve should be increased in line with the practice of other regulators. Table 3.1 showed that other Australian regulators typically use a reference credit rating of BBB+.

Bloomberg provides quotes on fair value curves[16] as shown in Table 4.4.

Table 4.4 Bloomberg fair value curves

Name	Bloomberg ticker
BFV AUD Australia Domestic AAA 5 Year	C3575Y Index
BFV AUD Australia Domestic **AAA 7 Year**	C3577Y Index
BFV AUD Australia Domestic **AAA 8 Year**	C3578Y Index
BFV AUD Australia Domestic **AAA 9 Year**	C3579Y Index
BFV AUD Australia Domestic **AAA 10 Year**	C35710Y Index
BFV AUD Australia Domestic **AAA 15 Year**	C35715Y Index
BFV AUD Australia Domestic **AAA 20 Year**	C35720Y Index
BFV AUD Australia Domestic **(AA) 5 Year**	C3585Y Index
BFV AUD Australia Domestic **(AA) 7 Year**	C3587Y Index
BFV AUD Australia Domestic **(AA) 8 Year**	C3588Y Index
BFV AUD Australia Domestic **(A) 5 Year**	C3595Y Index
BFV AUD Australia Domestic **(A) 7 Year**	C3597Y Index
BFV AUD Australia Domestic **(A) 8 Year**	C3598Y Index
BFV AUD Australia Domestic **(A) 9 Year**	C3599Y Index
BFV AUD Australia Domestic **(A) 10 Year**	C35910Y Index
BFV AUD Australia Domestic **(BBB) 5 Year**	C3565Y Index
BFV AUD Australia Domestic **(BBB) 7 Year**	C3567Y Index
BFV AUD Australia Domestic **(BBB) 8 Year**	C3568Y Index

Source: Bloomberg.

Table 4.4 indicates that Bloomberg provides fair yield curves for four credit ratings:

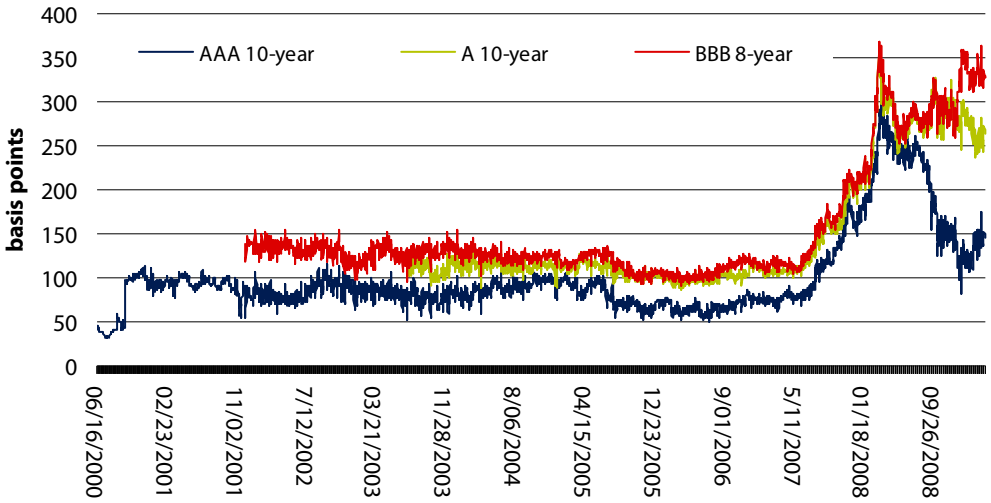
- AAA
- AA
- A, and
- BBB.

There is no Bloomberg fair value curve for an A- credit rating.

16 This is the equivalent of CBASpectrum's fair yield curve.

Figure 4.1 compares the yields on the fair value curves over the last 9 years. This figure indicates that the yields of the AAA fair value curve almost reverted to pre-financial crisis values whereas the yield on the fair value curves remained high. Pre-financial crisis, yields on the fair value curves other than AAA rated where surprisingly close.

Figure 4.1 Bloomberg fair value curves – 20-day averages



Note: Bloomberg does not report an 8-year Commonwealth Government bond index after 17 March 2008. The debt margin for all fair value curves has been computed using the 10-year Commonwealth Government bond index.

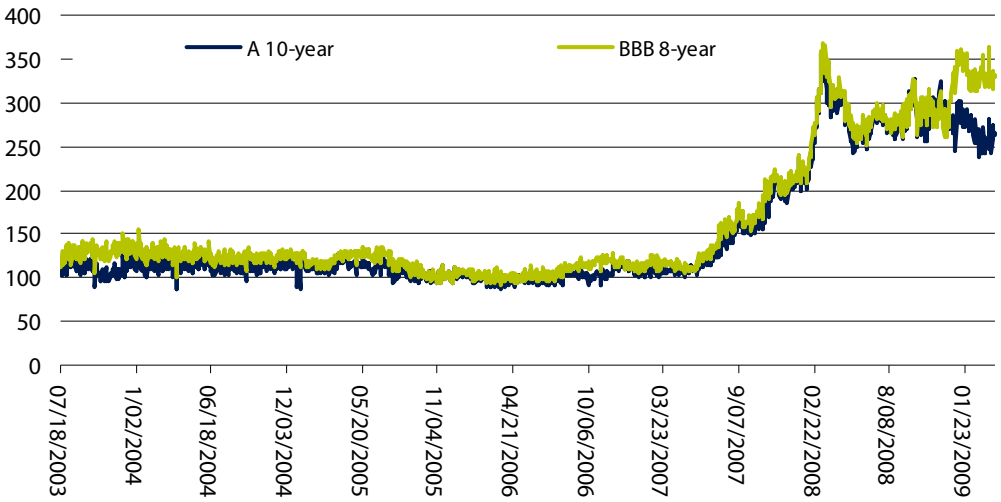
Data source: Bloomberg.

Figure 4.2 shows that in early 2009 the absolute differences between the 10-year A and the 8-year BBB fair value curves[17] was around 60 basis points. Prior to late 2008, the difference between the 10-year A and the 8-year BBB fair value curves was relatively small. This may indicate that the market is repricing risk and is becoming more discriminating between:

- credit ratings, and (or)
- the term to maturity.

17 This is the smallest possible simultaneous increase in credit rating and maturity.

Figure 4.2 Bloomberg A (10-year) and BBB (8-year) fair value curves 20-day averages to February 2009



Data source: Bloomberg.

IPART notes that in WACC decisions were the fair value curve represents either the lower or the upper bound of the debt margin – a change in the target credit rating of the fair value curve may have a substantial impact on the midpoint of the debt margin and consequently n the midpoint WACC estimate.

4.3 Should the benchmark debt margins be adjusted to reflect a 10-year maturity?

IPART and other Australian regulators face an additional difficulty in estimating the debt margin relating to the term to maturity of the benchmark bonds used. Theoretically, the term of the risk free rate and the term of the debt margin used to establish the cost of debt should be based on the same term to maturity. While it is relatively simple to construct a risk free rate for any maturity between say 1 and 10 years in the Australian market, this is not always possible for the debt margin. This is mainly due to the following reasons:

- Corporate bonds with maturities extending over 5-years are a rarity, and
- Regulators who use more than one benchmark bond will have a portfolio of different maturities, ie, it is very unlikely that all bonds are expiring on the same day.

Due to a lack in alternatives, regulators have not placed much weight on the mismatch in maturities between the risk free rate and the benchmark bonds used to estimate the debt margin. In some cases, regulators included a 10-year fair yield curve estimate with the appropriate target credit rating to address the maturity mismatch. The fair yield curve is a bond pricing tool, mainly used by banks to assess whether any particular bond issue is over – or under-priced.

IPART has asked Erik Schloegl to provide it with advice as to whether it would be possible to establish a standard methodology that could be used to extend the term structure of debt margins obtained from Australian corporate bonds to match the term of the risk free rate. Erik Schloegl[18] advised that it would be possible to construct a model to do this. The model would:

- fit a term structure to Australian credit spread data using a well known methodology (Nelson and Siegel) as proposed by Diebold and Li (2006)[19], and
- given that the markets for Australian dollar-denominated corporate debt are relatively thin, especially at longer maturities, the debt margin data can be augmented with information from the Euro and the US dollar denominated bonds credit spreads.

4.4 How will IPART adjust the composition of the set of securities in the future?

IPART proposes to adjust the set of securities by removing bonds when they mature and adding new bonds meeting the selection criteria as they are issued into the market. IPART also reserves the right to temporarily or permanently remove bonds from the set of securities in the case of abnormal events.

IPART has done this in the past where it believed that a security was mispriced relative to other comparable securities. For example IPART removed the General Property Trust bond from the set of securities used to estimate the debt margin as the yields on this issue increased dramatically with the onset of the credit crisis. IPART may also remove securities if it believes that yields on individual bonds are too low relative to its peers. For example, in the current market, IPART may consider excluding the ElectraNet issue from the set for securities used to estimate the debt margin. ElectraNet is currently trading at a significant discount compared to their historical yields as well as the yields on its peers.

4.5 What is the appropriate period of averaging the debt margin?

IPART currently averages the debt margin over a 20 trading-days period. This is consistent with the averaging of the nominal risk free rate and the expected inflation rate.

IPART notes that volatility in bond markets may be substantial. Adopting a longer term average debt margin estimate would smooth out any short term volatility in the debt market. However, it would also result in an estimate that does not reflect current market circumstances and information available. This highlights the key question: what is the appropriate balance between reducing volatility and ensuring

18 Erik Schloegl's advise to IPART is attached in Appendix A.

19 Diebold, F.X. and Li, C. (2006), Forecasting the term structure of Government bond yields, Journal of Econometrics, 130, 337-364.

that the estimate fully reflects current market data and the information embodied in that data?

4.5.1 What are the impacts of changing the averaging period?

The 20-day averaging is the same as the period of averaging used in the determination of the cost of equity from market variables. However, the discussion paper on adjusting the WACC for expected inflation noted the volatility in the inflation swap data and raised the question of whether a longer averaging period should be used. There is a presumption that if a longer average period were to be used that it should be used for all the parameters estimated directly from current market data (ie, the yields on long term government bond rates, the inflation swaps and the debt margin).

Australian regulatory practice has been to adopt quite short term averages of market rates for a period as close as possible to the date of final decision. Most commonly 20-day averages have been used, but 40 or 60 day averages could fit within this framework to smooth out short-term volatilities. The extent to which this reduces the variability in the market parameters can be tested using past data.

However, it would not smooth out the variations on these parameters over a longer period (say 6 or 24 months). Adopting a medium term averaging period (say 12 – 24 months) would represent a substantial change in approach and rebalancing in the weight given to stability versus currency of the estimates.

The advantage of using a longer term average is that it smoothes out short-term jumps in the yield curve. A practical disadvantage of using a long-term average is that the composition of the index used may change substantially over time. For example, any bonds that mature will fall out of the index and new issues will be added. This would make it difficult to determine whether the smoothing effects of this methodology are due to a change in the composition of the index or of the averaging of yields.

Furthermore, it may introduce a substantial gap between the regulatory WACC and the actual cost of capital the business faces at the time of the reset. A mismatch between long-term averages and current rates could create financial losses and discourage investment (if current rates are higher) or promote overinvestment and windfall profits (if current rates are lower). Table 4.5 shows the debt margins for different averaging periods for the options presented in this discussion paper.

Table 4.5 Debt margin estimates

Averages to 23 February 2009	Debt margin					
	3-years	2-years	1-year	60-days	40-days	20-days
Traditional set of securities (Option 1)	162	190	225	195	198	187
New set of securities (Option 2)	144	172	206	171	172	157
New set of securities and BBB fair value curve (Option 3)	150	181	223	201	204	186

Data source: Bloomberg – debt raising costs not included.

5 Comparing to options

This chapter quantitatively assesses the options set out in chapter 4. It includes an analysis of the potential impacts of a change in methodology on IPART's regulatory decisions.

5.1 Is a benchmark credit rating the best guide to the debt margin for utilities?

IPART has become concerned that credit ratings are not the main driver of corporate bond yields. In particular with the onset of the financial crisis the yields on corporate debt seem to be driven by the industry sector rather than by the credit rating. IPART has compared the yields of a large set of Australian corporate bonds and found that currently:

- there is a substantial difference in average yields between industry groups
- investment banking and other financial institutions trade at the highest yields, and
- A+ rated securities trade at the highest average yield of all bonds.

These findings are represented in Figures 5.1 and 5.2 below[20] which show the debt margins for the 20 days to 18 March 2009.

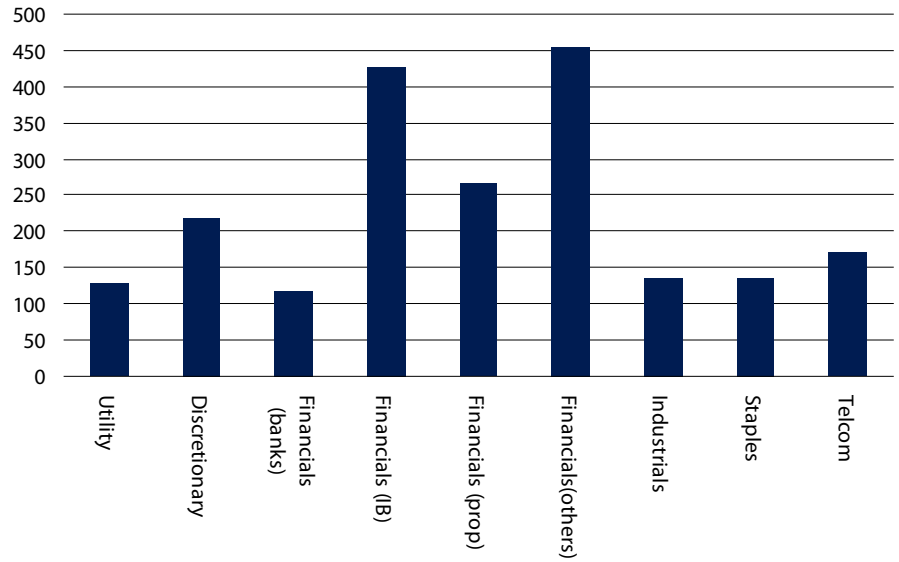
Figure 5.1 shows that the debt margins for utilities are lower than other industry groups. Figure 5.2 shows that even larger variations in debt margins across different credit ratings, but there are not the expected relationships between ratings and debt margins.

IPART notes that it is counterintuitive that a low credit rating representing a high probability of default should trade at a lower yield than a higher credit rating with a lower probability of default. It is likely that in the current environment, financial markets react faster than credit rating agencies. Hence, sector-specific yields may at times be higher for a better credit rating than for a lower rating, indicating that financial markets react to new information before credit rating agencies get through their ratings process. It is likely that in the medium term, rating agencies will

[20] For the purpose of this analysis, IPART has excluded some bonds which trade at a negative debt margin – ie, their yield is lower than the 10-year Commonwealth Government bond rate.

reassess the credit ratings that are out of line with standard probability of default calculations and ultimately, ratings will catch up with relative yields.

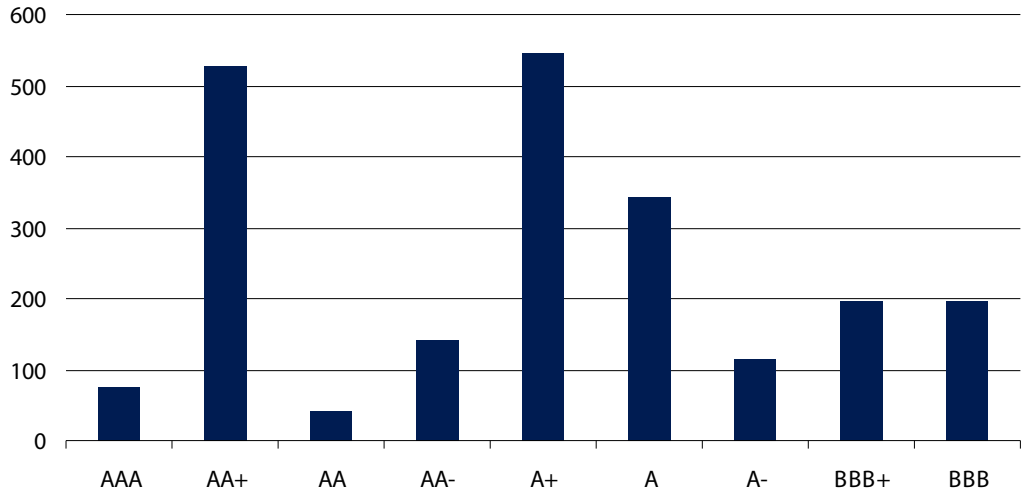
Figure 5.1 Debt margins by industry group[a] 20-day average to 18 March 2009



Appendix D contains a comprehensive list of all the bonds included in this analysis.

Data source: Bloomberg.

Figure 5.2 Debt margins by credit rating[a] 20-day average to 18 March 2009

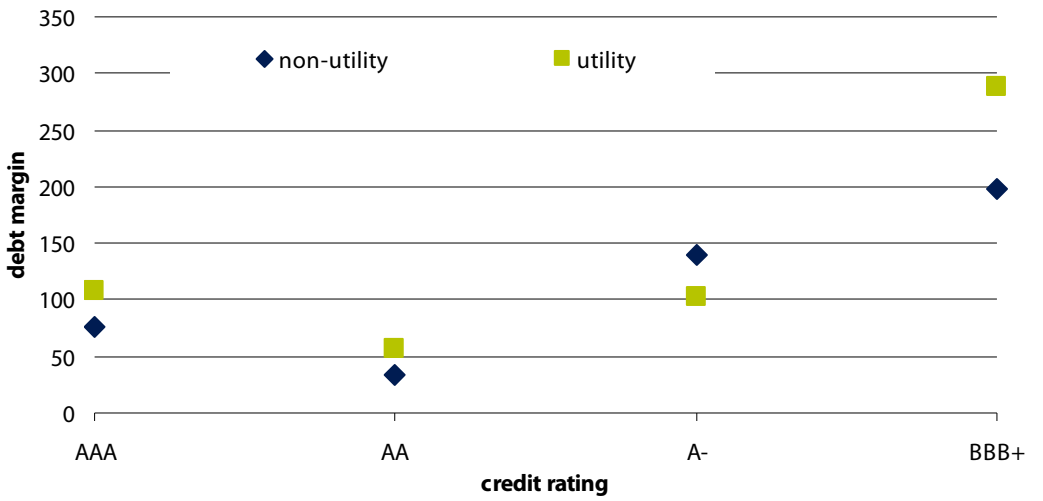


Credit ratings based on composite Bloomberg credit rating.

Data source: Bloomberg.

Figure 5.3 compares the average debt margins for utilities by credit rating against the average debt margin of non-utilities for the same credit rating category.

Figure 5.3 20-day average debt margins to 18 March 2009[a]



Inputs are based on a comparable set of corporate bonds between CBASpectrum and Bloomberg.
Data source: Bloomberg.

The small number of utility issued bonds clouds the interpretation of these variances. However, more than 50 per cent of all utility issued bonds are rated A- (four bonds) and in this credit rating category, utilities trade at lower debt margins than non utilities. This is not the case for the other ratings although there are very few bonds in each category.

IPART considers that changing the set of securities to a set that is not driven by a target credit rating of BBB+ and BBB to a set that includes bonds issued by utilities may provide a better benchmark for the credit risk of the businesses IPART regulates.

5.2 How do the old and the new set of securities compare?

IPART has compared the debt margins and the yields on individual securities between the traditional and the new sets of securities.

Table 5.1 compares the 20-day average debt margins between the three options before and after the onset of the financial crisis.

On 13 August 2007, the difference between Option 1 and 3 was 16 basis points. The differential between Option 1 and 2 was 17 basis points.

After the onset of the financial crisis, the differential debt margins between option 1 and 2 widens to 24 basis points. However, option 1 and 3 are separated by a mere 10 basis points.

On 23 February 2009, there is a difference of 1 basis points between options 1 and 3 and a 60 basis points differential between options 1 and 2.

If a change were made, switching to option 3 would reduce the differences in the debt margin compared to continuing to use option 1.

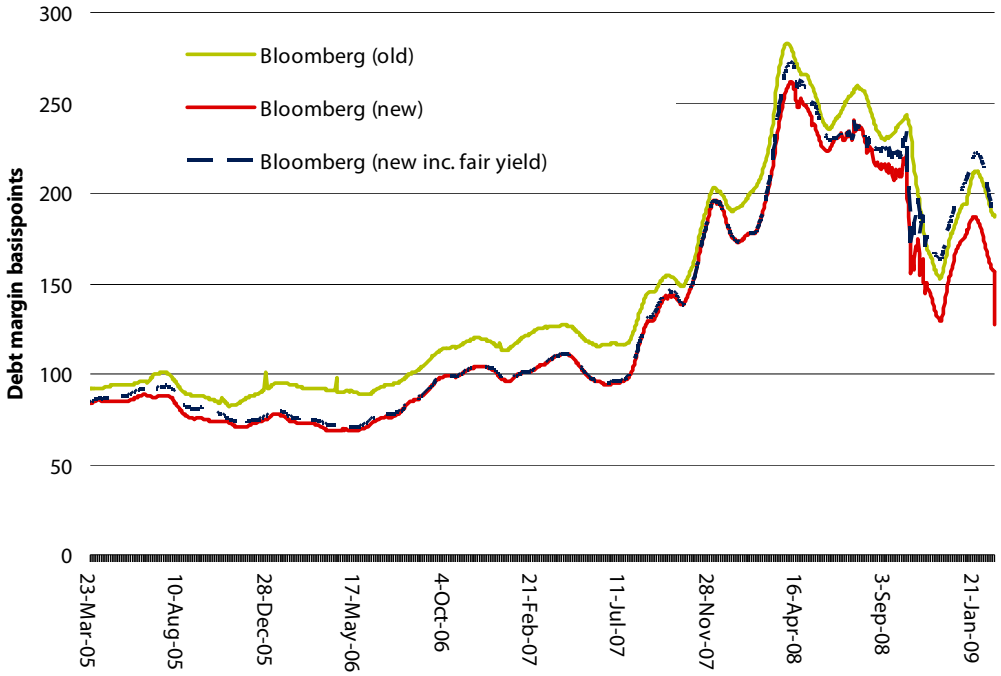
Table 5.1 Debt margin estimates

20-day average	Debt margin		
	13 Aug 07	1 Dec 08	23 Feb 09
Traditional set of securities (Option 1)	135	153	187
New set of securities (Option 2)	118	129	127
New set of securities and BBB fair value curve (Option 3)	119	163	186

Data source: Bloomberg – debt raising costs not included.

Figure 5.4 compares the midpoint debt margin estimate (not including the 12.5 basis points allowance for debt raising costs) between the three options presented in section 4.1. It shows that including the fair value curve in the new set of securities results in a slightly higher average yield. Regulators in the past included the fair yield curve as a proxy for the extension of the term to maturity of the data set to 10-years. IPART has commissioned Erik Schloegl to assist it in modelling a term structure adjustment which could be used instead of the fair yield curve. It is expected that Erik Schloegl delivers his final report and a model to IPART in early July 2009.

Figure 5.4 Debt margin midpoints 20-day average (23 February 2005 to 23 February 2009)



Data source: Bloomberg.

Comparing the new sets of securities, IPART found that during the three year period from early 2005 until the end of 2008 and using Bloomberg, the maximum difference in absolute numbers:

- Between the debt margin generating using the new set of securities and the old set of securities was 76 basis points, and
- Between the debt margin generated using the new set of securities and the new set plus the BBB fair yield curve was 34 basis points.

Based on the evidence currently available to IPART, it believes that switching to option 2 or 3 would not have a substantial impact on businesses, customers or the shareholder.

5.3 What is the impact of changing data sources

In past decisions IPART relied on CBASpectrum to obtain its debt margins. The Commonwealth Bank of Australia informed IPART that it will close the CBASpectrum accounts of several external parties including IPART. Hence, IPART has to switch to an alternative data service. IPART proposes to use Bloomberg in future debt margin estimates.

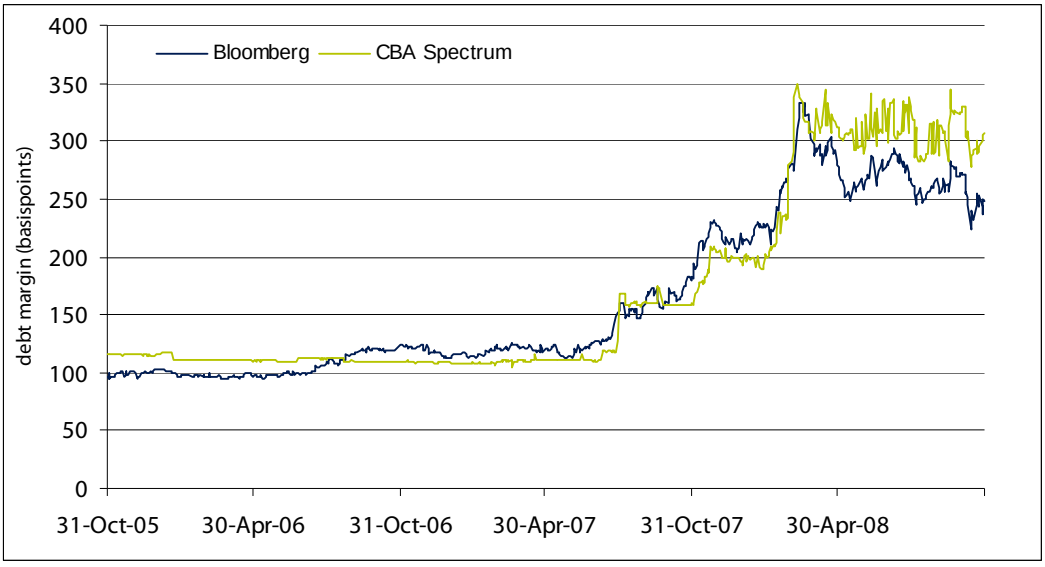
IPART recognises that the debt margin quotes generated by CBASpectrum and Bloomberg differ. This differential may have several sources:

- the way the daily quotes are computed
- the contributing banks
- the underlying risk free rate, or
- the model used to interpolate the data.

Previously the case had been put that CBASpectrum consistently underestimated debt margins and that Bloomberg provided a more reliable estimate[21]. The figures below demonstrate that the situation has reversed and CBASpectrum quotes were higher than Bloomberg quotes from late 2008 onwards.

IPART has compared the debt margins on individual securities over time. Figures 5.5 to 5.7 compare the debt margins of individual securities from the old and the new set from CBASpectrum and Bloomberg. Figure 5.8 compares the BBB fair yield curve from CBASpectrum and Bloomberg.

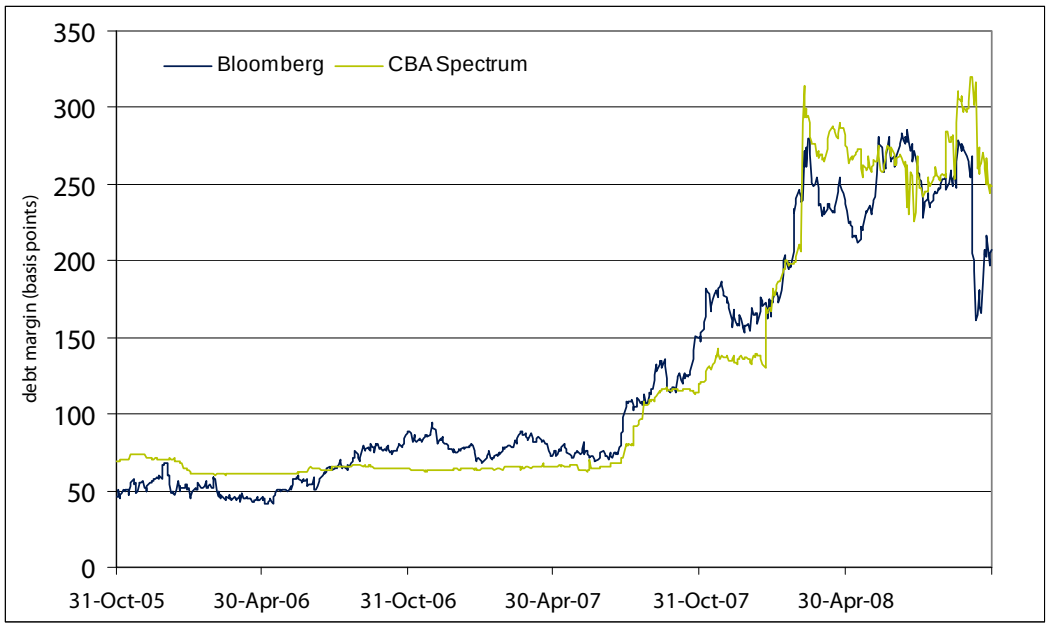
Figure 5.5 Old and new set – Snowy Hydro-price history 2005 to 2008



Data source: CBASpectrum and Bloomberg, some outliers removed.

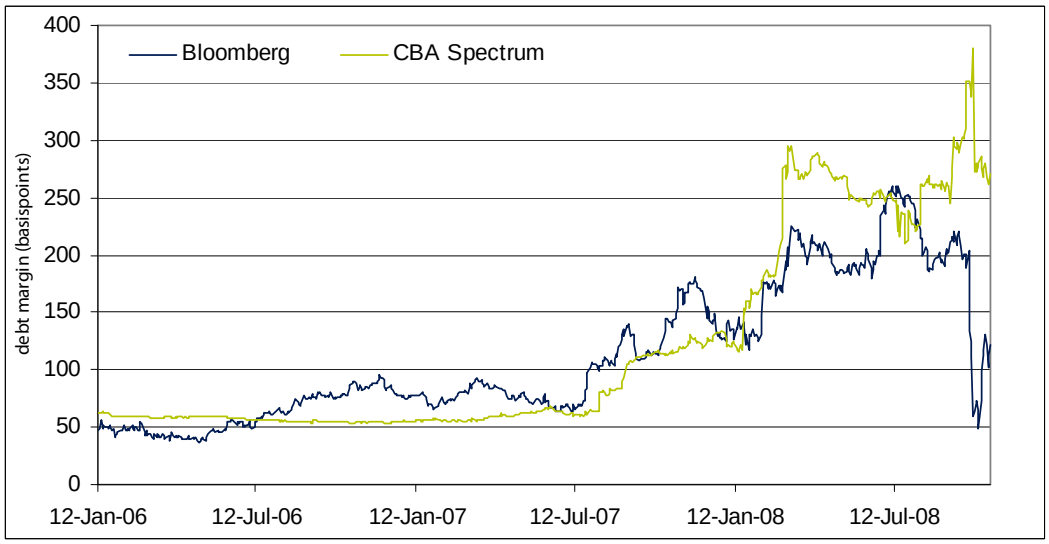
21 See for example: NERA, Estimating Debt Margin for ActewAGL, February 2004, a Report for ActewAGL.

Figure 5.6 New Set - Snowy wrapped – price history 2005 to 2008



Data source: CBASpectrum and Blooomberg, some outliers removed.

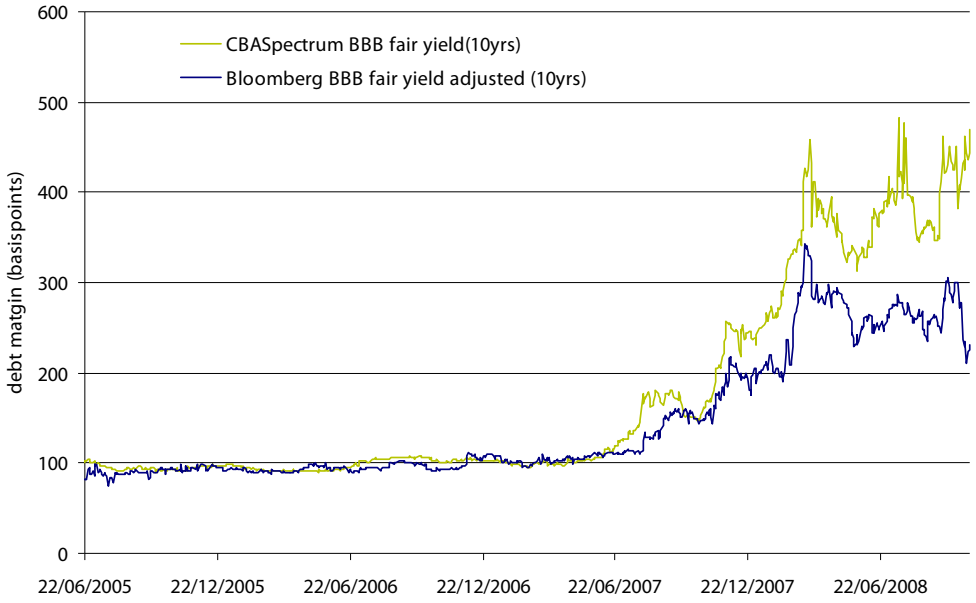
Figure 5.7 New Set - GasNet wrapped – price history 2005 to 2008



Data source: CBASpectrum and Bloomberg, some outliers removed.

IPART notes that since mid-2008 there has been a very clear upwards trend in the CBASpectrum debt margins for the securities in Tables 5.5 to 5.7. Figure 5.8 compares the CBASpectrum and the Bloomberg fair yield curves and the same trend is discernible since early 2008. IPART is not aware of any information that may justify this differential.

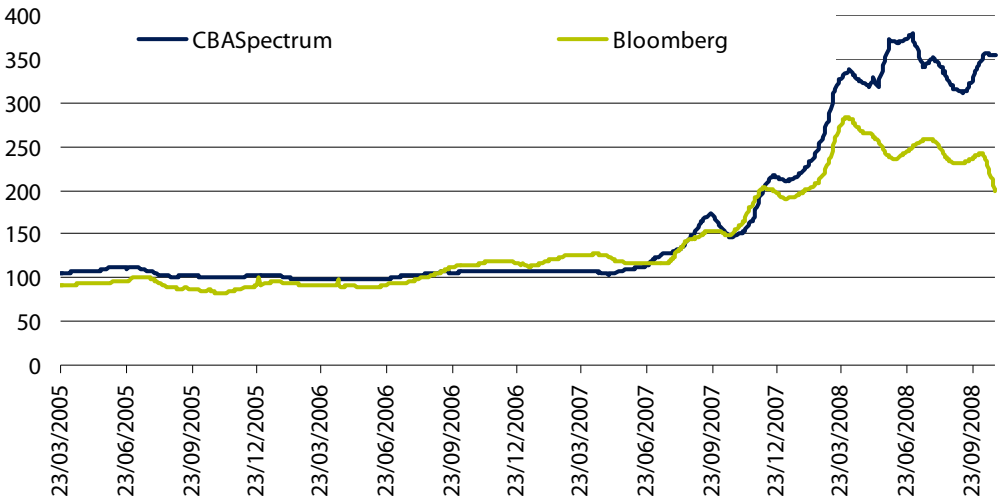
Figure 5.8 CBASpectrum and Bloomberg fair yield curves - price history 2005 to 2008



Data source: CBASpectrum and Bloomberg.

Figure 5.9 indicates that up until early 2008, the debt margin midpoints obtained from CBASpectrum and Bloomberg, using the old set of securities were relatively similar within a 20 basis points range. The gap then started to widen and towards the end of 2008, the CBAspectrum debt margin generated using the old set of securities was trading over 150 basis points above the debt margin generated by Bloomberg, using the same set of securities. Figure 5.8 indicates that although there has been considerable variation over time, during the last four years, Bloomberg yields for the old set of securities were more stable than CBASpectrum yields.

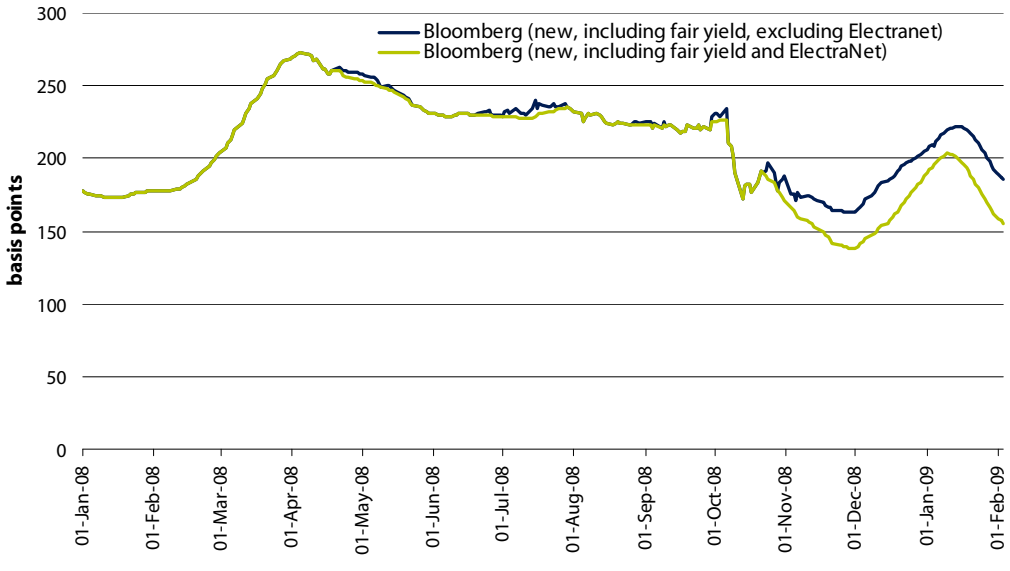
Figure 5.9 Option 1 - Traditional set of securities, 20-day averages to November 2008



Data source: Bloomberg and CBASpectrum.

Figure 5.10 shows how debt margin midpoints generated using the new set of securities plus the fair yield curve, but excludes the ElectraNet issue which is currently trading at a negative debt margin (as discussed in section 4.4).

Figure 5.10 Debt margin midpoints (excluding the ElectraNet issue) 20-day averages to February 2009



Data source: Bloomberg.

Figure 5.10 shows that if the ElectraNet issue is excluded from the analysis, the debt margin generated from the new set would be slightly higher. In particular, as at 23 February 2009 excluding the ElectraNet issue from the analysis would:

- increase the new set of security debt margin midpoint by 30 basis points from 127 to 157, and
- increase the new set including the fair yield curve of security debt margin midpoint by 30 basis points from 156 to 186.

5.4 What is the impact of changing the credit rating benchmark?

IPART currently uses a target credit rating range of BBB+ to BBB in its debt margin decisions. As outlined in Section 3.3 Australian regulators tend to use a target credit rating of BBB+, the exceptions being the ICRC (A to BBB+) and IPART.

The AER is currently reviewing the WACC parameters it uses in its electricity transmission and distribution network service providers. This review includes a review of the target credit rating and a draft decision in early January 2009 proposes to change the target credit rating to A-. In its final decision, the AER reverted to a target credit rating of BBB+.

5.4.1 What is a credit rating?

Standard & Poor's describes credit ratings as an opinion of the general creditworthiness of an obligor (issuer credit rating/corporate credit rating), or the credit risk associated with a particular debt security or other financial obligation. In an issuer credit rating, Standard & Poor's provides an opinion of the obligor's overall capacity and willingness to meet its financial obligations as they fall due. Default on any of these leads to an issuer rating of 'D' or 'SD'. In general, a credit rating reflects the probability of default of an issuer or an issue.

5.4.2 How appropriate is a target credit rating of BBB+ to BBB?

Credit ratings are the product of qualitative and quantitative analysis of a business and its competitive environment. All rating agencies seem to be in agreement on this. In regard to regulated utilities, rating agencies tend to assume that the higher the proportion of regulated revenue the lower the overall credit risk of a business.

Table 5.2 shows the cumulative default rate of for global issues between 1981 and 2006. Table 5.2 indicates that for a BBB rated issue, the probability of default during a 10-year time period is 5.4 per cent. Similarly, for a 1-year time period:

- the default rate for a AAA rated issue is zero per cent, and
- the default rate for a BBB rated issue is 0.2 per cent.

Probabilities of default are the core rates measured by credit ratings. Intuitively, it is highly improbable that any Australian utility regulated by IPART would default within a 1-year time period. Even for the longer time periods, the default rates for the BBB credit ratings look rather high in the context of an Australian regulated utility.

Table 5.2 Cumulative default rates 1981 -2006 (%)

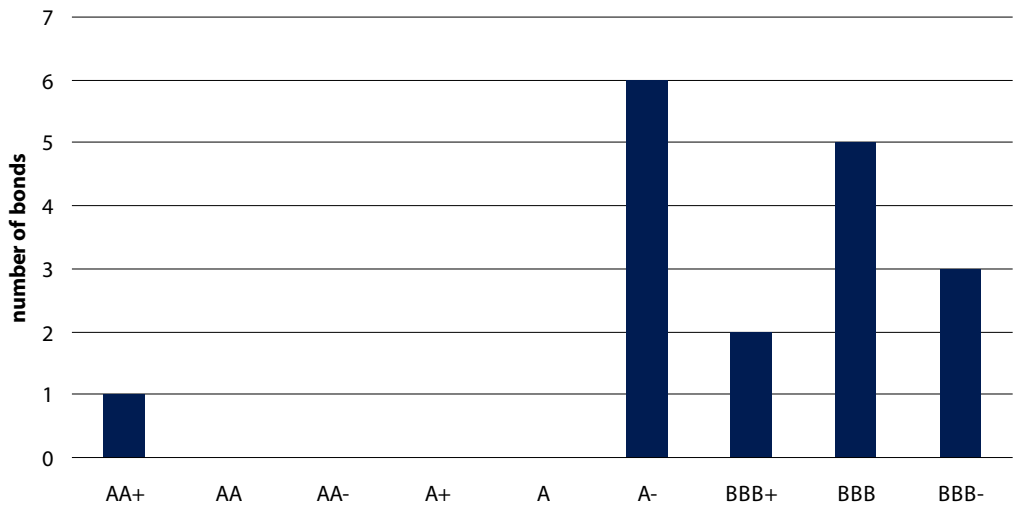
Year	AAA	AA	A	BBB
1	0.0	0.0	0.1	0.2
10	0.7	0.9	1.9	5.4
15	0.8	1.3	2.8	7.9

Source: Standard&Poor's "Corporate Ratings Criteria", 2008.

As it is in the lower end of the benchmark ratings for investment grade bonds, BBB may be seen as a floor rating level for regulatory benchmarks. This then becomes a ceiling for debt costs. Regulators, such as IPART, have given further credence to BBB to BBB+ as a floor for financial performance by using the maintenance of BBB to BBB+ as a test for the financial sustainability of the outcomes. That is, proxy credit rating levels have been calculated on the basis of cash flows and regulators have sought to ensure these are consistent with maintenance of at least a BBB to BBB+ credit rating.

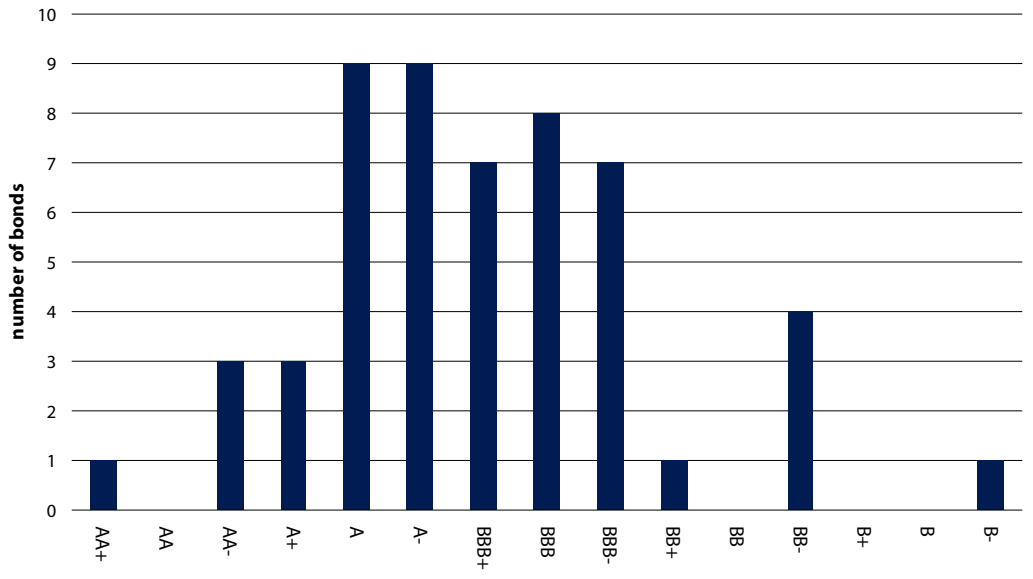
However, while this implies that BBB to BBB+ is the minimum benchmark credit rating, it does not directly address the issue of the appropriate benchmark credit rating for an efficient well-managed firm. Indeed, although regulatory reviews typically identify scope for efficiency gains, the projected benchmark credit ratings have often been above these levels.

Figure 5.11 Distribution of credit ratings for utilities – Australia



Data source: Standard & Poor's.

Figure 5.12 Distribution of credit ratings for utilities –Asia Pacific region (including Australia)



Data source: Standard & Poor's.

Figure 5.11 shows that Australian utilities' credit ratings range from AA+ to BBB- with the majority being between A- and BBB. Seven Australian utilities are rated BBB+ and BBB. Three Australian utilities have a below investment grade rating (BBB-). Figure 5.12 show that 13 utilities in the Asia Pacific region are rated below investment grade (<BBB). Three out of these utilities are Australian (Duet Group, ElectraNet and Energy Partnership (Gas) Pty.Ltd.). However, 25 are rated at A- and above[22].

IPART notes that in some cases the credit rating may be influenced by the parent company in cases where there is a majority shareholder able to influence the rating agencies outlook on the companies' ability to service its liabilities. IPART is estimating a commercial cost of debt of stand alone entities and it is widely recognised that there is substantial uncertainty involved in estimating the cost of debt from benchmark data. As is done in the commercial lending sector, IPART has to use its judgement to achieve the most appropriate allocation of the risk of over- or underestimating the true cost of debt, between the business, customers and the shareholder. IPART will continue to do so in the future and therefore use a range in its debt margin estimate rather than a point estimate.

22 IPART notes that there are more utility issued bonds available than those used in the debt margin analysis in this chapter. However, not all utilities trade every day and thus IPART is limited to using those securities for which quotes are available.

5.4.3 What is the relationship between credit ratings and debt margins?

In principle, the credit rating represents the relative credit worthiness of an issuer or in the case of a credit rating of an individual bond issue, the probability of default of the issuing company on this particular bond issue.

Other things being equal, one would expect that a lower credit rating leads to a higher debt margin. This must be because the expected default rate (or the potential loss of invested funds) of a lower rated bond issue is greater than the probability of default of a higher rated bond issue. However, Figure 5.2 indicated that currently this does not seem to be the case in that Australian market. For example, currently the average debt margin for A+ rated securities is higher than the average debt margin for BBB+ rated securities[23].

As Figure 4.1 indicated, for most of the last three years there has been only a quite small spread between debt margins for the BBB and A value curves. However, in the last 6-months, the spreads between the fair value curves for different ratings, including BBB and A have become much larger. Furthermore, for a number of ratings (for example AA+), the average relative debt margin is different form the assumed relationship (Figure 5.2).

If IPART changes the set of securities it uses to estimate the debt margin, this would most likely involve a change in the target credit rating. However, a set of securities including all utility issued bonds would still have a lower end credit rating of BBB[24] and thus there would be no change in the lower end of the target credit rating range. However, there is likely to be a change in the upper end of the target credit range as some of the utilities are rated higher than BBB+ (Figure 5.10). It is likely that there may be a slight reduction in the mid-point of the debt margin but it is unlikely to be material.

5.5 Does the target credit rating impact on IPART's financial model?

IPART uses a target credit rating in its estimate of the debt margin. Currently this target credit rating is BBB+ to BBB.

Under the section 12 requirements of the IPART Act, when making price determinations, IPART has to consider a businesses financial viability. In the past, IPART has done this by considering a number of financial ratios based on the NSW Treasury ratings system. IPART assumed that a business is financially viable if it achieves at least a nominal credit rating of BBB in its financial model, consistent with the debt margin assumptions.

23 IPART understands that this may be driven by outliers, but even after removing any obvious outliers, this statement is still true.

24 If only investment grade bonds are included.

If IPART switches to a new set of securities and relaxes the nominal credit rating assumptions, this may have implications on how IPART assesses the financial viability of the businesses it regulates in the future. This is discussed in the following sections.

5.5.1 How do credit rating agencies assign a credit rating for a utility?

Moody's is one of the major global credit ratings agencies. Although, regulators in Australia generally used Standard & Poor's or some sort of state treasury credit rating system, Moody's provides an alternative source of equivalent globally recognised credit ratings[25]. IPART has decided to use Moody's in this paper as Moody's has more up-to-date information on its rating methodology in the public domain[26].

Similar to other credit ratings agencies, Moody's uses quantitative and qualitative factors to assign a credit rating. The following two sections outline the ratings process for an electric utility and, where appropriate, provide reference to IPART's own process of assigning a notional credit rating.

Qualitative factors

Moody's framework for rating regulated utilities is constructed around a number of credit risk factors rather than one particular metric such as a financial ratio.

In a first step, Moody's assesses the extent of a regulated company's exposure to unregulated businesses. In a second step, it assesses the credit support that is gained form operating within a particular regulatory framework. Lastly, Moody's considers the exact level of risk posed by the unregulated business.

Moody's assigns the lowest business risk to a company with wholly regulated activities in a supportive regulatory framework. The highest business risk will be a company with a high degree of exposure to non-regulated businesses when those businesses are viewed to be relatively high-risk.

Moody's states that the importance of ratio analysis can be overstated. In general, for electric utilities, other factors may outweigh financial ratios:

- degree of likely support form a sovereign
- degree of development of regulatory system
- political risk, and

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25 A table comparing credit ratings between Standard& Poor's and Moody's can be found in Appendix B.

26 A similar analysis using Standard and Poor's ratings process can be found in the AER's 2008 WACC issues paper: http://www.aer.gov.au/content/item.phtml?itemId=722312&nodeId=d91f7605b58ef42b64dda8253f2d1b1c&fn=Issues%20paper%20(6%20August%202008).pdf

- corporate governance.

Quantitative factors

Moody's uses financial ratio analysis as part of its quantitative analysis of all corporates. Table 5.3 shows four key ratios used by Moody's. These are similar to those used by other ratings agencies:

- FFO interest cover – funds from operations interest cover
- FFO/debt: funds from operations over adjusted gross debt
- RCF/debt: retained cash flow over adjusted gross debt, and
- Debt/Capital: Adjusted gross debt over regulated asset value or market capitalisation.

Table 5.3 Expected financial ratio for a utility company

Moody's rating	**Aa2**	**Aa1**	**A2**	**A1**	**Baa2**	**Baa1**	**Ba2**	**Ba1**
Business risk	**Medium**	**Low**	**Medium**	**Low**	**Medium**	**Low**	**Medium**	**Low**
S&P equivalent	**AA**	**AA+**	**A**	**A+**	**BBB**	**BBB+**	**BB**	**BB+**
FFO interest cover (x)	>6	>5	3.5-6.0	3.0-5.7	2.7-5.0	2-4.0	<2.5	<2
FFO/Debt (%)	>30	>22	22-30	12-22	13-25	5-13	<13	<5
RCF/Debt (%)	>25	>20	13-25	9-20	8-20	3-10	<10	<3
Debt/Capital	<40	<50	40-60	50-75	50-70	60-75	>60	>70

Note: BB and BB+ are below investment grade ratings.

Source: www.moodys.com

Table 5.4 shows some the notional financial ratios used in IPART's current determinations for EnergyAustralia's distribution assets and Sydney Water. Also included are the notional credit ratings based on the NSW Treasury ratings used by IPART in each determination.

Table 5.4 IPART notional credit ratings for Energy Australia ands Sydney Water Corporation

	FFO interest cover	FFO to Debt	Debt to Equity
EnergyAustralia, notional, 2009[a]	2.97	9.37	57.3
Implied NSW Treasury rating[b] (2002)	BBB+	BB	BBB
Moody's/S&P equivalent	B(aa)/BBB+	A to Ba / A to BB	A to Baa / A to BBB+
Sydney Water, notional, 2008	1.86	8	46
Implied NSW Treasury rating	BBB+	BBB+	AA
Moody's equivalent	Ba / BB+	Baa to Ba / BBB+ to BB	Aa to A / AA+ to A

Note that the Energy Australia 2009 ratios were calculated in 2003, based on the ratings system available at that time.

NSW Treasury uses its own ratings methodology.

Note: Sydney Water estimates include desalination plant.

Source: For Energy Australia: http://www.ipart.nsw.gov.au/files/op-23.pdf, p 248. For Sydney Water: http://www.ipart.nsw.gov.au/files/Final%20Report%20and%20Determination%20-%20Review%20of%20prices%20for%20Sydney%20Water%20Corporations%20water%20sewerage%20stormwater%20and%20other%20services%20-%20Richard%20Warner%20-%2016%20June%202008%20-%20Website%20Document.PDF, p 138.

Table 5.4 indicates that the notional financial position (in particular the funds from operations over debt ratio) of Energy Australia's distribution assets and Sydney Water is relatively weak. However, given the fact that both are a natural monopoly operating within a stable regulatory system, it would be expected that credit rating agencies assign a higher weighting to qualitative factors than to quantitative ones. This means that it would be assumed that such a monopoly could easily support a financial position that, based on purely quantitative factors, would result in a BBB credit rating. Given the relatively high proportion of regulated revenue, the probability of default for these businesses is probably closer to a much higher credit rating (see Table 5.2). Hence, the credit ratings agency would assign a higher credit rating than that purely stipulated by the financial ratios.

5.5.2 How do the financial ratios for the securities in the old set compare to those in the new set?

IPART has compared some of the key financial ratios used in its financial model and by the ratings agencies:

- Total debt to total assets – a measure of a company's financial risk, this ratio determines how much of a company's assets have been financed by debt.
- Total debt to EBITDA – a measure of a company's ability to pay off its debt. This ratio gives the approximate amount of time that would be needed to pay off all debt.

- Interest expense coverage – this ratio is used to determine how easy a company can pay interest on outstanding debt. The lower the ratio, the more the company is burdened by debt expenses. A ratio below 1 indicates that the company is not generating sufficient revenues to satisfy interest expenses.

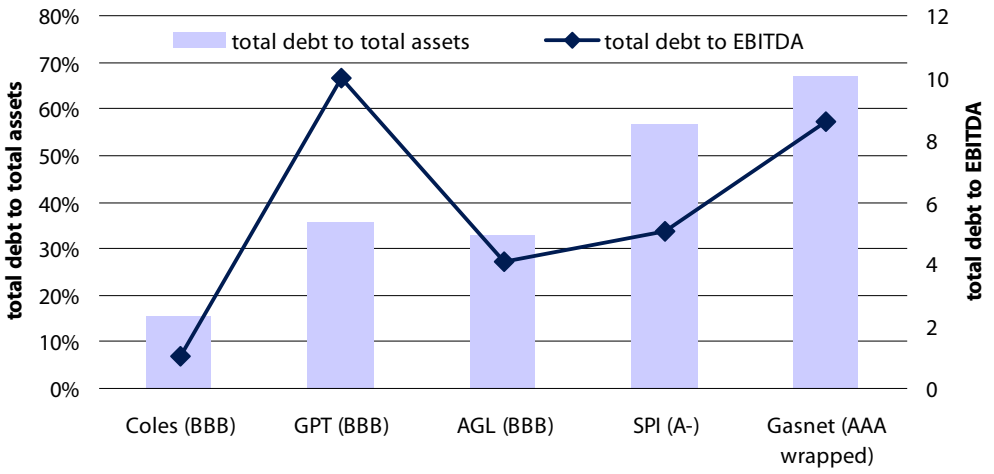
Figures 5.13 and 5.14 compare these ratios for some of the companies included in the traditional set and securities:

- Coles
- AGL, and
- GPT.

And the new set of securities:

- SPI, and
- GasNet.

Figure 5.13 Total debt to total assets and total debt to EBITDA

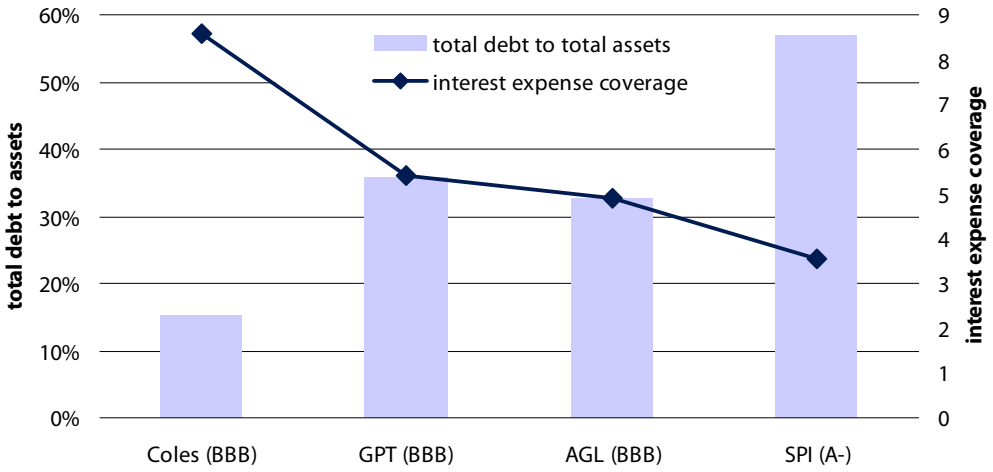


Data source: Bloomberg, 23 February 2009.

Figure 5.13 indicates that the companies included in the new set of securities have a much higher total debt to total assets ratio than those included in the traditional set of securities. This clearly illustrates that the level of gearing is not the key determinant of the credit rating. For example, SPI is rated A- with a gearing just below 60 per cent. Coles on the other hand is rated BBB with a gearing level of 15 per cent and GPT is rated BBB with a gearing level of 36 per cent.

Similarly, just looking at the total debt to EBITDA does not seem to provide a reliable estimate of the probability of default. For example, AGL and SPI have a similar total debt to EBITDA ratio, 4.7 and 5.5 and yet AGL is rated BBB and SPI is rated A-.

Figure 5.14 Total debt to assets and interest expense coverage



Data source: Bloomberg, 23 February 2009.

Figure 5.14 indicates that there seems to be some correlation between the gearing of a company, its ability to repay debt and the credit rating. IPART notes that the interest expense coverage ratios for all companies in Figure 5.14 are relatively strong and consequently just looking at this ratio gives little indication of the probability of default of the company's included in this analysis.

Appendices

A Estimation of the interest rate term structure of corporate debt

MEMORANDUM

Draft subject to amendment

To: Mr. Alex Oeser, Analyst,
Independent Pricing and Regulatory Tribunal (IPART)

From: Professor Erik Schlögl, Private Consultant

Date: 24 February, 2009

Re: Estimation of the interest rate term structure of corporate debt

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1. The Brief

The purpose of the present draft memorandum is to describe a possible approach to the estimation of the term structures of interest rates faced by Australian corporate borrowers. In particular, the recommended method is expected to provide a consistent and robust way of extending these term structures beyond the maturity of the longest-dated Australian corporate bonds available in the market. One should note that the objective is not to develop a model for predicting future changes in the term structure of interest rates or in the credit spread, but rather to construct the current discount curve for corporate debt for mark–to–market valuation purposes.

2. Background

Interest rate term structures of corporate debt represent one of the inputs into the weighted average cost of capital (WACC) calculation performed by IPART. A robust method of estimating these term structures from market prices for corporate bonds is therefore required. In many cases, the maturities of Australian corporate bonds do not extend out to a sufficiently long time horizon, so the market term structure needs to be extrapolated. Standard approaches to term structure interpolation, such as the spline methods pioneered by McCulloch (1971) and subsequently refined and extended by numerous authors, do not provide very stable or reliable extrapolation. Furthermore, for any given corporate issues, the number of bonds trading in the market is very small compared to the number of government bonds that are available to estimate the term structure of interest rates for government debt. Thus in the case of corporate debt a method of estimation needs to draw on additional information beyond the bonds of a particular issuer, as well as on some of the results of theoretical modeling, in order to construct robust interpolated and extrapolated term structures.

3. The term structure of interest rates for corporate debt

The term structure of interest rates for corporate debt can be decomposed into a reference term structure plus a credit spread. As a reference term structure, a discount curve estimated from government bond prices is most commonly used, and this term structure is typically labeled "riskless." However, for the purpose of calibrating a term structure of interest rates faced by a corporate borrower one could

alternatively use a discount curve fitted to the interbank money market as a reference term structure. This would have the advantage of avoiding issues with liquidity and scarcity premia in estimating the reference curve.

Regardless of the choice of reference term structure, there are instruments out to sufficiently long maturities available in the market to obviate the need for extrapolation, so the effort to extend the term structure of interest rates out to the required time horizon can be focused on robust extrapolation of the credit spread.

Credit spreads relate to risk-neutral probabilities of default[1] as default–free interest rates relate to default–free zero coupon bond prices. Thus the known machinery of arbitrage–free interest rate term structure modeling can be applied directly to the term structure of credit spreads. In term structure modeling, it is well known that movements in the term structure can be identified with stochastic factors driving interest rate dynamics.[2] These factors can be chosen in such a way as to identify the first factor with the level, the second factor with the slope, and the third factor with the curvature of the term structure. In the empirical literature on the evolution of the default–free term structure, it is well–established that the dynamics are driven overwhelmingly by three[3] or at most four stochastic factors. However, there is a dichotomy of approaches to constructing factor models for the purpose of term structure estimation. On the one hand, there is the modeling of arbitrage–free dynamics, while other authors have taken the approach to simply specify a particular functional form for the term structure, which is then fitted to market data on a day–by–day basis. The latter is not necessarily consistent with the absence of arbitrage when one lets the term structure evolve dynamically over time.[4]

However, the literature to date suggests that for the purposes of term structure estimation, this approach may be preferable to the available dynamically arbitrage–free models. For reasons of analytical tractability, empirical tests of arbitrage–free term structure models have mainly focused on those nested in the affine framework of Duffie and Kan (1996). The most well known results in this context are perhaps those of Duffee (2002), who found that affine models of the term structure do not perform well in predicting out–of–sample behaviour. In contrast, Diebold and Li (2006) are able to achieve substantially better econometric performance by using the Nelson and Siegel (1987) exponential components framework to project the entire term structure onto a three–dimensional parameter — while it is not demonstrated that modeling the evolution of the term structure in this manner is free of dynamic arbitrage opportunities, the out–of–sample forecasts achieved by Diebold/Li are better than those of Duffee. This is an indication that the Nelson/Siegel functional form adapted by Diebold/Li provides a better mapping of the term structure of default–free interest rates to the three driving factors of level, slope and curvature, thus also providing a more reliable fit to the observed term structure on a given day. Neither forecasting of the term structure nor arbitrage–free pricing of interest rate derivatives

[1] If credit spreads/default events are not independent of default–free interest rates, this is only true when the risk–neutral probabilities are taken under the appropriate forward martingale measures; see e.g. Schönbucher (2003).

[2] See e.g. Schlögl and Sommer (1998).

[3] See Litterman and Scheinkman (1991) and Knez, Litterman and Scheinkman (1994).

[4] See Schlögl (2002).

is our objective, so it is this last point that most informs our choice between the two possible approaches.

While considerable work has been done on term structure fitting, estimation and forecasting for default–free interest rates, the literature on the term structure of credit–risky debt is much more sparse, and those studies that have been done are typically focused on US, or in some cases European, data. Of particular interest is the recent work of Krishnan, Ritchken and Thomson (2008), who use the Diebold/Li parameterisation for the estimation of firm–specific credit spread curves. They find that for modeling the evolution of the credit spread curve, current credit spreads and default–free interest rates represent a sufficient state variable in the sense that they subsume all relevant marketwide and firm–specific information. They note that this is an argument against using an affine term structure model for the credit spreads, because in such a model the state variable would be the current credit spread curve only. They also find that no explanatory power is gained by adding, say, equity values or equity volatility to the analysis.

This last point is somewhat at odds with previous results. For example, Bedendo, Cathcart and El-Jahel (2007) find that firm–specific equity volatility is an important determinant of the level, slope and curvature of credit spreads, most significantly for bonds of lower rating, while equity index returns also have an important impact on the shape of the credit spread term structure, most strongly for higher–rated obligors. The widely cited study of Collin-Dufresne, Goldstein and Martin (2001) finds the presence of an additional factor in credit spread dynamics, which is independent of the commonly considered credit risk factors, including the default–free term structure, equity returns and volatility.

4. Australian credit spreads: What is known from the literature

Very little work has been published on the term structure of interest rates for Australian corporate debt, and typically the authors restrict themselves to conducting statistical regressions aimed at identifying the variables explaining Australian credit spreads, with neither term structure estimation nor out–of–sample forecasting receiving much attention.

Batten, Hogan and Jacoby (2005) perform such a regression study on a daily sample of non-callable Australian–dollar–denominated Eurobonds and find inverse relationships between the changes in credit spreads and both changes in equity index returns and changes in default–free bond yields. This reinforced the results of a previous, similar study by Batten and Hogan (2003), which additionally found the slope of the default–free yield curve to be of little significance in explaining the evolution of credit spreads. This is somewhat at odds with more recent results by Frino, Lepone and Wong (2007), which indicate that the most important determinants of changes in Australian credit spreads are changes in the default–free spot rate of interest and in the slope of the default–free yield curve. Both relationships are found to be negative.

As no work is available, which directly fits a term structure of credit spreads to Australian corporate bond data, any methodology considered for use by IPART will have to be carefully empirically validated. One should also consider alternative sources of credit spread information, i.e. the market for credit default swaps (CDSs),

although this would entail additional issues involving market liquidity and exchange rate risk.

5. Recommended approach to the problem

(1) Based on the considerations detailed above, it seems advisable to decompose the interest rate term structure of Australian corporate debt into a ("risk-less") reference curve and a term structure of credit spreads, thus reducing the problem of extrapolation of the term structure to the latter. Following Krishnan, Ritchken and Thomson (2008), one can implement the Diebold/Li parameterisation for both the reference curve and for the term structure of credit spreads. In order to establish the applicability of this approach to the Australian context, one should replicate the Krishnan/Ritchken/Thomson study on Australian data.

(2) The markets for Australian–dollar–denominated corporate debt are relatively thin, specially at longer maturities, so it would be useful if the data from these markets could be augmented with information from the Euro and US dollar credit spreads. This would in particular assist by providing information on the factor postulated by Collin-Dufresne, Goldstein and Martin (2001) to be specific to the credit spread (assuming that this factor is common across the industrialised economies).

    One can attempt to achieve this by jointly modelling the credit spread curves in Australia, the US and the EU using the Krishnan/Ritchken/Thomson approach, with aim to establish whether credit spreads in the latter two currencies have any explanatory power for Australian credit spreads. Anectdotally, there is some reason to expect that this will be the case: As the Head of Debt Research of Commonwealth Bank[5] noted in a recent presentation, "[. . .] the performance of Australia's banks and credit markets has been remarkably similar to the United States and other markets." This befits Australia's status as a small open economy with a large current account deficit, heavily reliant on external financing and thus much exposed to global financial shocks.

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[5] See Donaldson (2008).

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B Mapping Standard & Poor's and Moody's credit ratings

The following table shows how APRA would expect credit ratings to compare between Standard & Poor's and Moody's.

Table B.1 Recognised long-term ratings and equivalent credit rating grades

Credit rating grade	Standard & Poor's Corporation	Moody's Investor Services	Fitch Ratings
1	AAA AA+ AA AA-	Aaa Aa1 Aa2 Aa3	AAA AA+ AA AA-
2	A+ A A-	A1 A2 A3	A+ A A-
3	BBB+ BBB BBB-	Baa1 Baa2 Baa3	BBB+ BBB BBB-
4	BB+ BB BB-	Ba1 Ba2 Ba3	BB+ BB BB-
5	B+ B B-	B1 B2 B3	B+ B B-
6	CCC+ CCC CCC- CC C D	Caa1 Caa2 Caa3 Ca C	CCC+ CCC CCC- CC C D

Source: APRA: http://www.apra.gov.au/ADI/upload/Final-APG-120-November-2007.pdf , p 13.

C Glossary

Capital asset pricing model (CAPM)

The CAPM is used in the estimation of the cost of equity. The CAPM is based on the assumption that an investor in an asset requires additional returns to compensate for the risk borne. Thus, the CAPM states that a firm's cost of equity capital is equal to the risk free rate of return on the market, plus a premium above the risk free rate, to reflect the relative riskiness of the investment.

Credit spread

Bond prices are quoted as yields. This yield comprises the nominal risk free rate and a company or government specific risk premium[27]. This risk premium is commonly referred to as the credit spread (or alternatively the debt margin).

Credit wrapping

Credit wrapping is a form of credit enhancement in which bond insurers lend their higher rating to lower-rated companies, allowing them to sell their bonds at a cheaper rate and to a wider number of investors. In return for the credit enhancement, the issuing entity pays a premium to the insurer.

Debt margin

Bond prices are quoted as yields. This yield comprises the nominal risk free rate and a company or government specific risk premium[28]. This risk premium is commonly referred to as the debt margin (or alternatively the credit spread).

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27 This premium may also be affected by the type of bond issued, for example, a bond with a call or put option may require an additional premium.

28 This premium may also be affected by the type of bond issued, for example, a bond with a call or put option may require an additional premium.

Fair yield curve (or fair value curve)

A statistical estimate of the yields of a particular set of bonds (for example by credit rating) for a defined term structure (for example form now to 10 years). This type of model is widely used in bond markets for bond valuations.

Nominal risk free rate

The risk free rate is the starting point for all expected return models (for example CAPM). For an asset to be risk free, it has to meet two conditions:

1. there can be no risk of default associated with its cash flows, and
2. there can be no reinvestment risk.

In reality, such an asset does not exist and it is common to use a quasi default-free (government) zero coupon rate. In Australia, regulators use Commonwealth Government bonds.

Term structure

A yield curve displaying the relationship between spot rates of zero-coupon securities and their term to maturity. The resulting curve allows an interest rate pattern to be determined, which can then be used to discount cash flows appropriately. Unfortunately, most bonds carry coupons, so the term structure must be determined using the prices of these securities.

Term to maturity

The remaining life of a financial instrument. In bonds, it is the time between when the bond is issued and when it matures (maturity date), at which time the issuer must redeem the bond by paying the principal (or face value).

Yield-to-maturity

The rate of return anticipated on a bond if it is held until the maturity date. YTM is considered a long-term bond yield expressed as an annual rate. The calculation of YTM takes into account the current market price, par value, coupon interest rate and time to maturity. It is also assumed that all coupons are reinvested at the same rate.

D Bloomberg tickers[29]

Name	Bloomberg ticker
CORPORATE BONDS	EF0231854 Corp
Coles	EF1026097 Corp
Santos	EC0870795 Corp
Snowy Hydro	EF870795Corp
Snowy wrapped	ED109422 Corp
General Property Trust	EF6371578 Corp
AGL	ED672423 Corp
SPI Electricty and Gas	EC874743 Corp
Citipower	EF538766Corp
Gasnet	ED233950Corp
Electranet	EF1007840 Corp
Alinta	
FAIR VALUE CURVES	C3575Y Index
BFV AUD Australia Domestic **AAA 5 Year**	C3577Y Index
BFV AUD Australia Domestic **AAA 7 Year**	C3578Y Index
BFV AUD Australia Domestic **AAA 8 Year**	C3579Y Index
BFV AUD Australia Domestic **AAA 9 Year**	C35710Y Index
BFV AUD Australia Domestic **AAA 10 Year**	C35715Y Index
BFV AUD Australia Domestic **AAA 15 Year**	C35720Y Index
BFV AUD Australia Domestic **AAA 20 Year**	C3585Y Index
BFV AUD Australia Domestic **(AA) 5 Year**	C3587Y Index
BFV AUD Australia Domestic **(AA) 7 Year**	C3588Y Index
BFV AUD Australia Domestic **(AA) 8 Year**	C3595Y Index
BFV AUD Australia Domestic **(A) 5 Year**	C3597Y Index
BFV AUD Australia Domestic **(A) 7 Year**	C3598Y Index
BFV AUD Australia Domestic **(A) 8 Year**	C3599Y Index
BFV AUD Australia Domestic **(A) 9 Year**	C35910Y Index
BFV AUD Australia Domestic (**A) 10 Yea**r	C3565Y Index
BFV AUD Australia Domestic **(BBB) 5 Year**	C3567Y Index
BFV AUD Australia Domestic **(BBB) 7 Year**	C3568Y Index
BFV AUD Australia Domestic **(BBB) 8 Year**	EF0231854 Corp

[29] These tickers identify securities on Bloomberg – similar to the ASX codes on the ASX.