YOUR TRUSTED VALUE ADVISER



Review of Debt Risk Premium and Market Risk Premium

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Prepared for Aurizon

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Executive Summary

The recent impact of the GFC and aftermath on capital markets has brought into focus a deficiency in the way the weighted average cost of capital ["WACC"] has generally been estimated. The WACC for decision making and regulatory purposes is an opportunity cost which should reflect the best view of economic conditions that are expected to prevail over the decision horizon. In well attended capital markets the spot rate on long dated financial instruments best reflects the opportunity cost for long-lived assets like those held by Aurizon.

However a mix of average and spot rates is generally used to estimate the cost of equity whereas a spot rate is used for the cost of debt. The cost of equity is usually estimated with a spot risk free rate but an average equity risk premium, in turn estimated as an average market risk premium (usually over a very long horizon) and an average beta (usually estimated over a much shorter time horizon). For explanatory purposes, the average market risk premium can be viewed as if it is an average market return less an average risk free rate (although this is not the way it is calculated). An outcome of the usual process is that the risk free rate, to which an equity risk premium is added, is a spot rate (explicitly using the CAPM approach) and will therefore differ from that implicit in the market risk premium [$E(R_m) - R_f$] where an average risk free rate is used i.e. the risk free used as the first term in the CAPM equation is different from that used as the second term.

Recent increased risk in capital markets is naturally accompanied by an increase in the risk premium in required rates of return. This will be reflected in the cost of debt component of the WACC estimate but not in the equity component when long term averages are used, thereby underestimating the WACC under current high risk conditions (the converse also holds).

Two further matters may have exacerbated the challenge in estimating a WACC currently. One is that the thinness of the Australian corporate debt market (in both size and number of trades) means a paucity of data for estimating a debt risk premium ["DRP"], particularly for 10 year bonds, and a need to use a form of modelling for this purpose – always second best to using actual market data. The other is changes in liquidity and in the demand for long dated Commonwealth Government Securities ["CGS"] causing some concern that the risk free rate is lower than it would be otherwise.

A WACC will be estimated for Aurizon for price determination purposes and we have been asked for advice around matters dealing with estimating the cost of debt and equity under conditions described above.

Our preference is to use an independent and professional source of market based information where possible i.e. one not involved in the regulatory setting process. In this regard we are comfortable with use of the Bloomberg fair value curve as the primary input to the cost of 10 year debt. There are a number of ways to extend the curve from seven to 10 years and we propose the use of matched pairs as the primary data source although triangulation to sense check is important given paucity of data. We note, for the purpose of estimating its refinancing allowance the Queensland Competition Authority ["QCA"] used a method of estimating the DRP that mimics advice from NSW TCorp to the nine utilities it funds to hedge its debt for the regulatory period. As a consequence the QCA process includes the costs of this activity. We are comfortable with this approach provided it mimics the cost of 10 year debt but note a challenge in obtaining the swap cost in particular as this is not transparent. In general we would expect the method used by the Australian Energy Regulatory ["AER"] and the QCA should give the same result otherwise it implies an arbitrage opportunity. If the estimates differ then would not be clear which is the more accurate – both could be wrong as well.

We are of the view that 6% underestimates the current expected MRP. There are two reasons for this. One is that the 6% is largely influenced by the historical record and we are of the view that 7% is a better reflection of this record for estimation purposes under current tax systems. The other is that current risk spreads in the capital market have risen since the GFC, all this points to the equity spread (risk premium) is also rising. The relatively high debt spreads, in particular, suggest the MRP has increased above the long term average. We do not support the view that the increase in debt spreads can be substantially explained by idiosyncratic default risk but are of the view that it is a result of increased systematic risk and is symptomatic of an increase in risk premiums on financial instruments more generally.

The regulatory process for Aurizon, and more generally, sets a maximum revenue and price profile over the regulatory period and these are set prior to the beginning of the period. The lack of flexibility in pricing relative to a non-regulated environment exposes the regulated business to an additional risk, particularly the change in the cost of capital during the course of the regulatory period. Estimating the size of this risk (the insurance cost) is problematic. The implicit assumption by Australian regulators appears to be that the WACC set at the beginning of the period is an unbiased reflection of the way the cost of capital will evolve until the next reset. A different view is apparent in the UK in that the regulatory authority Ofgem has decided to introduce indexation of the cost of debt and enable prices to change in keeping with changes in debt costs. Clearly this is only a partial recognition of changes in the cost of capital because it does not index change in the cost of equity. An alternative to indexation in the Australian context is to introduce a range in the WACC and to select a WACC above the mid-point. This is the process followed in NZ.

Scope

1. We have been asked to prepare a report for Aurizon dealing with the following.

   a) *"A review of QCA's approach to estimating the debt risk premium and recommendation of the preferred approach;*

   b) *A review of the suitability of an equity risk premium of 6.0 percent under current market conditions including but not limited to:*

      - *The historical MRP*
      - *a contrast of the current economic conditions and those at the time of the GFC with a particular focus on any relevant metrics such as equity market volatility*
      - *a recommendation of the current MRP that should be applied over the regulatory period;*
      - *timing issues associated with the setting of the cost of equity in a regulatory context;*

   c) *A review timing issues associated with the setting of the cost of equity in a regulatory context including but not limited to*

      - *the ability of equity investors to manage or hedge variations between the expected cost of equity determined at the commencement of the regulatory control period and changes in that expectation if that expected cost of equity was reviewed more frequently within the term of the regulatory control period*
      - *the normal commercial frequency of review and setting the cost of equity, or the markets approach to resetting the cost of equity for valuation purposes*
      - *the relevant economic arguments for and against setting the cost of equity on an annual basis, including evidence of where this approach is applied by economic regulators*
      - *the suitability of using financial information from derivative markets to determine the risk free rate expected to prevail over the regulatory control period*
      - *the relationship between the risk free rate and the MRP*
      - *issues in quantifying the impact of volatility of WACC inputs*."

2. This report follows the major heading structure above after presenting some introductory remarks to provide a setting for addressing the brief.

Introductory Remarks

3. In this section we outline background material to provide a setting for addressing the matters in the Request For Proposal.

The Cost of Capital

4. The cost of capital of the asset or investment can be viewed as the required total reward for investors bearing risk and tying up capital over the life of the asset. The cost of capital is an input to price determination hearings in regulatory price jurisdictions in Australia. These determinations consider a return on capital to be an appropriate 'cost' of doing business and an estimate of it is built into an assessment of regulatory revenue requirements.

5. The cost of capital for these purposes is estimated as a weighted average of the current cost of debt and the current cost of equity. In general this weighted average cost of capital ("WACC") can be expressed as:

$$WACC = k_d\, D/V + k_e\, E/V \qquad (1)$$

Where k_e is the required return on equity of cost of equity

k_d is the required return on debt or cost of debt

D/V is the market value of debt as a proportion of the market value of equity and debt

E/V is the market value of equity as a proportion of the market value of equity and debt which is (1 – D/V)

V is the market value of debt plus the market value of equity

6. This form of the WACC is often referred to as the 'plain vanilla' WACC and it assumes all tax effects of financing, e.g. the tax deductibility of interest and imputation tax credits, are reflected in the associated cash flows.

7. The cost of debt is usually estimated as a benchmark risk free rate plus a premium for risk. The cost of equity is similarly calculated but by using the capital asset pricing model ["CAPM"].

8. The CAPM equation is defined as:

$$k_e = r_f + [k_m - r_f]\,\beta_e \qquad (2)$$

Where k_e is the expected return on asset e or cost of equity if the asset is equity

r_f is the nominal risk free rate of return

k_m is the expected return on the market portfolio

$[k_m) - r_f]$ is often called the expected market risk premium ["MRP"] being the amount by which investors will be rewarded for bearing the risk of the market portfolio which has a beta of 1

β_e is the risk of asset e relative to the risk of the market or equity beta.

9. In principle the CAPM could be used to estimate both the cost of debt and the cost of equity since both are risky assets. However, the cost of debt in regulatory hearings is based on a risk free rate plus a premium estimated from market trades (i.e. independent of the CAPM) - we are most comfortable with this approach because market trading data is a better reflection of reality than a model such as CAPM. Consequently the overall WACC can be expressed as:

$$\text{WACC} = (r_f + \text{debt premium})\ D/V + (r_f + [k_m - r_f]\ \beta_e\ E/V \qquad (3)$$

10. From this equation it is apparent that the risk free rate is generally used for two (related) purposes in establishing the cost of capital for price determinations. It is used as a base reference rate when establishing the cost of debt,it is also used as a base reference rate as an input to the CAPM when used to assess the cost of equity. In the latter case it appears as both the first term in the CAPM equation and as a deduction for the expected market return to define the market risk premium ("MRP"), in effect a 'base rate' against which equity is set e.g. the expected return on equity under the CAPM is (re-arranging the equation (2) above):

$$k_e = r_f(1-\beta_e) + \beta_e k_m$$

11. In theory, all the risk free rate terms in equation (3) should be the same, however what is important is that the cost of debt and equity reflect what investors in the asset require to motivate them to invest.

12. The CAPM is a one period model but the time period is not specified. Consequently there are challenges in applying it in practice both in defining an appropriate time period and in dealing with a multi-period decision environment.

13. Conceptually it is the price setter's horizon that would define the period but typically there is an assumption of some match between the asset life and investors' planning horizon. Since rail network assets are long term assets (greater than 50 years to our understanding) our starting point is that the output from the CAPM should capture the long term opportunity cost of investors.

14. Given that there is a term structure of interest rates which is usually not flat a choice has to be made as to what term is relevant for both the CAPM (since the CAPM only is silent on the term) and the maturity of debt. We have argued elsewhere that the term should be 10 years and we assume this in the remainder of this paper.[1]Consequently the risk free rate, debt risk premium and equity risk premium should be relative to a 10 year 'risk free' security usually assessed by the yield on a Commonwealth Treasury Bond.

[1] See for example, Officer RR and SR Bishop, "Term of the Risk Free Rate: Commentary", Paper submitted to AER, September 2008.

Assessment of the WACC

15. The WACC is usually assessed at a point in time. For most investment decision making purposes (by firms or investors) it should reflect the forward view of the required rates or return given the information available at that point in time. Generally it is assumed that market rates used as inputs are unbiased expectations of rates applicable over the forward time horizon (with 10 years as the typical default in regulatory hearings).

16. The guidelines for regulatory hearings call for a cost of capital that is reflective of current economic circumstances.

> *"The rate of return on capital is to be commensurate with the prevailing conditions in the market for funds and the risks involved in providing reference services: NGR r 87(1)" ACT Envestra #57*[2]

17. This means spot rates should be the basis for inputs to the WACC as they are reflective of current economic circumstances. Of course this applies to both debt and equity and the weights of these in the WACC calculation should reflect the market value proportions of the source of funds expected to prevail over the period of interest.

18. An important overlay is the ranking of the sources of inputs to the assessment. In our view market trading data is, under most circumstances, the most appropriate source. While such data may not be available for a particular company comparable company data may be the next best source. In absence of such data, pricing models may be used again with market data as inputs where available.

19. Most regulatory authorities in Australia (e.g. AER, ESCOSA, QCA) estimate the WACC for 'utilities' using a 'benchmark' company with an assumed debt to capital value ratio of 60% and a credit rating in the BBB range – we assume the credit rating for Aurizon will be in the BBB range but with benchmark gearing of 55% as has been the case in the past for Aurizon.

20. As noted, a WACC that reflects current economic conditions would be best estimated using 'spot' rates however all necessary data is not readily observable. Because of the contractual nature of debt we can usually observe a spot rate for the required yield on debt from trades in the debt but such a rate is not available for equity. This is because equity-holders are 'residual claimants' to the earnings and assets of the company and there is no 'promised' yield or rate of return like that used to compute a yield on debt. Therefore, a model of equity returns is necessary to estimate an expected yield or return. The CAPM is the most widely used model for this purpose, although other models are available e.g. other factor models and the Dividend Growth Model.

21. Tho only 'observable' spot rate for the CAPM is the risk free rate (really a default free rate). The market risk premium ["MRP"] and beta have to be estimated, usually with historical based estimates as the primary guide. The Inputs to CAPM are usually mixed – spot for r_f (or average of recent trades) but (usually) an

[2] Australian Competition Tribunal "Application by Envestra Ltd (No 2) [2012] ACompT 3"

average for MRP and an historical beta estimated over a 'long period' (the length, usually depending on data availability but 60 months is commonly used).

22. The mixed use of spot rates for debt (the risk free rate) but an historical average for the equity risk premium (and beta) has not been an issue of great concern under fairly stable market conditions – but it has presented some significant challenges recently.

23. The first area of challenge is that since the advent of the so called global financial crisis ["GFC"] spot rates on debt margins or risk premiums have risen well above the level experienced through most of the last decade. This means the cost of debt, as usually estimated, will reflect this increase in risk but the cost of equity estimated using a historically based MRP will not. A consequence will be the narrowing of the margin between the cost of debt and equity, and in the case of a recent QCA determination for SEQ Water the incongruent outcome of a cost of debt higher than the cost of equity.[3]

24. The second area of challenge is when the rates are set for time periods that are less than the 'life' of the assets. The concern is that current risk free rates are generally low around the world relative to pre GFC levels. If price determination hearings occur when rates are 'low' which subsequently rise over the regulatory price review period then, given inflexibility in output prices, regulated businesses are concerned investors will not be able to earn the prevailing required rate of return for long term investments or assets. Of course the converse will also hold whereby regulatory authorities will be concerned that investors are overcompensated if the WACC is set for a period that is less than the 'life' of the investment and the risk free rate falls.

Treatment of Risks

25. An intention of building a capital cost (WACC times 'capital') into price determinations is to provide investors with a return commensurate with the risk faced. Under the CAPM the equity risk of a particular company is partitioned into systematic and unsystematic (or idiosyncratic) risk. The former is the residual of total risk (variance of returns) not 'diversified away' by holding a broadly based market portfolio. The return required for this risk is MRP x equity beta. The only risk rewarded with a premium is systematic risk.

26. Nonetheless a business and shareholders do face idiosyncratic risk and this can impose significant costs on the business e.g. a fire or flood that renders the network unusable. Some of these risks are insurable by a third party and the actuarial fair cost of the insurance is a cost that should be built into the recoverable cost of the business. However many of these risks are self-insured and the equivalent actuarially fair insurance cost is hard to estimate. This estimation difficulty does not deny the legitimacy of the expense. Some businesses set up a sinking fund or carry additional equity to deal with unexpected losses of this type e.g. banks carry capital for this purpose (regulated capital is the minimum). This investment is a necessary component of business and if the risk is dealt with in this way then it

[3] Queensland Competition Authority, "Final Report SEQ Interim Price Monitoring for 2010/11 Part B – Detailed Assessment", March 2011

should earn the cost of the capital implicitly or explicitly needed to meet such contingencies.

27. With this background setting we now address the three areas asked of us viz:

    a. The debt risk premium;

    b. The equity risk premium; and

    c. The timing of estimating the proxy for the risk free rate and cost of equity.

The Debt Risk Premium

Preamble

28. There is both a term and risk structure of interest rates. Typically, the term structure is upward sloping, the risk structure is always positive or 'upward sloping'. For example, 1) the annual equivalent yield on long term Commonwealth Treasury Bonds ["CTB"] is higher than 5 year and 1 year debt, and 2) the risk premium on BBB long term debt is usually higher than short term BBB debt. Of course the risk premium on BBB debt is higher than lower risk debt.

29. From a risk management perspective it would be prudent to finance an investment in an asset with debt that matches the life of the asset – this minimises roll-over risk. However it is challenging to obtain debt that matches the very long life of rail network assets. Consequently network businesses face roll-over risk (the risk of not being able to borrow at the 'regulated cost' or not being able to borrow at all at the time the assets require re-financing).

30. Regulated businesses are exposed to the risk arising from prices being set at five year intervals and the 'recoverable' cost being fixed for that time period. This is unlikely to correspond to the timing of rolling over prudently managed debt maturity profiles and to the maturity of debt contracts or the refinancing of equity.

31. In general for utilities the regulatory authorities have worked with a benchmark debt to value ratio of about 60% and a corresponding debt rating in the BBB range. We understand that the benchmark debt to value ratio for Aurizon is 55% and the rating in is the BBB range. This is not necessarily inconsistent with a benchmark for utilities of 60% ,it could simply imply that in order to 'obtain' a BBB rating QR requires marginally less debt than the benchmark.

32. Typically the debt premium is over CTB yields (the Commonwealth Bonds acting as a surrogate r_f) to estimate the yields on BBB bonds. A real challenge in Australia to obtain accurate or even reasonable estimates of the premium because the corporate debt market is small and thinly traded.

Core Regulatory Related Issues

33. There are two core issues when establishing a debt risk premium ["DRP"] for BBB+ debt for Aurizon:

    a. What is an appropriate term of debt when assessing the DRP?

    b. How to estimate the premium for the term. There are a number of sub-issues:

- How to deal with the paucity of traded utility debt to obtain market based comparable yields and therefore the DRP - there are a relatively small number of traded bonds and there is low liquidity in the market;
- What is the most appropriate data source for trades given that many of the yields available in the public domain do not necessary represent trades but rather a view of what traders believe the price and yield of the bonds might have been had a trade occurred;
- There is often overlap in the yields on bonds in the BBB range (and the AA- range for that matter) i.e. a rate sheet may show the yield on a BBB+ as lower than a BBB bond;
- Finally, most importantly, how to estimate the DRP on a 10 year bond when there are no bonds or trades of Australian issued bonds with this maturity in the Australian market.

34. These issues have been addressed by the different regulatory authorities over time and there is not a clear consensus at this time on all issues.

35. For example, IPART favour a 5 year term (see Sydney Water for example) whereas the AER and QCA have accepted a 10 year term. In choosing 5 year term as the starting point, the QCA accepted that infrastructure businesses raise long term debt and recognised a 10 year term as appropriate for debt when estimating the WACC. It included the cost of swapping debt for a fixed term equal to the regulatory period.[4] The AER have expressed a view that they are locked into a 10 year term to be consistent with the choice of the risk free rate proxy. Our view is that a ten year term is the 'best' assumption to make and we proceed on this basis with our focus in this paper on the second set of issues.[5]

[4] See Queensland Competition Authority, "Final Report SEQ Interim Price Monitoring for 2010/11 Part B – Detailed Assessment", March 2011

[5] Our views on the most appropriate term appear in Officer and Bishop (2008) [ENA] and Officer and Bishop (2011) [ESCOSA]

Review of QCA Approach to DRP

QCA Approach

36. The QCA took a different view to the other regulatory authorities in its determination for SEQ water and wastewater distribution and retail activities (the SEQ water decision) and subsequently in its draft QRN proposal.[6]

- while maintaining the view that the term to maturity for the risk-free rate and debt margin should match the length of the regulatory period, it accepted advice that regulated businesses are more likely to borrow for longer terms (i.e. 10 years); and
- It concluded that it is reasonable to fix interest rates for the regulatory period and incur the associated swap cost.

37. The QCA position is captured in the quote below:

> *"In assessing the efficient cost of debt in the Draft Report, the Authority acknowledged that firms subject to a fixed regulatory cycle might issue longer-term debt, due to refinancing risk. Refinancing risk is not a matter to be resolved through in-principle arguments but with reference to empirical evidence of relevant comparators." p248 SEQ Water*
>
> *"Accordingly, the Authority considers that a reasonable cost of debt for theQR Network [Aurizon] is 9.94% which is comprised of the 5-year risk-free rate (519 bp); the 5-year debt margin (362 bp); periodic debt refinancing costs (12.5 bp); interest rate swap costs (17.5 bp); and proxy for credit default swap costs (83 bp)." QR Draft Determination 2010*

38. The QCA's approach requires that the costs of refinancing, as well as the transaction costs for swapping from 10 year debt to 5 year debt be included in the cost of debt. We assume the process of swapping from 10 year to 5 year debt is as follows:

a. Two interest rate swaps (this is assumed by Evans and Peck[7]) convert the 10 year risk free rate (actually the inter-bank rate – see later comments) to a 5 year rate:
   - Assume regulated entities borrow 10 year fixed rate debt (if they borrow floating only one swap is required) consistent with the AER approach of measuring a 10 year fixed rate BBB yield;
   - The first swap converts the 10 year fixed rate to 10 year floating rate;
   - The second swap converts back the floating rate to fixed rate over the first 5 years (regulatory period);

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[6] Queensland Competition Authority, "Final Report: SEQ Interim Price Monitoring for 2010/11: Part B – Detailed Assessment, March 2011 and Queensland Competition Authority "QR Network's 2010 DAU – Tariffs and Schedule F, Draft Decision", June 2010

[7] Evans and Peck "SEQ Interim Price Monitoring" 5 January 2011

- At the next regulatory reset, the regulated business would revert to paying the floating rate based on the first swap for the remaining 5 years. This could be once again fixed and would be equivalent to the risk free rate adopted at the 5 year reset.

- The implied rate can be derived by backing out the forward rate between years 5 and 10 that equates the 5 year risk free rate and the 10 year risk free rate.

b. The credit or BBB spread (to the swap rate) also needs to be fixed for the 5 years. While not stated explicitly by QCA, our view is that two CDS contracts would be required:

- as the regulated entity is short (sells) its credit, it hedges the 10 year credit spread by buying its own credit over the 10 years. It does this by selling a 10 year CDS (selling a CDS is analogous to buying a bond);

- it then fixes the 5 year premium by buying a 5 year CDS.

39. We assume that the regulated entity would either buy/sell the CDS on its own credit or on an index comparable to the BBB spread referenced by the regulator. There is an index that includes 25 investment grade CDS in Australia, however only a proportion of these are BBB rated.

40. Rather than trying to estimate the costs of these two CDS contracts, the QCA, on advice from Dr Lally[8], assumed that the costs would be equivalent to the 5 to 10 year term premium for the BBB spread. Specifically it was noted that[9]:

"..credit default swaps are, in general, unavailable to hedge underlying physcial debt with a term of greater than five years"

In addition, the QCA also provides allowance for the costs of refinancing which were assumed to be 0.125% in the draft June 2010 QRN decision. We have assumed a similar cost for the purpose of our analysis.

Commentary on QCA Approach

41. We note that the QCA's preferred approach is to match the term to maturity of the risk free rate to the length of the regulatory period. We disagree with this approach (as we have argued elsewhere) however we have not been asked to cover this issue in this report. Instead, we focus on an assessment of the DRP for 10 year BBB rated debt. We agree with the focus on 10 year debt.

42. To assist our view of the QCA approach, we have tested the relative merits and implementation challenges of three main approaches used by regulators to estimate the DRP. Each approach results in a different cost of debt due to a combination of the method employed and the assumptions of which risks are borne by the regulated entity. In the remainder of this section we:

- Outline the three main approaches and the essential differences;

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[8]Lally M, "The Estimated WACC for the SEQ Interim Price Monitoring", 5 January 2011

[9] Queensland Competition Authority "QR Network, 2010 DAU – Tariffs and Schedule F, Draft Decision", June 2010, page 37

- Outline and discuss a number of options for extending the Bloomberg fair value curve from 7 to 10 years.

Summary of Approaches to Estimating the DRP

43. There are broadly three approaches that have been used to estimate the DRP in regulatory hearings:

    a. Use the 10 year BBB spread (however derived). Our view is that this approach matches the spread to what is commonly regarded as a prudent term for the debt of regulated entities and maintains consistency to the risk free rate employed in the MRP calculation. This is the method currently employed by the AER and ESCOSA for example. These regulators use the Bloomberg fair value curve to obtain the current yield however it now only provides an estimate for a seven year bond. Consequently there is a challenge in finding a suitable method of extending the DRP from seven to ten years;

    b. Use the method outlined in the recent SEQ Water decision and QRN draft 2010 decision by the QCA. This involved recognising that the regulated businesses borrow long term (e.g. ten years) but fix the rate for the regulatory period at each reset, which is consistent with advice from NSW TCorp to the nine utilities for which it provides funding. In this case it used the 5 year BBB spread but includes compensation for the costs of fixing the first 5-years of the debt (both the risk free and risk premium components). In our view this option is the closest approximation to the risks faced by a regulated entity as it recognizes that regulated entities prudently borrow over 10 years. The entities are also incentivized to match the 5-year regulatory process. However there are challenges in obtaining transparent transaction costs;

    c. Use the 5 year BBB spread without adjustment as used by IPART and ERA. This is our least preferred approach as it does not recognize that regulated entities prudently borrow for a longer term and that not all costs of the longer term borrowing will be compensated. We do not support this position.

44. Most importantly, in principle we are of the view that the cost of debt under approaches 'a' and 'b' above should be the same, on the basis that arbitrage opportunities would otherwise exist in a competitive market. A firm issuing 10 year debt could lock in the 10 year debt or follow a process like b. It would choose the cheapest strategy. If the second was lower cost than the first then there would be little demand for the 10 year debt i.e. firms would borrow for two five year periods bearing the transaction and rollover costs. If a was a lower cost than b then those wanting 10 year debt would not be interested in the equivalent of 5 year debt.

Key Differences of the Approaches

45. As we interpret the way the QCA's approach is implemented, approaches 'a' and 'b' outlined above will provide similar estimates. This is because both rely on the estimated 10 year BBB spread (excluding the swap costs and refinancing costs which we discuss later). The similarity arose because the QCA deemed it was not possible to estimate the costs of fixing the credit spread for the 5 years directly via the transaction costs of two CDS contracts. The BBB spread between years 5 and 10 was therefore deemed to be the best estimation of the cost in the face of no CDS transaction data.

46. In a non-regulated business, a company that decides to move from 10 year fixed rate debt to 5 year fixed rate debt plus a floating rate between years 5 and 10 would normally do so to enjoy a lower fixed rate in the first five years (net of transaction costs). However, in doing so it would be assuming floating rate risk in the years 5 to 10.

47. In the case of regulated entities, the reset process effectively removes the floating rate risk in years 5 to 10. Even though the entity prudently borrows at a fixed rate for 10 years, there is an incentive to convert this via swaps for example, to a 5 year fixed rate due to the expected regulatory reset at the prevailing rate at the time.

48. Whether the 5 to 10 year rate results in a rate implied by the original 10 year borrowing (the implied forward rate from years 5 to 10) or a rate higher or lower than this implied rate, does not matter. The regulatory reset process should fully compensate the regulated entity for the next five year fixed rate, which the regulated entity could match by converting the remaining floating rate debt to fixed debt in the 5 to 10 year period.

49. To test the approaches and inform us of implementation challenges we have estimated the cost of debt and DRP under each approach using data as at 30 November 2012. The estimates are captured in Table 1. In approach 'a' the cost of debt is assumed fixed for the 10 years implicitly through choice of reference data to the 10 year BBB fixed rate bond yield and results in a cost of debt of 6.42%. In approach 'b' the DRP is fixed for 10 years, but the risk free rate is only fixed for 5 years. Using the Evans and Peck estimates for swap costs and refinancing assumptions of QCA the total cost of debt is 6.24%. This is lower than 'a' but based on the no arbitrage argument we are of the opinion that this is due to errors in estimation. The cost of debt under approach 'c' is 5.67% as both the risk free rate and DRP reflect only the 5 year risk premiums. This lower rate reflects the higher refinancing risks borne by the company.

50. As discussed, the difference in our calculation of the cost of debt based on approaches 'a' and 'b' is likely due to estimation errors. These errors likely relate to:

    a. Estimating the swap costs as we were unable to source up to date costs and therefore relied on the estimates from the draft 2010 decision;

    b. Estimating the 10 year BBB premium;

    c. Any differences in liquidity or markets of different maturity which impact estimation of the costs.

51. Given that the calculation of the cost of debt under approach 'b' involves more steps and is potentially more prone to error we would recommend that the QCA use approach 'a' in the first instance. Should the QCA continue using approach 'b' then we would recommend that a similar calculation to approach 'a' is still undertaken as a 'sense check' to the results and that any difference in the results is explained or justified (for example as relating to refinancing costs not accounted for by approach 'a').

TABLE 1 SUMMARY ESTIMATES FOR THE COST OF DEBT AND DRP BASED ON MAIN APPROACHES*

	a. AER/ ESCOSA Method	b. QCA Method	c. IPART /ERA Method
Risk free rate term	10yr	5yr	5yr
Current risk free rate	3.16%	2.70%	2.70%
BBB Spread			
- 5 year		2.97%	2.97%
- 7-year	3.01%		
- 7 to 10 year premium (based on matched pair analysis later in report)	0.25%		
Transaction Costs			
- Refinancing		0.125%	
- Swaps		0.19%	
- CDS (uses QCA recommendation that this equates 7 to 10 year spread para 45 above)		0.25%	
Total Cost of Debt (%)	6.42	6.24%	5.67%
Debt Risk Premium including all transaction costs (bp)	326	354	297

Note risk free rate and BBB spread data based on average of 20 preceding days trades 30 November 2012. Matched pairs data is average of preceding 5 trading days 30 November 2012 – shorter period based on data available but not expected to provide a biased result.

52. Australia's corporate bond market does not have sufficient bonds of long-dated maturity to estimate directly the 10 year BBB yield and risk spread. Further Bloomberg no longer produce a 10 year FVC.

53. The ideal process for estimating the spread would rely on an independent expert such as Bloomberg. In principle, we agree with Dr Tom Hird of CEG[10], in his assessment that the Bloomberg FVC still represents the most robust process available:

"I consider that there are significant advantages in relying on an independent expert opinion, such as that of Bloomberg, when setting the DRP…. To the extent that the AER is less expert in this are than Bloomberg, it is reasonable that, in the absence of compelling evidence that the measurement of the DRP based on the Bloomberg

[10] Hird, T "Estimating the regulatory debt risk premium for Victorian gas businesses, March 2012

curve would be unreasonable, a presumption should exist in favour of adopting Bloomberg's estimate."

54. However, there still remains the issue that the Bloomberg FVC is only available to 7 years with the remaining difficulty of extrapolating the 7 year data to 10 years. Given the lack of 10 year data a number of approaches have been proposed to estimate the additional risk premium for BBB spreads between the 7 and 10 year maturities:

a. Extrapolation of the curve via some form of trend-line or fitted curve;

b. Approximation via the spread premium from other rating classes (e.g. A, AA, AAA);

c. Identification of matched pairs, i.e. bonds of the same issuer but with different maturities and ideally based on the spread differential at 7 and 10 years. Given that there are no long-dated bonds in the Bloomberg BBB FVC, the pairs need to be sourced from:

- Additional bond pricing data, for example based on rate sheets from UBS;
- Bonds of other rating classes;
- Bonds issued by Australian entities but denominated in USD.

d. The difference in CDS spreads of 7 and 10 year maturities plus any difference in the swap spreads of 7 and 10 year maturities (the swap spread adjustment is necessary to be consistent with a bond yield spread to the risk free rate – this adjustment is outlined in more detail later in this report).

Strengths and Weaknesses of Extrapolation Approaches

55. The approach of directly extrapolating the curve (i.e. fitting an algebraic equation to available data and then extrapolating via the equation) has been undertaken by PwC and CEG and referenced by Lally.[11] This approach does not directly reference market data around the 10 year maturity and therefore presents problems given that it is entirely dependent on the equation used and the currency of the data used to derive the equation. If this approach is to be adopted, it would be best undertaken by an independent third party with recent data and with the third party agreed to by both the regulator and regulated business to minimise debate.

56. The approach of using other rating classes such as A, AA, and AAA to extrapolate to 10 years is not possible at present as the Bloomberg FVCs does not have any data past 7 years for any rating class.

57. The approach of using matched pairs may be a better option, as there are some matched pairs with bonds at 10 year maturities and shorter dated maturities with which a premium could be estimated and averaged. However, we note this method is exposed to idiosyncratic data issues.

[11] Lally, "The Estimated WACC for the SEQ Interim Price Monitoring", 5 January 2011

58. The 'matched pair' approach looks for bonds that have both 7 year and 10 year maturities as an approximation to the extension of the overall curve.

59. The use of CDS data presents an alternative approach to the matched pairs with available data in Bloomberg. However the CDS is not a direct observation of the yield of a BBB bond, which has been the preferred approach of regulators in Australia. There may be instances whereby the 'basis' or match between the CDS and the bond are not exact due to the CDS:

    a. Being USD denominated, i.e. they are written in USD;

    b. Having a 40% recovery rate defined as part of the contract, which may vary significantly from assumed recovery rates implied in bond yields;

    c. Relying on the swap rates to derive the spread over the risk free rate which may introduce unintended errors and whether the average swap spreads reflect the actual counterparty risk of the contract.

Summary / Conclusion for Extrapolation from Seven to Ten Year DRP

60. Unfortunately there is no current approach to estimating the 7 to 10 year BBB spread component of the DRP that will not require the use of informed judgement, given the potential variation in outcomes among the different approaches employed in other regulatory settings and lack of actual bond yield data at the 10 year maturity. Appointing an independent third party expert to estimate the premium would simplify the regulatory process.

61. However, given the approaches that are currently available, our view is that the matched pairs approach appears the most robust and has been subject to debate and analysis by the AER.

62. The use of CDS data has not been thoroughly tested by regulators or regulated entities, perhaps due to reliance on traditional bond pricing historically. Despite the fact that it is relatively robust market data, our analysis highlights the challenge of being able to directly match the CDS to the properties of underlying BBB bond yields.

Matched Pairs Approach

63. As noted above our view is that the matched pairs approach to extending the Bloomberg Fair Value Curve appears the most robust and has been subject to debate and analysis by the AER who accept the approach. Such data can provide market evidence of the additional risk premium required for 10 year debt.

64. An estimate of the additional premium to convert the Bloomberg 7 year maturing debt to 10 years using this approach is summarised in Table 2.

65. The underlying data is taken from UBS Rate sheets for the 5 trading days ending 30 November 2012. Only data on corporate debt for A+, A++, and A- rating classifications was available with debt issued by the same company but with maturities near 10 and 7 years. Banks were excluded from the analysis.

66. Column 6 shows the risk spread relative to the nearest maturing Commonwealth Government Security instrument with column 7 showing the average spread over the prior trading week to deal with any potential aberrations. A simple linear

interpolation (or extrapolation) was undertaken to estimate a risk premium relative to 7 year maturing debt. This is shown in column 8.

67. The average 7 to 10 year risk premium across the 5 matched instruments was 25 basis points (it was 24 basis points based on the trades on 30 November rather than the 5 day average). This was relatively insensitive to leaving out GE Capital, a diversified financial services company. This compares with the 21 basis points that we recommended in our prior report.

68. It is noted that CEG questions the use of SPI E&G due to implicit guarantee by the Singapore Government.[12] Consequently, this data may be an underestimate of the risk premium because the ratings are of lower risk than BBB companies.

TABLE 2 MATCHED PAIR DATA FROM UBS RATE SHEETS FOR A+ AND AAA BONDS

Issuer	Maturity Date	Time to Maturity (Yrs)	S&P Rating	Yield (%)	Margin (bp)	Maturity Spread (bp)	5 Day Average Maturity Spread (bp)	Estimated Premium to 7 Years*	Sector
FONTERRA	11/07/2016	3.6	A+	3.99	137.0				Food Beverage & Tobacco
FONTERRA	23/05/2022	9.5	A+	4.91	182.0	45.0	43.3	19.0	Food Beverage & Tobacco
GECAPITAL	23/08/2017	4.7	AA+	4.28	158.8				Diversified Financials
GECAPITAL	8/08/2022	9.7	AA+	5.19	210.3	51.5	50.6	28.0	Diversified Financials
GECAPITAL	15/03/2019	6.3	AA+	4.66	182.1				Diversified Financials
GECAPITAL	8/08/2022	9.7	AA+	5.19	210.3	28.3	28.2	22.4	Diversified Financials
SPI E&G C	25/09/2017	4.8	A-	4.65	195.2				Utilities
SPI E&G C	28/06/2022	9.6	A-	5.33	223.5	28.4	27.4	15.4	Utilities
SPI E&G C	1/04/2021	8.3	A-	5.08	207.3				Utilities
SPI E&G C	28/06/2022	9.6	A-	5.33	223.5	16.2	18.8	33.7	Utilities
Average								23.7	

[12] Hird, T "Estimating the regulatory debt risk premium for Victorian gas businesses, March 2012

The Equity Risk Premium: Suitability of 6% as Reflecting the Current Market Risk Premium

69. The required return of equity investors (or cost of equity) is generally derived from the CAPM. The CAPM is a forward looking model – it guides an assessment of what equity investors require to compensate them for time and risk over the period of interest. An estimate of the forward looking, or ex ante, equity risk premium (henceforth called the market risk premium ["MRP"] to distinguish it from MRP times beta which is a term that can be used for the equity premium on a particular stock). The MRP is defined as the expected return on the market, $E(r_m)$, less the risk free rate.

70. The most critical parameter is the expectations operator (E). The expectations operator should be thought of as the market's forecast of future or required (expected) returns before they will invest in the equity of 'average' risk (beta of 1). Ideally, what we need is some method of forecasting investor's expectations or equivalently their required returns for the different risk class of assets, averaged over all risk classes to capture the market view. Unfortunately, while such models exist, they require additional assumptions about investor behaviour and rarely have very much to offer in the way of forecast-ability or practicability. In an investment environment, this is perhaps not surprising insofar as if there were forecast abilities in these models then this would remove elements of risk and make the models redundant insofar as they are based on risk or stochastic returns.

71. Our view is that the ex-ante MRP is not constant and probably cannot be adequately represented by a stable distribution. Unfortunately, however, the theory as to what might cause the parameters of the distribution (and thus the mean ex-ante MRP) to change is not well developed. This makes forecasting changes difficult. Moreover, given the volatility of ex post market excess returns, even detecting such a change after the event is extremely difficult. One exception is the current credit crisis where there is a number of market data that all point to an expected MRP above the historical average at least for the short – medium term.

72. In circumstances where forecasting either the long term expected market return or the long term MRP, it is perhaps inevitable that, in order to be objective, forecasts rely heavily on historical data. The reason for relying on such data is that the expectations of investors will be framed on the basis of their experiences, which are of course historical. Therefore the mean of historical distributions of returns or models framing returns could be expected to have had the greatest influence on investors' expectations about the future. Hence the reliance on some average of historical MRPs in order to settle on an estimate of the investor's expected or required MRP.

73. Under these circumstances a longer time series is best as it will not only improve statistical 'accuracy' but also weight events according to the likelihood of occurrence. For example, a short time period that incorporates the 1987 crash could potentially overweight that event compared to its likelihood of occurrence. Similarly, we note that observed market return for 2008 was a negative 40.4%, the lowest in the 128 year history of market returns available to us. From experience to date, this will be over-weighted in a short time horizon. Given the negative

relationship between the 'observed' and expected MRP, a market crash will reduce the historical average when the forward looking MRP will have risen.

74. As we noted at the outset, the use of the historical MRP has not been a major concern before the GFC because market risks have been within what can be called a normal range. However its use is of concern under recent and current circumstances when all indications are that the spot rate, particularly in the short and medium term is above the average. Consequently mixing the use of spot rates on the DRP and the risk free rate with an average for the MRP will, in our view, underestimate the current cost of equity.

75. An alternative approach to estimating an MRP from historical data is to use forward looking approaches. As noted there is no generally agreed and robust method of estimating this. Consequently some form of triangulation is recommended to inform what is essentially judgemental.

76. Informed judgement is not new to finance practitioners and regulators. Any parameter derived from a model can be described in this manner e.g. beta, MRP.

The Historical MRP

77. A number of different views have been presented around the most appropriate historical period over which to estimate the MRP. We have consistently argued for use of a simple average MRP estimated over the longest period for which data is available (1883 to the present) and have noted its sensitivity to the period selected. This is apparent from Figures 1 and 2 below which highlight the basis of our recommendation for 7% as reflective of the historical MRP.

78. Figure 1 commences with the average MRP from historical data calculated with annual observations from 1958 to 1990. Brailsford et al have argued that the market return data from 1958 forward is likely to be more representative of actual market returns than the data available from 1883 to 1957.[13] From the first point, the graph then traces the historical average MRP calculated by adding an additional year up to 2011. Also shown is the average with imputation tax credits included at full value and with a value at 0.36 (i.e. theta - as currently accepted in most recent regulatory hearing based on research by Strategic Finance Group).

79. Figure 2 is similar in construct but commences with the data available from 1883. The data from 1883 to 1958 was taken from Brailsford et al noted above. In this case the impact of imputation tax credits is smaller as they commenced in 1987 and represent a smaller proportion of the longer data set.

[13] Brailsford T, J Handley & K Maheswaran, "Re-examination of the historical equity risk premium in Australia," Accounting and Finance, 48, (2008) pp 73-97 also Accounting and Finance May 2012

FIGURE 1 HISTORICAL MRP FROM 1958 TO 1990 AS FIRST POINT, THEN SUCCESSIVELY ADDING A YEAR

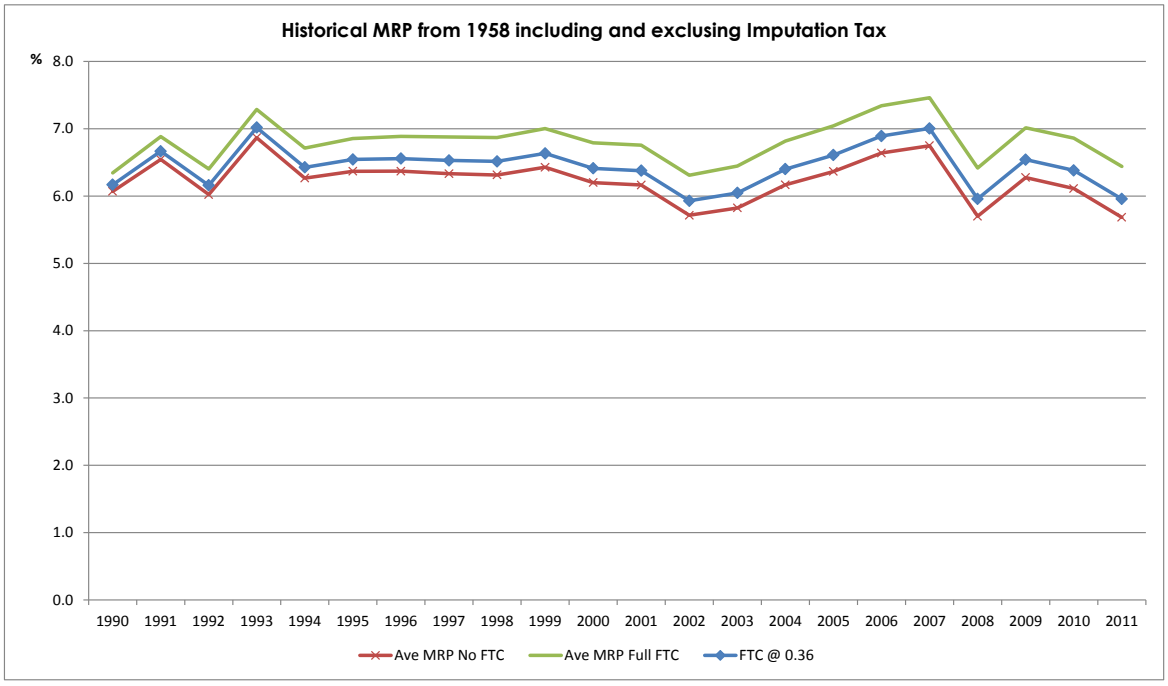
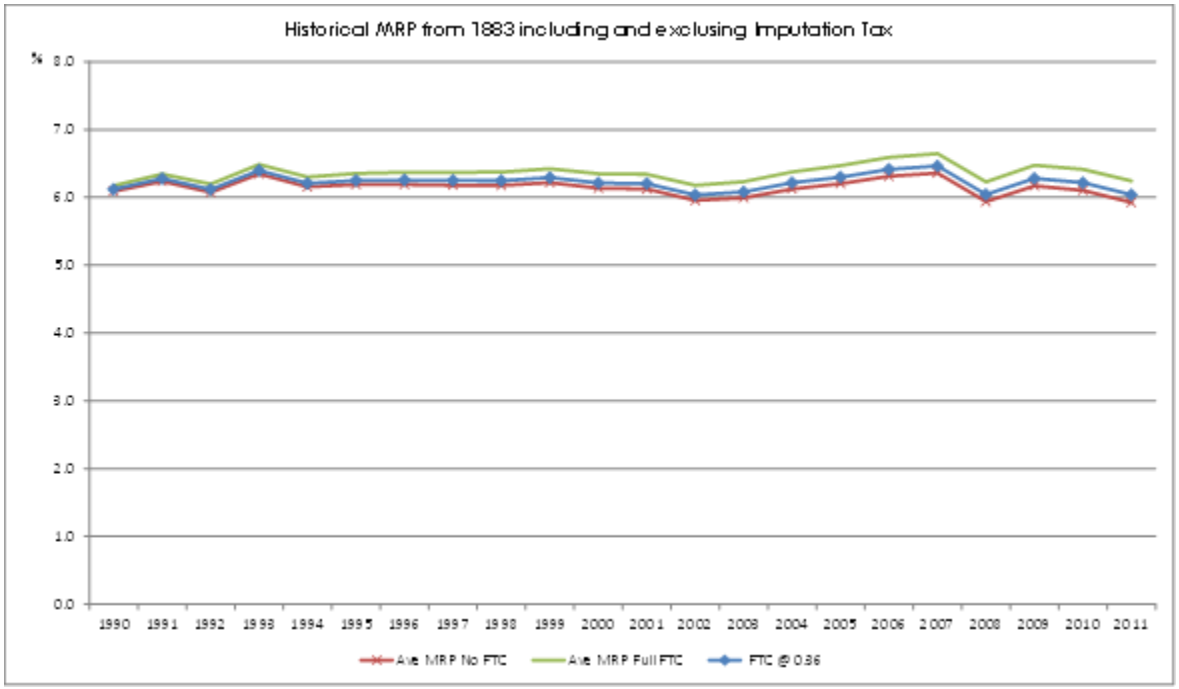


FIGURE 2 HISTORICAL MRP FROM 1883 TO 1990 AS THE FIRST POINT, THEN SUCCESSIVELY ADDING A YEAR



80. The impact of the GFC is evident in both graphs albeit more impactful in the shorter horizon graph. This relatively unusual event reduces the historical average MRP just as the prior boom years increased it.

81. It is evident from both graphs that the historical average risk premium generally falls within the range 6 – 7%.

82. The graphs highlight the danger in choosing just one historical interval to represent the forward MRP because it moves around e.g. the historical average for 1958 – 2007 was 7.5% (including FTC at full value) whereas it was 6.4% one year later – and in a year when the forward MRP would have risen (not fallen) considerably because of the GFC. Clearly the average moves around and is influenced by the most recent events, particularly when the event is substantially different from the prior average. As a further example, the addition of the negative 17% MRP for 2011 decreases the historical average MRP (from 6.9% to 6.2% with full imputation) when the forward MRP will have increased, not fallen. It is inappropriate to decrease a forward estimate of the MRP because the historical average fell under conditions like those being experienced at present i.e. higher than average market risk.

Current Conditions

83. The primary economic conditions and measures of interest when assessing a MRP reflective of current circumstances are those prevailing in the capital market. This is the market where capital is raised to finance asset investment and the market that assesses the value of businesses. Examining metrics of the broader economy, (e.g. GDP growth) and commentary are of interest but not as direct. It can be a stretch to take general economic commentary over more direct capital market measures.

84. In our view the primary metrics of direct relevance include:

- Stock market volatility, particularly implied volatility which reflects a forward view;
- Yields on traded financial instruments, particularly risky debt including credit default swaps ["CDS"];
- Liquidity of financial instruments to the extent it can be measured. There is substantial evidence that investors require a discount for lack of liquidity (alternatively pay a premium for liquid financial instruments). Obtaining detailed data on this is challenging and we have not pursued establishing an empirical relationship time.

85. We examine each of these metrics in more detail below.

Stock Market Volatility

86. The risk that is priced under the CAPM is systematic or market risk. This is usually defined in terms of the variance or standard deviation of the distribution of possible market returns. Consequently a metric that captures a forward view of overall market volatility will be the most direct measure of market risk.

87. Similar to the MRP, average market volatility can be estimated from an historical time series. Our estimate using the longest time series of daily data (from January 1980) is that the average volatility (standard deviation) is 14% pa.

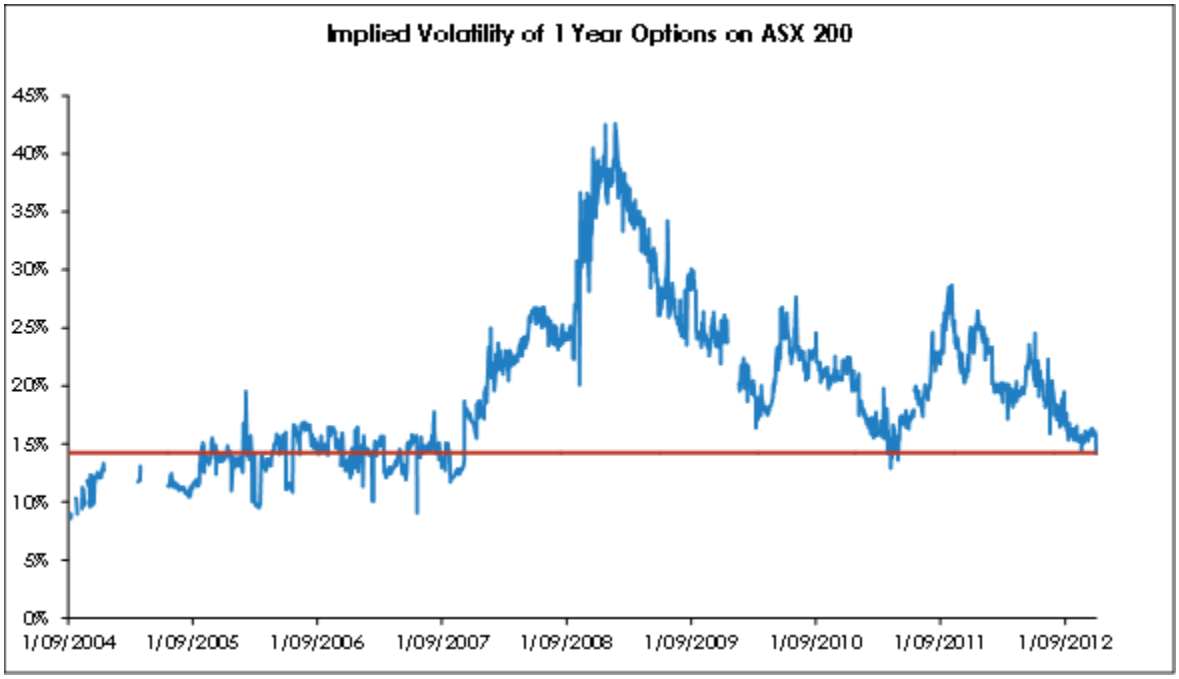
88. Option pricing models use volatility of the underlying asset as an input. A forward estimate of volatility is the only unobservable input to the models having a genesis from the Black and Scholes model. This is usually estimated from recent historical data or 'backed' out of comparable instruments that are priced. The latter estimate is usually called implied volatility.

89. The pricing of options written against a stock market index provides a source of a forward view of overall stock market volatility. The latter can be backed out of an option pricing model. Indexes of implied volatility are readily available e.g. from Bloomberg. The terms to maturity are up to two years however the two year maturity instruments are very thinly traded. We understand that the three month bonds are the most traded however there is a reasonable time series for one year options.

90. Figure 3 presents the implied volatility on one year options to 30 November 2012 and represents the market's one year forward view of risk. Also shown is the pre GFC average which happens to correspond to the long term historical average of 14% noted above.

91. In our view, 14% is the best estimate of average risk essentially because it also accords with the historical estimate derived on data commencing on 1 January 1980 viz. an average of the 90 day moving average as shown in Figure 4.

FIGURE 3 IMPLIED VOLATILITY OF THE EQUITY MARKET



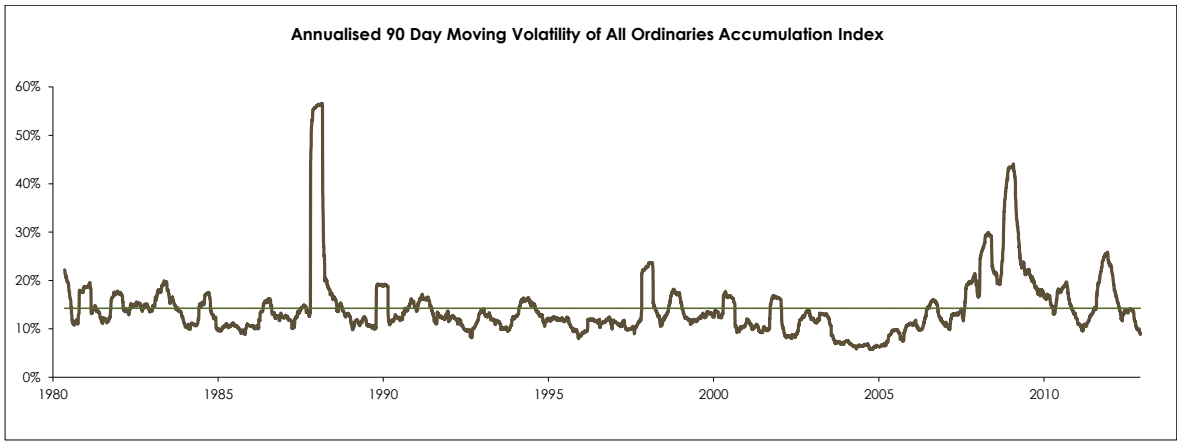
92. The impact of the GFC is evident. Also evident is short period around the turn of the 2010 to 2011 calendar year when volatility returned to the average.

93. It is apparent that volatility appears to be returning to the pre GFC average suggesting a return to the long run average MRP (the 20 day average to 30 November 2012 is above the average). However we note below that this is in conflict with the risk premium in the debt market.

94. Given the conflict we prefer to rely on market data rather than models to guide our assessment of the MRP. Our priors are that changes in the forward estimate of the MRP should, at least, reflect changes in the debt risk premium. Thus given that the debt risk premium is above the pre GFC average then we would also expect the equity MRP to be above the pre GFC average. Since market data is more compelling than model based output, we lean toward the market based data

and expect the MRP to be above the long run average i.e. greater than our view of the long run average of 7% (or 6% as assessed by the AER).

FIGURE 4 HISTORICAL VOLATILITY OF THE EQUITY MARKET



Source: Bloomberg VAA Analysis

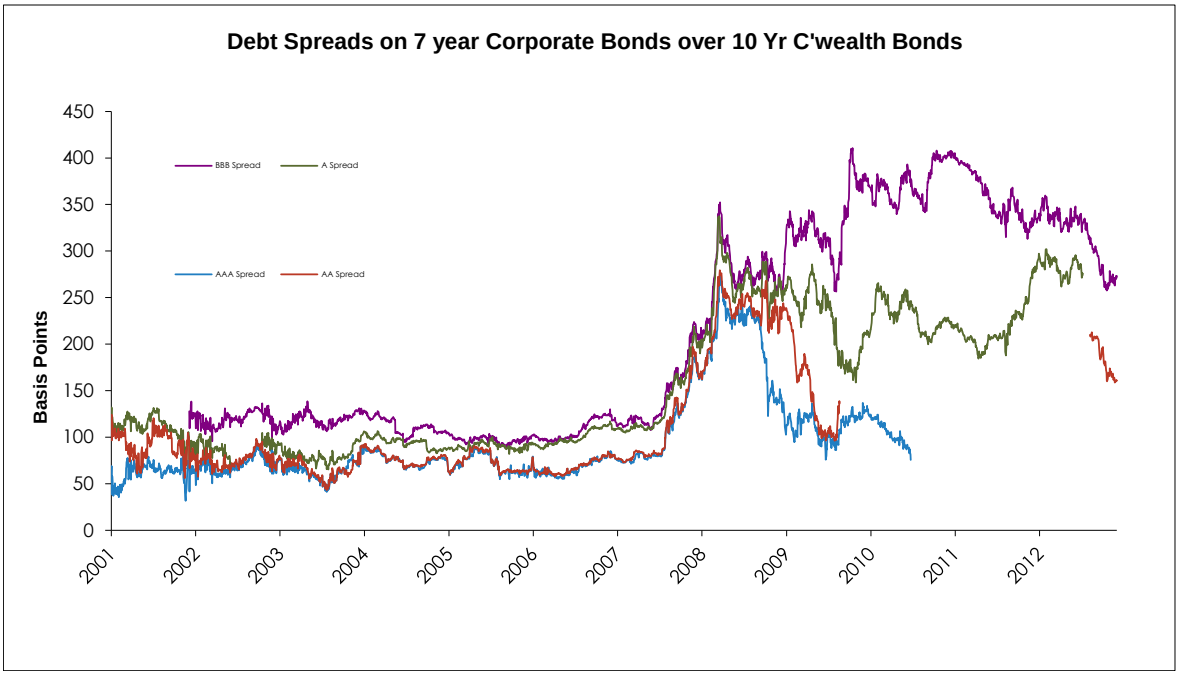
95. The recent one year implied volatility measure at 15.8% (20 day average to 30 November 2012) remains above the average and we estimate an implied MRP of 8% from this (in a later section).

Observed Yields on Financial Instruments

96. While market volatility measures provide evidence of the risk investors face, yields signal how this (and liquidity risk) has been translated into price. The promised cash flows on debt instruments are well defined so given price a yield can be calculated. Unfortunately the flow profile available to equity investors is not as readily available as it is for debt holders so a model is required to assess the required yield – and these are discussed in the next section.

97. A challenge with data from the Australian corporate debt market is the relatively small number of bonds and maturities. Nevertheless, Bloomberg publish a fair value curve for debt instruments as captured in Figure 5. It reveals that yields on corporate bonds have remained well above pre GFC levels. This is particularly the case for the higher risk end of investment grade debt e.g. BBB (closest to equity risk).

FIGURE 5 DEBT RISK SPREADS ON CORPORATE BONDS



Source: Bloomberg VAA Analysis

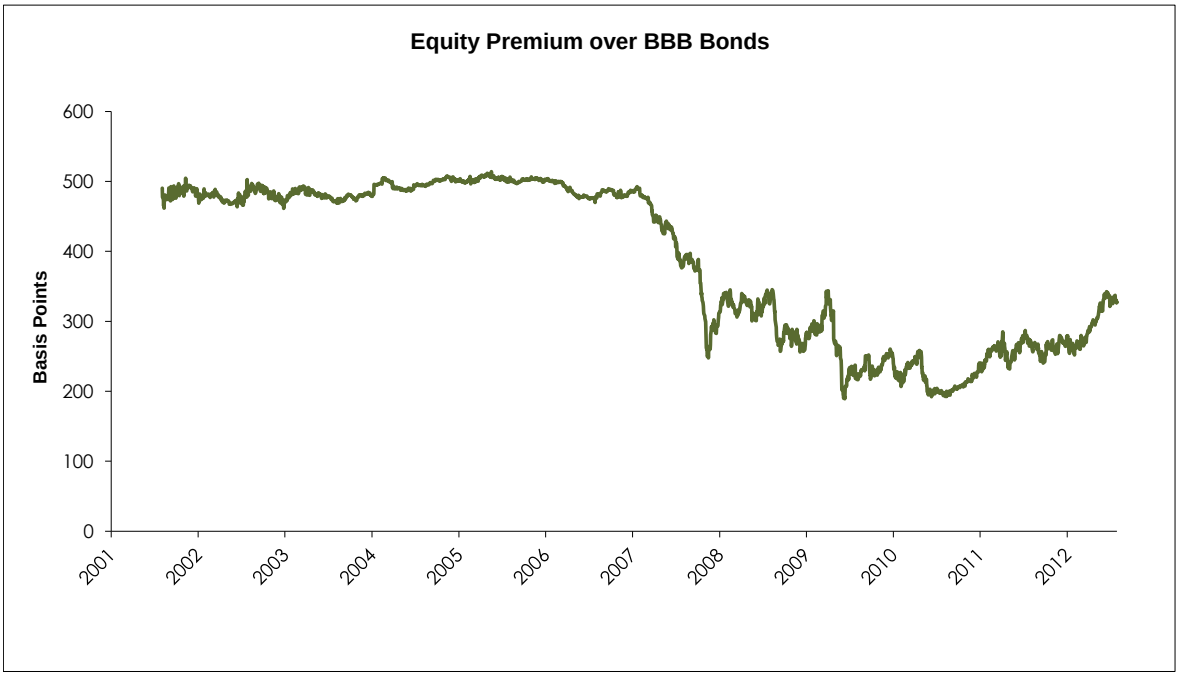
98. In our view this is compelling evidence that investors continue to require a return (MRP) above pre-GFC levels. In addition we note that the yield and risk maturity curve are upward sloping for the longest term available (7 years) thereby the forward rates signal that the premiums are not expected to return to pre GFC levels in that period.

99. Since there are no impediments to moving across debt and equity markets, we would expect the equity premium to behave in a manner that mimics the debt market – the higher than average risk premium in the riskier end of the debt market should also be prevalent in the equity market.

100. An outcome of not recognising the same phenomena across markets and continuing to use an average rather than spot MRP to calculate the cost of equity is a narrowing of the relative risk spread on debt and equity as is apparent in Figure 6 below. The figure shows the 6% MRP less the DRP as it evolved over time. This makes little sense to us. At a minimum we would expect the difference to remain around the same rather than decline. If financial markets become riskier, reflecting underlying economic conditions, then we would expect both debt and equity investors to experience this increased risk – it is hard to see how the equity risk premium (on average) would remain the same when debt markets respond by demanding a higher risk premium. If both debt and equity demand a higher premium for the increased risk then we would expect the margin between the debt and equity risk premium to at least remain the same or, more likely increase, not decrease as the graph shows. Thus we strongly reject the notion that the equity risk premium has remained at 6% in light of increased capital market risk. To believe otherwise would imply a disjoint market between debt and equity and there is no evidence of such, in fact debt can resemble equity in cases of a company facing liquidation and the reverse, equity can resemble debt in cases

where a company has a secure and long term contract (often with government but not necessarily) to provide goods/services that ensure a secure return, e.g. infrastructure assets.

FIGURE 6 DEBT SPREADS COMPARED WITH A 6% MRP



101. Both debt and equity can be priced with the CAPM so debt markets provide an insight into the MRP. We anticipate that betas (debt and equity) are unlikely to change relative to changes in the MRP. Beta is a relative measure of risk and the average has to be one i.e. all betas cannot rise in a market that has increased risk – it is more likely that the MRP will change to reflect the higher risk.

102. Some have argued that it is inappropriate to infer an increase in the MRP from the higher yields in debt markets. Referring to an argument similar that above, McKenzie and Partington write[14]:

> *"There is a potential problem in the foregoing analysis [by Bishop, Fitzsimmons and Officer] however, in that it treats all of the change of the credit spread as being attributable to changes in either the risk premium, or the debt beta, or some combination of two. The implicit assumption is that the expected cash flow (as opposed to the promised cash flow) from the debt has remained unchanged.*
>
> *This is a tenuous proposition. A key element of the GFC was increasing credit risk, with a widespread perception that default risk had increased sharply. Consequently, the expected cash flow on risky debt declined, which caused the price of the debt to fall. Since the yield is calculated on the promised cash flow relative to the price, the yield on risky debt went up and the credit spread widened. This would*

[14] Michael McKenzie & Graham Partington on behalf Of XTR Pty Ltd, "Equity Market Risk Premium: Report To Corrs Chambers Westgarth", December 21, 2011

have happened even if there was no change in the MRP, or debt betas. …

Clearly the analysis of Bishop and Officer (2009) grossly overstates any change in the MRP. Given a change in credit spreads we know of no well developed, reliable, and precise way to separate out the effects of changes in expected cash flow, changes in beta, and changes in the MRP. Thus we recommend that little or no weight be placed on this method when determining the MRP." P30 -31

103. In their supplementary report they state at page 22:

"An increase in default risk will show up in higher promised yields on debt and will likely also show up as a reduction in share prices as expected cash flows to equity are likely to be revised downwards. However, there need not necessarily be any change in the MRP applied to those equity cash flows.

To make the debt yield and the MRP comparable we must convert the promised return on debt to an expected return. To do this we must adjust the promised cash flows to debt holders. for the probability of default."

104. They are arguing that if the increase in debt yields can be attributed to default risk that this is not systematic risk and therefore does not translate to an increase in the MRP in the CAPM. They also appear to be arguing that the increase in the DRP on 7 year bonds from circa 120 basis points pre GFC to circa 320 basis points currently can be explained a change in non-systematic default risk alone.

105. While it is possible that the global financial crisis may have led to an increase in the difference between promised and expected yields on debt in the short - medium term, we would expect the same GFC phenomena to impact upon the required return on equity i.e. it is a macro event and is likely to be systematic or non-diversifiable. Put another way, if there is an increase in default risk then the factors driving it are macro-economic and will therefore affect the risk and required return on equity as well as debt. Consequently it is not clear that there would be any narrowing of the difference between expected returns across debt and equity i.e. the GFC would not affect debt to the exclusion of equity. In short we don't see this as an adequate basis for arguing for a cost of debt increase being higher than the cost of equity increase. Any casual observer of markets over the past 5 years would recognise that equity has been affected by the GFC and so has its risk, to argue that it has been less affected than debt requires evidence, evidence that is lacking in the McKenzie and Partington paper.

106. We have undertaken an analysis to assess the likely size of any difference between expected and promised yields and the impact of a change in default risk on the DRP. This analysis is consistent with the difference being small and changes in it due to the GFC being a most unlikely explanation for the increase in the observed DRP on 7 year BBB debt.

107. Estimating the expected cash flow for debt instruments requires a probability weighting of all possible payoffs from the debt instrument. The expected cash flow in a simple two states of the world analysis will be:

Payment under default x POD + promised payment x (1 – POD)
Where POD is the probability of default

108. The payment under default is often expressed as promised payment x recovery rate ["RR"] or (1 – loss on default).

109. Of interest is how much the first term in the expression is less than the second. We don't have access to data on the likely recovery rate for debt-holders if an Australian network utility defaulted but we suspect it will be high. The networks are regulated monopolies generally with few or no substitutes. Our sense is that demand for networks would be high as they provide relatively low risk stable cash flow returns and are attractive to Super Funds for example. Consequently we anticipate that the market price would be close to the RAB. This means the difference between promised and expected yields would be small. The detailed calculations are provided in Appendix 1.

110. By way of illustration, US data points to recovery rates of around 70% for utilities.[15] The cumulative probability of default on 10 year maturing bonds, at year 10, is 4.29% for Baa2 and 2.09% for Baa1 rated bonds.[16] Suppose a 10 year 5% coupon bond with a face value of $100 sold for $79.30. Further suppose the coupon rate on 10 year maturing Commonwealth Treasury Bonds was 5%. In this case the promised yield on the bond is 8.1% or a spread of 3.1% over the risk free rate. The expected yield is 8.05% which is 5 (4.6 rounded) basis points below the promised yield (see Appendix for calculations). If the bond was Baa2 rated then the expected yield is 8.00% or 10 (9.5 rounded) basis points below the promised yield. At an 80% recovery rate the differences are 2 and 4.3 basis points respectively. At a 50% recovery rate the difference is 9.8 and 19.7 basis points respectively. Given the measurement error in benchmark yields we view this as small.

111. Doubling the default rate leads to a near doubling of the difference between the promised and expected yield. At an 80% recovery rate, the DRP would increase from 2 to 3.8 basis points for Baa1 bonds and from 4.3 to 7.8 for Baa1. With an unlikely additional 4 basis points arising from a doubling in default risk, there remains circa 216 of the 220 basis points increase to explain!

112. Moving to an unlikely 50% recovery rate leads to the difference being 20 and 40 basis points for the Baa1 and Baa2 bond respectively leaving 200 and 180 basis points to be explained by matters other than default risk.

113. This numerical analysis implicitly assumes all the default risk is idiosyncratic. This is most unlikely as default risk will have a substantial systematic component making the gap between promised and expected return even smaller.

114. Like much of their commentary, McKenzie and Partington do not appear to have undertaken any empirical analysis to support their assertion, consequently, on the basis of our analysis, we can put aside their comments that the increase in DRP can be explained by changes in default risk alone without any changes in MRP as mere postulation.

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[15] Hu & Perraudin, "The dependence of recovery rates and defaults", Working Paper Feb 2002, p18.

[16] See letter from TCorp to Sydney Water, Sydney Water – Submission to IPART 2012 pricing determination", Appendix 14 p 276

115. Our analysis of the impact of changes in debt related idiosyncratic default risk shows that a negligible proportion of the increase in DRP can be explained by the difference between promised and expected yields. This means it must be explained by changes in systematic (market) risk.

116. Further support for this view can be obtained from examination of behaviour of a CDS index and the equity market index. The CDS index reflects a forward view of default risk and changes in this index will be negatively correlated with changes in observed market returns if a primary driver of stock market changes is systematic risk i.e. an increase in risk premiums means, ceteris paribus, a decrease in observed share prices.

117. This inverse relationship is apparent in Figures 7 and 8.

118. Recognising the debt market perception of risk it is apparent that the MRP for equity expected to prevail over the regulatory period will also be above the historical average i.e. greater than 7.0%.

FIGURE 7 PERFORMANCE OF ASX200 (LH AXIS) VERSUS AUSTRALIAN INVESTMENT GRADE CDS (RH AXIS)

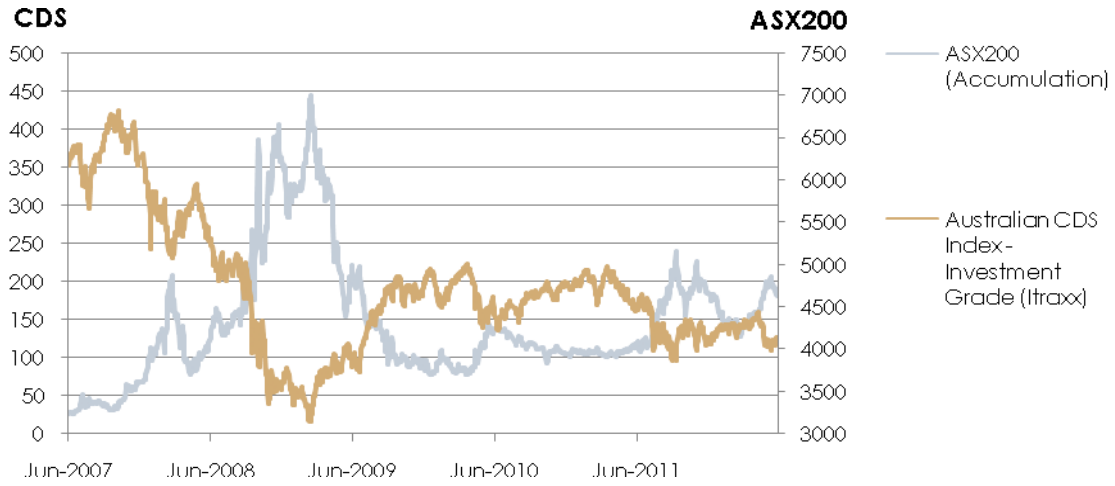
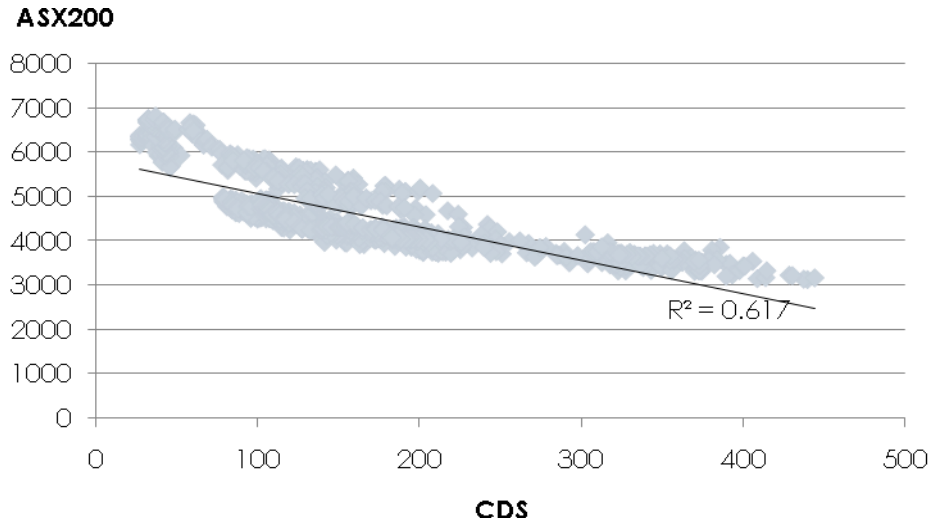
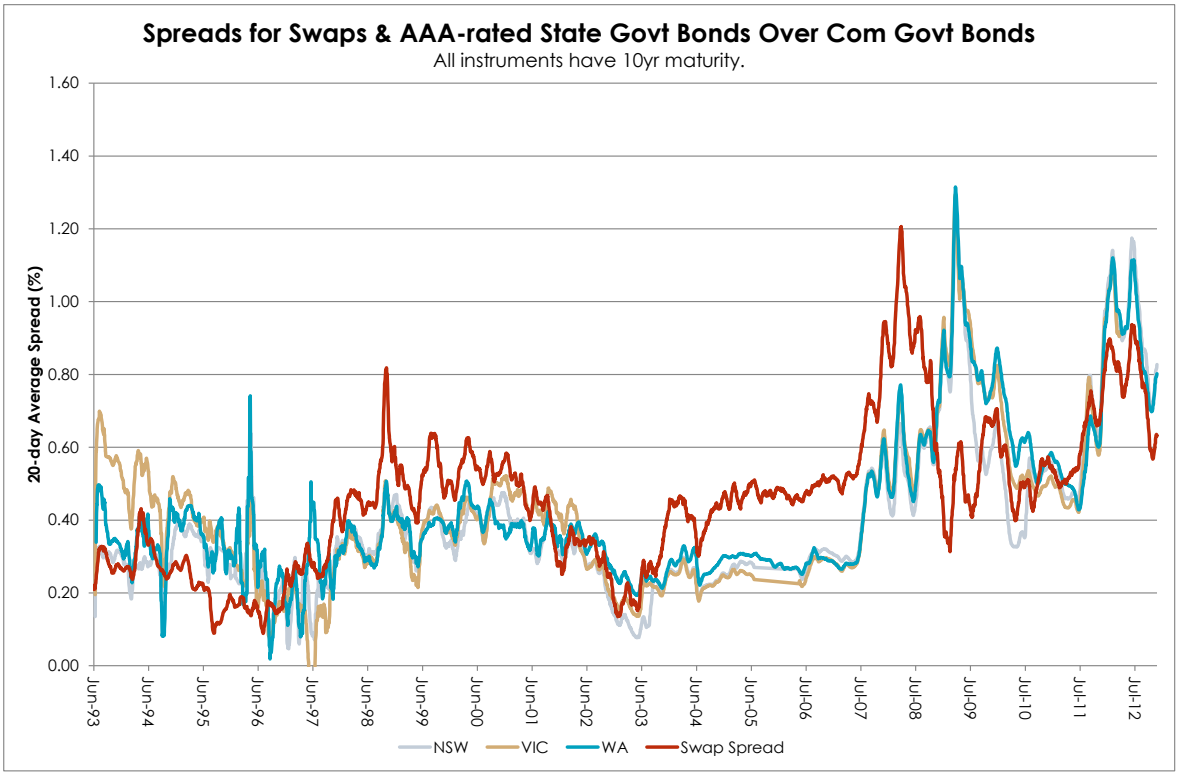


FIGURE 8 REGRESSION OF CDS SPREADS VERSUS ASX200



119. To date we have focused on the yields and spreads on corporate debt and observed an increase in both following the GFC. However it is evident that the risk spread on other debt instruments has also risen (albeit with some recovery recently). Figure 9 captures the behaviour of the spread on 10 year interest rate swaps and AAA rated State Government Bonds relative to 10 year CGS. The time frame matches Figure 5 above.

FIGURE 9 RISK PREMIUM ON AAA RATED STATE GOVERNMENT ISSUED BONDS AND INTEREST RATE SWAPS



120. Interestingly the spread on State government debt rose during the GFC, fell and has risen again over the last year prior to a recent fall. The spread on interest rate swaps has behaved similarly reflecting the higher risk of BBSW debt relative to CGS. This, we argue, is a response to relative risk (either systematic and / or liquidity) and is largely consistent with what is happening in the corporate bond market. Again we expect this to be mimicked in the equity market.

121. To re-iterate, it is apparent that spreads on instruments for which we have market data of a forward view (e.g. yields on debt instruments) reflect increased risk premiums. Our analysis of the default premium shows that the difference between the expected and promised return on debt is quite small and changes in default risk since the GFC will not explain the observed increase in risk premiums.

122. As noted, in the CAPM world embraced by Australian regulators, the risk premium (and expected return) for all financial instruments should be the beta of the instrument times the MRP. In the context of the CAPM, the change in observed premiums is best explained by an increase in the MRP since it is unlikely that betas of debt and equity will have changed (no evidence of substantial changes) as they are relative measures of risk. Therefore it is evident that the increase in market risk premium applies to equity and debt, not just debt alone.[17]

Estimating a Forward MRP

123. There is not a generally or universally accepted method of estimating a forward MRP at this time, at least to the degree that the CAPM is an accepted method for estimating a cost of equity, despite its many shortcomings.

124. In light of this, we argue that it is better to be approximately right than definitely wrong when establishing an estimate. There is a strong weight of evidence pointing to a MRP above 6%.

125. There are a number of methods available to estimate a forward looking MRP. These methods include use of:

1. information from forward markets;
2. information on debt spreads;
3. dividend growth models.

Information from forward markets

126. We use a forward estimate of market risk to derive a forward estimate of the MRP. We propose it only as a means of amending the MRP under unusual economic circumstances such as the GFC and its aftermath.

127. The method has its genesis in the CAPM which describes the risk premium on equity as beta times the MRP. The MRP, in turn, can be shown to be a function of

[17] This is not an assertion as implied by comments at para 155 of Australian Competition Tribunal, "Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14", but rather a fundamental outcome of the CAPM.

the risk of variance of the market and the market price of risk. Merton[18] for example, describes the MRP (at a point of time) in terms of:

$MRP = \alpha - r_f = Y_1\sigma^2$

where α is the expected market return

r_f is the risk free rate

Y_1 reflects a representative investor's relative risk aversion (or the reciprocal of the weighted sum of the reciprocal of each investor's relative risk aversion and the weights are related to the distribution of wealth among investors)

σ^2 is a current view of the variance of the market return

So the MRP is expressed as amount of risk x 'price of risk' or a reward to risk ratio as Merton calls it.

128. We assume Y_1 is a constant and equal to the average historical MRP divided by the average historical standard deviation of the market (σ).

129. The link to total market risk can also be seen by direct reference to the CAPM for the market as a whole:

$E(k_m) = r_f + [E(k_m) - r_f]\ \beta_m$

Since $\beta_m = cov(k_m, k_m) / \sigma_m^2$

$= \sigma_m^2 / \sigma_m^2 = \sigma_m / \sigma_m$ then

$E(k_m) = r_f + [E(k_m) - r_f)\ \sigma_m / \sigma_m$

$= r_f + [E(MRP)/ \sigma_m]\ \sigma_m'$

As noted, we have applied this relationship by assuming the reward to risk ratio [E(MRP) / σ_m) is constant derived from historical averages and used a forward view of σ_m' available from the implied volatility of options on a stock market index.[19]

130. The forward estimate of market risk is assessed from the implied volatility of traded options written on the ASX 200 Index. We apply a constant MRP per unit of risk to the current estimate of market risk to derive a one year view of the MRP. It is a one year view because the option contract has a one year maturity. The one year

[18] R Merton, "Estimating the Expected Return on the Market: an Exploratory Investigation", Journal of Financial Economics, 8, 1980 p 323-361

[19] Lettau M & S Ludvigson, "Measuring and Modeling Variation in the Risk- Return Trade-off", Handbook of Financial Econometrics, Vol 1, 2010, Ch 5 note that the empirical evidence on whether the reward for risk is constant is mixed and inconclusive. Given that we are seeking a practical method of adjusting for an unusual risk environment we are of the view that our approach is reasonable and not contradicted by the evidence. We also note that Wang, "Is Australia Risk Averse? Some Evidence from the All Ordinaries Index Market", Working Paper (ssrn.com/abstract= 1104883) finds a positive risk return trade-off and that Australian stock market investors are risk averse.

estimate is transitioned to the long run average MRP over a typical 5 year regulatory period.

131. Our application of the approach using data to 30th November 2012 provides a one year forward view of 7.9% which, when transitioned to the long run MRP of 7% over 3 years generated an MRP of 7.4% p.a. The 7.4% is a geometric average of the decline from 7.9% to 7% over three years with the remaining two years at 7%. If the long term average is seen to be 6% then the geometric average of the decline to this number over 3 years is 6.3%. This is a conservative view of the profile given that the one year forward rates in the BBB debt risk premium for seven years do not show any evidence of a decline.

132. While the approach can be criticised for lack of precision, this form of criticism can be levelled at much of the process of estimating the WACC. In our view the approach provides a MRP that is more reflective of current circumstances than the historical average that does not reflect current economic circumstances. It is also better aligned with the DRP than the historical average thereby capturing a similar view across the capital market.

133. In our view, it is useful information to provide an estimate on the MRP. Value Adviser Associates uses this approach in much of its valuation work, including valuation of infrastructure for Funds Managers and Superannuation funds and JCP Investment Partners use it in its portfolio selection methods.

Information on Debt Spreads

134. As noted above we would expect the equity premium to behave in a manner that mimics the debt market – the higher than average risk premium in the riskier end of the debt market should also be prevalent in the equity market.

135. A particular challenge arises as how to use information on DRPs to infer a MRP.

136. One method is to use to estimate a beta of debt and backward solve for the MRP from the CAPM. This requires an estimate of the beta of debt which is a contentious issue. As an illustration, one estimate can be derived from the period of relative stability in the debt markets when the spread on BBB was circa 120 basis points. If the MRP is 7% then this implies a beta of debt of 0.17 – say 0.2. We can assume this didn't change with the DRP and we have no reason to believe it will (since beta is a relative measure of risk). Given this assumption and the observation that the DRP for 7 year BBB debt at 30 November 2012 was 305 basis points then the implied MRP for the next 7 years is 15% (3.04%/0.2). If there was an increase in the beta of debt to say 0.25 then the implied MRP is 12%.

137. Another approach to informing a view of the MRP is to assume the difference between the equity MRP and DRP is constant. The average difference between the observed risk premium on debt on the BBB corporate bonds and an equity risk premium of 7% is 590 basis points over the period 4 December 2001 to 29 June 2007 (a pre GFC period)[20]. If this difference was maintained (i.e. a straight line was projected in Figure 6 as the difference between the equity and debt premium)

[20] 4 December 2001 is the first date for which we have BBB spread data. The average spread of BBB bonds to 10 year CTB yields was 112 basis points using 7 year BBB spreads and 10 year risk free rate – this underestimates the premium because of the maturity mismatch.

then the equity risk premium should be the debt premium of 305 (as of 30 November 2012) plus 590 basis points or 8.9%, say 9%. If the average MRP was seen to be 6% then the implied MRP is 7.9%. This MRP would be expected to prevail over a period equal to the maturity of the debt i.e. 7 years which is beyond the regulatory period of interest.

138. Given risk aversion by investors in the Australian capital market we would expect the difference between the DRP and the MRP to increase rather than stay constant. As a consequence the preceding analysis is conservative. This expectation of an increase in premiums is evident in the increase in premiums on State Government debt and Swaps as presented in Figure 9 later in this report.

139. Damodaran[21] presents a similar view to the constant difference by investigating the MRP as a constant multiple of the DRP using US data.

> *"On January 1, 2012, the default spread on a Baa rated bond was 3.14%. Applying the median ratio of 1.96, estimated from 1960-2011 numbers, to the Baa default spread of 3.14% results in the following estimate of the ERP:*
>
> *Default Spread on Baa bonds (over treasury) on 1/1/2012 = 3.14%*
> *Imputed Equity Risk Premium = Default Spread * Median ratio or ERP/Spread*
>
> *= 3.14%* 1.96 = 6.15%"*

140. Unfortunately the rich history of spread data used by Damodaran is not available in Australia nor is the history of implied MRPs (he derived them from a dividend discount model). However application of the approach is consistent with the approach applied to the BBB data immediately above giving additional credence to our view.

141. Again, perhaps not surprisingly, McKenzie and Partington have criticised the suggestion that there may be constancy in the relationship between the DRP and the MRP. Their attempt to dismiss the suggestion is reflected in the following assertion:

> *"The widening credit spreads during the GFC were substantially driven by increasing concern about the risk of default. There was also a drying up of liquidity in debt markets caused by extreme concerns about default risk. Thus, it was a combination of default premiums and liquidity premiums that drove up returns in debt markets." Supplementary report p 21.*

142. Again they assert that any relationship will be affected by an increase in the difference between promised and expected yields on debt arising from default risk, and providing no evidence to support their assertion. As we noted earlier – the difference between expected and promised yields is small and any impact of the GFC on default risk is likely to be systematic thereby affecting all financial instruments.

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[21] A Damodaran, "Equity Risk Premiums (ERP): Determinants, Estimation and Implications – the 2012 Edition", March 2012

143. In our view the assertions have little merit and are at odds with the most casual of market observations. It is eminently reasonable to infer a change in the MRP from a change in the DRPs since both are and have been affected by the GFC.

Dividend Growth Models

144. The dividend growth model attributed to Gordon and Shapiro has been widely used in regulatory determination in the USA instead of the CAPM so there is regulatory precedent for its use.

145. The model has a number of variants and has been used by many to back-out a cost of equity, an equity risk premium and a MRP. CEG, for example, has advocated its use in the Australian regulatory environment. It is used in US regulatory processes. Bloomberg also estimate a MRP for a number of countries by using share price data and analysts' consensus forecasts of earnings / dividends.

146. The model is forward looking and so can provide valuable information on discount rates incorporating changes in views of cash flows and the cash flow profile.

147. A particular challenge with use of various forms of the model is its sensitivity to assumptions about the cash flow profile derived from analysts' forecasts. Often the forecasts are for 2 or 5 years into the future so the cash flows beyond that period are approximated by a growth rate. This is the variable that is usually criticised by those wishing to discredit the approach or derive a different estimate of an ERP or MRP.

148. We note numerous Australian experts have used this approach to estimate an ERP or MRP. These include Capital Research, CEG, NERA and SFG. Capital Research provided a useful summary / comparison of estimates arising from these advisors in a recent paper prepared for the Gasnet determination currently underway by the AER.[22] The range of MRP estimates was 9.9 to 10.5% - all above the 6% proposed by the AER, IPART and ERA's recent decisions and drafts and our estimate of 8.4% from the implied volatility approach.

Summary

149. In our view the best estimate of the historical average MRP is 7% and the current forward view is above this. We look to a number of sources to guide our view of a current forward looking MRP. These include:

- the DRP from yields on debt markets (corporate and State Government) is the most instructive and objective source of premium data. The increase in these yields above historical averages should be mimicked (at least) in the equity market as they are primarily due to some combination of market wide increased risk and investor risk aversion. Under the CAPM the market wide impact on debt spreads must be carried through to equity as our analysis shows that the increase in debt spreads cannot be explained by idiosyncratic default risk but rather market wide increase in the risk premium ;

[22] Capital Research, "Forward Estimate of the Market Risk Premium: Update". March 2012 p 28-9

- the estimate derived from assuming a constant required premium per unit of risk and the forward view of market risk derived from traded options on the stock market index which provides a rate above 8%;
- the implied MRP from the dividend growth model work which is remarkably consistently above both 6% and our estimate using forward volatility.

The Timing for Estimating the Cost of Equity

Introductory Comments and Setting

150. In a commercial environment, businesses will focus on (cash flow) earnings i.e. the return on equity, at least, the cost of capital on funds invested i.e. the WACC. Investments will be undertaken that are judged to be positive NPV at the time of making the decision and the commitment of (or raising) funds to a project.

151. Once the project is undertaken and funds are committed, the challenge is to deliver the expected outcome. Investors will provide funds for projects if they are of the view that they can earn at least the cost of capital. They will require a premium to cover the risk of the project. In the wash up, investors may earn at, above or below the expected cost of capital depending how events and management of the project materialises. Investors must expect to earn the required rate of return otherwise they will not provide the funds.

152. Similarly, projects underway will be assessed periodically to establish whether there are alternatives that will provide a higher return without compromising the selected overarching strategy. 'Alternatives' is broadly defined and includes changing pricing of products to the extent the competitive environment permits. One driver of the need to re-assess projects is a change in the cost of capital which can drive a change in the value of the investments (and business).

153. If the cost of capital **rises** after an investment is undertaken then the prices on new investments would need to rise to make it attractive. Assuming the higher prices flowed to existing investments and ignoring secondary effects, then their value may not change because the increased cash flow would be offset by the increase in the cost of capital. However if the price increase does not flow through then the value of existing investments would fall (ceteris paribus, the same cash flows but higher discount rate).

154. On the other hand, should the cost of capital **fall** then prices on new investments need not be as high as investments underway to earn the cost of capital. If the lower prices flow to existing investments, the value may not change because both the cash flows and the cost of capital fall. If the lower prices do not pass through to existing investments then their value will rise (earn above the cost of capital).

155. We can expect a firm to review its cost of capital, pricing and alternatives whenever a project and fund raising event occurs or when there is a change in parameters affecting the cost of capital. The cost of capital parameters are largely out of the control of management.

156. In a **regulated environment** where price (profile) is set at the beginning of a regulatory period, there is little or no flexibility to change prices. This can lead to sub-optimal levels of investment (i.e. under or over investment). For example, if there is a subsequent **rise** in the cost of capital then new investment will not be attractive (will not earn the cost of capital) and the value of existing investments will fall as the firm will not earn the opportunity cost of capital. This will lead to under-investment.

157. The converse holds for a **fall** in the cost of capital where there may be over-investment.

158. The simple analysis so far assumes similar productive efficiency for existing and new investments. Should new investment be more efficient than existing investment then pricing based on new investment will lead to earning below the cost of capital on existing (relatively inefficient) investment. This challenge applies to both regulated and non-regulated businesses so there should not be any guarantee that existing assets will earn the cost of capital if they become relatively inefficient.

Ability to manage or hedge

159. With the access pricing profile set for the term of the regulatory period, equity investors are exposed to the lack of flexibility that a non-regulated firm may have in changing pricing if the cost of capital changes.

160. However we would not expect equity investors to be able to or to try and hedge this risk. This risk will be idiosyncratic and equity investors diversify this risk away by holding a well-diversified portfolio. The actuarial cost of the lack of flexibility is challenging to estimate as we discuss later.

161. In our view, the regulator should consider the cost arising from this risk in the regulatory process. This relates to the discussion of how to deal with changes in the determinants of the cost of equity over the regulatory period e.g. to use some form of indexation of prices to reflect changes in the risk free rate or allow headroom. Without some adjustment we expect the NPV = 0 rule will not hold as regulated businesses will be disadvantaged relative to non-regulated businesses with an ability to adjust prices if need be.

Normal Commercial Frequency of Revising the Cost of Capital

162. Our advice to commercial enterprises is to update the WACC whenever a key investment (including acquisitions) decision is to be made. This includes reviewing the current strategy against alternatives for businesses that use value as a key metric in decision making.

163. Our advice also is that a careful review of the consistency between assumptions in the discount rate and cash flow forecasts is undertaken. For example, any difference in assumed inflation in the cash flows and the discount rate is conscious and deliberate.

164. As a result there may be no particular set frequency. Certainly Fund Managers and Super Funds mark to market regularly (e.g. quarterly of half yearly). Investments in unlisted infrastructure for example are generally valued half yearly requiring updates of the cost of capital.

Arguments for and against setting the cost of capital on an annual basis

165. As noted in the introduction, a price profile for tariffs is set at the beginning of the regulatory period. This does not change if the cost of capital changes consequently a potential difference arise between a regulated business and a non-regulated business (that the regulated process is attempting to replicate) due to the lack of flexibility for regulated businesses to move prices to reflect cost of capital changes.

166. Indexation has been proposed as one possible solution to this challenge. By indexation we mean a regular, perhaps annual, revision of the WACC (and prices) to reflect changes in the inputs, particularly the risk free rate. Use of headroom is another, perhaps less precise way of dealing with the issue.

Annual Indexation as a solution

167. Arguments for frequent automatic updates of the WACC include:

a. It permits changes in prices commensurate with changes in the cost of capital which is largely out of the control of the regulated businesses. Since regulated businesses cannot control most of the changes in the cost of equity, for example, then it doesn't follow that they are the best at dealing with the risk. So the argument for indexation is that if the cost is not under the control of the business then it should be passed on to customers. While they cannot control the changes in the cost of debt (other than through leverage) they are able to hedge the cost of debt for existing investments by variable to fixed rate swaps. By appropriately building this in as a cost of doing business (as the QCA have) there is a precedent for passing it on to consumers. However regulated businesses cannot hedge the cost of debt for new investments not yet funded. They are exposed to this risk out of their control other than though timing of capex and funding decisions, in turn are subject to regulatory influence. There is a counter-argument. While changes in the cost of debt may be out of a businesses' control, some management of this risk may be feasible, thereby reducing the strength of the argument that the risk should automatically be passed on to consumers reducing the incentive to manage it at least cost.

b. It sends the right pricing signals to consumers and investment signals to businesses to the extent that prices will reflect the cost of production. By way of an analogy, the introduction of smart metering in Victoria is partially justified on the grounds that it informs customers of the underlying price of electricity on a half hourly basis and thereby enables them to change utilisation based on informed price information.

c. Since the risk is hard to manage it doesn't follow that the regulated business should bear the risk[23]. Indexation passes the risk to the consumer which is consistent with a non-regulated business operating in a competitive environment where all competitors face the same changes in the cost of capital. The change in prices may not be as frequent as the change in the cost of capital but rather 'averaged' over time just as insurance premiums 'average' other risks over time.

168. OfGem are considering moving to indexation of the cost of debt:

"We still consider indexation to be the most robust option available for setting the cost of debt allowance, to protect both the companies against the risk of rising market rates, and consumers. Our decision is to base the cost of debt index on the iBoxx indices for GBP Non-Financials of 10+ years maturity, with broad A and broad BBB credit ratings. This choice is based on stakeholders' strong preference for

[23] A reduction in the cost of capital may be appropriate if risks are passed from a regulated business to consumers.

iBoxx and further analysis of the indices available. The allowance will be updated annually during the price control based on a 10-year simple trailing average of the index."[24]

169. As best we can assess the decision has been made by Ofgem to introduce indexation of the cost of debt after going through a consultation process. The first decision appears to be Transmission Ltd (SPTL) and Scottish Hydro Electric Transmission Ltd (SHETL) covering the period from April 2013 to March 2021 – still a way off. The next electricity distribution price control (ED1) is due to start on 1 April 2015. It appears they are indexing the cost of debt but not equity which doesn't really make sense.

Use of headroom as a mechanism

170. Increasing the cost of capital above a point estimate is a mechanism for dealing with the risk of the cost of capital changing after the reset period. Its use for this purpose is apparent in a number of jurisdictions. For example the NZ Commerce Commission accepts a WACC above the mid-point of an estimated range and UK regulators use a risk free rate that is above the prevailing rate.

171. The Productivity Commission has expressed a view that the social cost of under-investment is higher than the social cost of estimating a WACC that is too high. The Productivity Commission reflects the following view:

"The possible disincentives for investment in essential infrastructure services are the main concern. In essence, third party access over the longer term is only possible if there is investment to make these services available on a continuing basis. Such investment may be threatened if inappropriate provision to access, or regulated terms and conditions of access, lead to insufficient returns for facility owners. While the denial of monopoly pricing of access also imposes costs on the community, they do not threaten the continued availability of the essential services concerned. Thus, over the longer term, the costs of inappropriate intervention in this area are likely to be greater than the cost of not intervening when action is warranted.[25]

"However given the asymmetry in the costs in under and over compensation of facility owners, together with the informational uncertainties facing regulators, there is a strong principle case to 'err' on the side of investors. The challenge is how to render this principle operational without creating new problems."[26]

"… given the cost of inappropriate intervention and the practical difficulties of intervening efficaciously, it is important that access regulators are not overly ambitious. The costs potentially associated with efforts to fully remove monopoly rents might suggest that the focus of regulators should be a more modest one of reducing demonstrably large rents. Similarly, the extensive information required to base access prices on precise assessments of firms' costs, and the

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[24]Ofgem, "Decision on strategy for the next transmission and gas distribution price controls - RIIO-T1 and GD1 Uncertainty mechanisms", 31 March 2011, p16

[25] Productivity Commission, "Review of the Network Access Regime," Position Paper March 2001 p xv111-xix

[26] Ibid p71

attendant risk of mistakes, might provide a case for less intrusive approaches, involving some rules of thumb."[27]

172. As noted, the NZ Commerce Commission can choose a WACC above mid-point of a plausible range. The plausible range is estimated as the 1st and 3rd quartile assessed from a point estimate and the standard error of the estimate.

173. The Commerce Commission provides the following explanation on page 315 of the Input Methodologies Draft Reasons Paper for the choice of the 75th percentile WACC:

> *"The reason for the Commission adopting a cost of capital estimate that is above the mid-point is that it considers the social costs associated with underestimation of the cost of capital in a regulatory setting, are likely to outweigh the short-term costs of overestimation. That is, the Commission is acknowledging that where there is potentially a trade-off between dynamic efficiency (i.e. incentives to invest) and static allocative efficiency (i.e. higher short-term pricing), the Commission will always favour outcomes that promote dynamic efficiency. The reason being that dynamic efficiency promotes investment over time and ensures the longer term supply of the service, which thereby promotes the long-term interests of consumers.*

174. The view is supported by notable corporate finance and regulatory academics and practitioners Professors Richard Brealey and Julian Franks:

> ***Recommendation 53*** *Professors Myers and Franks agree with the Commission's policy of setting the WACC equal to, or greater than, the midpoint of the estimated range, in recognition of the asymmetric costs of setting the WACC too low.*[28]

175. Additionally UK regulators appear to follow a similar view as is evident from the following quote from Cambridge Economic Policy Associates:

> *"First Economics notes that since 2002, regulators' determinations of the allowed cost of debt have left a wide gap between the allowed and actual cost. They note that 'a rough rule of thumb' would be that companies can expect to see regulators use a risk free rate worth at least 50 basis points and perhaps as much as 125 basis points above prevailing market levels' when setting the allowed risk free rate. As recently as December 2006 Ofgem set the allowed risk free rate at a level 100 basis points higher than the short-term historic rate. The same 'headroom' is observed when comparing the allowed debt premium with the actual debt premium and the allowed cost of debt with the actual cost of debt."* [29]

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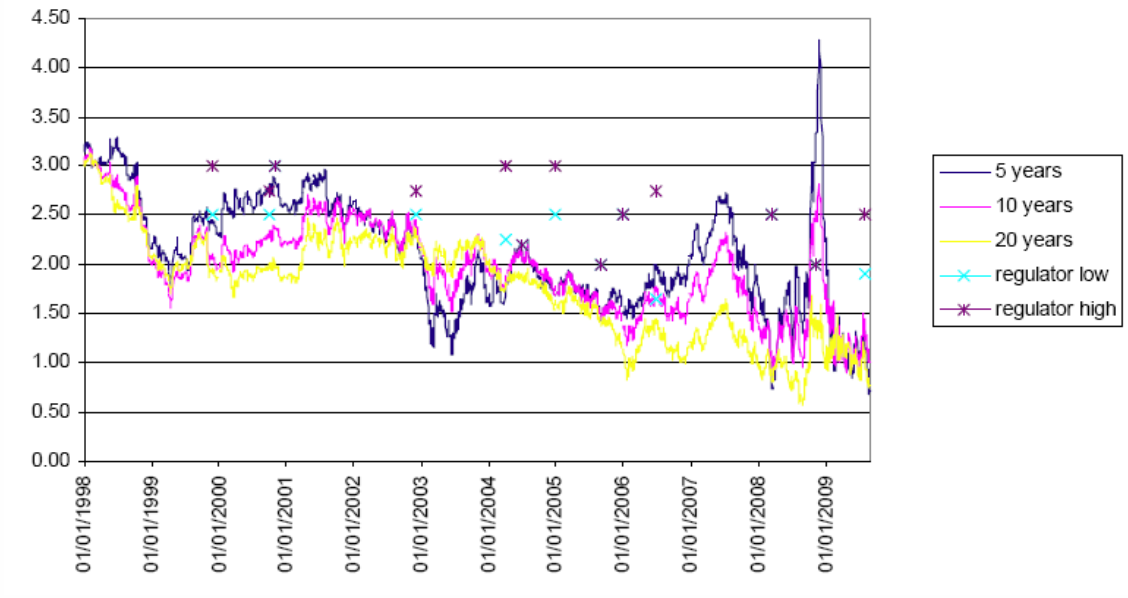
[27] Ibid p71

[28] Recommendations to the New Zealand Commerce Commission on an Appropriate Cost of Capital Methodology

[29] Cambridge Economic Policy Associates, "Indexing the Allowed Rate of Return ORR / OfWat, Final Report, 2007, p6

176. Europe Economics analysed the risk free rate selected by regulators in the UK over the period 1999 to 2009 relative to the prevailing spot rate.[30] As is apparent, regulators have frequently used (real) rates above government gilt yields.

Figure 2.6 : Previous regulatory decisions on the risk-free rate



Source: BOE data and EE review of regulatory determinations

177. One interpretation Europe Economics posit is that prior experience with the risk free rate is only updated through time so the changes in the regulatory rate lag changes in the spot rate. Interestingly the risk free rate recommended by Europe Economics (advisor to Ofwat) was above the spot rate and a rate they note (para 2,45) 'was supported by longer-term averages'.

178. Ofwat stated in its selection of 2% as the real risk free rate:

> *"This is below the 2.8% we assumed at the last price review. It is well above the current spot rates for index-linked gilts but consistent with the view that the risk-free rate is expected to increase in the medium term. It is also consistent with the ten-year long-run historic UK index-linked gilts of five and ten-year maturity and consistent with recent regulatory determinations."*

179. This suggests that Ofwat at least has a view that spot rates can be too low.

180. Another explanation posited by Brealey and Franks is that the UK regulators allow headroom because the social cost of under-investment is higher than that for over-investment i.e. if the risk free rate rises after the decision then investment may be delayed because some investments may now not earn the opportunity cost of capital. Brealey and Franks state:

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[30] Europe Economics, "Cost of Capital and Financeability at PR09: Updated Report by Europe Economics", 22 October 2009

"In calculating the cost of capital, UK regulators have typically allowed a degree of 'headroom' by assuming a rate of interest that is higher than prevailing rates."[31]

181. Adding headroom is consistent with evidence that cost of capital for low beta stocks is higher than that predicted by the CAPM (i.e. actual CAPM flatter than theoretical). The beta of equity for regulated businesses in Australia is generally less than on so headroom can also be justified on this basis.

Suitability of information from derivative markets to determine the risk free rate

182. Yields on CGS are generally used as a proxy for the risk free rate essentially because there is very low default risk if held to maturity. However it is argued that they have other characteristics that may be priced e.g. liquidity. Consequences changes in economic circumstances may change the value of these other characteristics, particularly relative to the equity market, thereby potentially under (or over) stating the risk free rate used in the CAPM equation.

183. The interest rate swap rate market provides information about interest rates on low risk investments. The quoted rate is for a fixed rate over the term on the swap. There are other potentially low risk derivative instruments that can provide data to assist in understanding the value of the other characteristics of CGS e.g. Credit Default Swaps.

184. The "swap spread" at any given maturity, reflects the incremental credit risk associated with the banks that provide swaps compared to CGS. The swap spread can be influenced by other factors e.g. liquidity and short-term supply and demand changes.

185. CEG summarise academic research into explanations for the swap spread and conclude:

The unambiguous finding is that spreads between government bonds and swap rates cannot be explained by differences in default risk.[32]

186. Consequently its conclusion is that there are non-risk factors driving the swap spread and this may under- (or over) estimate the risk free rate used in the CAPM.

187. It is clear from Figure 10 that the swap spread is volatile. Figure 11 shows the yields on 10 year CGS, the 10 year swap rate and the swap spread from June 1988 to 30 November 2012. The range in that period is from 9 bp to 136 bp with an average of 49 bp.

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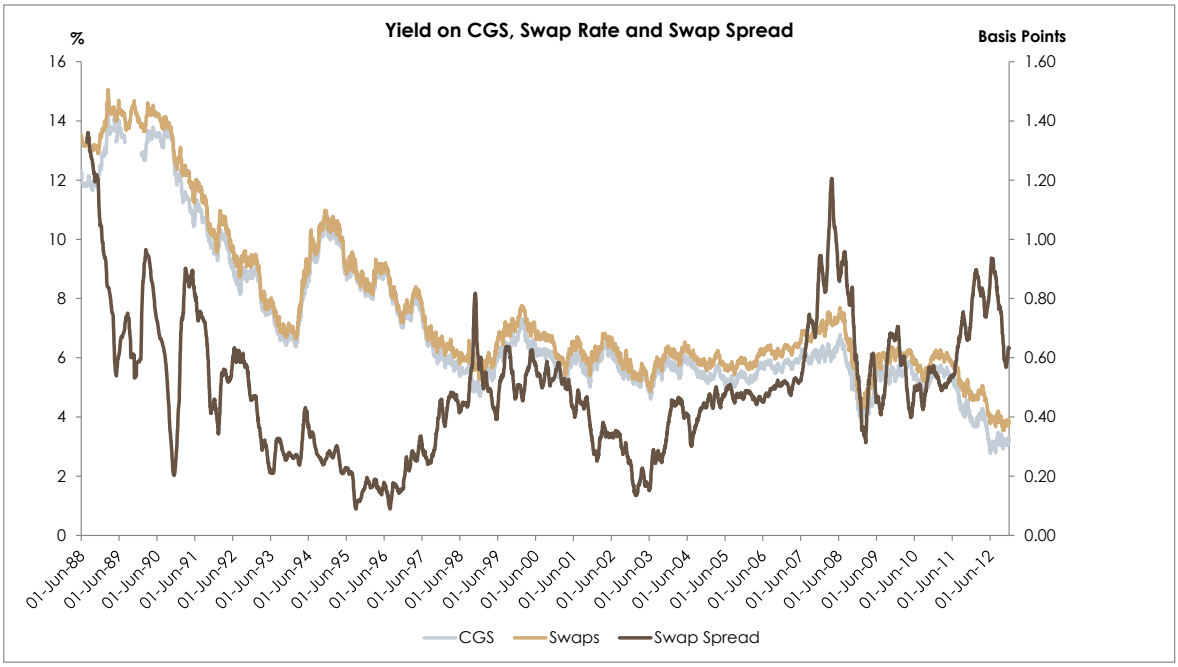
[31] Brealey R & J Franks, "Indexation, investment, and utility prices", Oxford Review of Economic Policy, Volume 25, Number 3, 2009 p440

[32] CEG, "Choosing a proxy for the nominal risk free rate" 26 October 2007 p10

FIGURE 10 YIELDS ON 10 YEAR CGS AND INTEREST RATE SWAPS AND THE SWAP SPREAD



188. UBS[33] have examined the issuance pattern of CGS over the period prior to and including the GFC and conclude that the recent behaviour of the swap spread is demand rather than supply related (emphasis added):

> *"The decline in issuance of Australian Government bonds has caused much discussion regarding how this should affect Treasury yields relative to other rates. Schools of thought differ between a lower issuance driving Treasury outperformance (due to lower supply), and lower issuance driving Treasury underperformance (as lines will be too illiquid). We do not believe that there is any significant and sustained causal relationship between Treasuries issuance and spreads to swap.*
>
> *We examine the effect of changes in the size of the index on swap spreads. From 2003 to 2007 the size of the AUD Treasuries index decreased as a % of GDP, and Treasuries outperformed swap (swap spreads widened). In contrast, from 2009 to 2010 the size of the index increased by ~4% of GDP, and Treasuries again outperformed swap by ~20bps. Further, from in FY12 issuance was above average, and Treasuries outperformed swap, this time by ~45bps.* ***The outperformance was driven by an increase in risk-aversion,*** *which meant the increase in asset supply could easily be absorbed by investor demand.*
>
> *Therefore we do not find either argument convincing. Supply may play a part,* ***but the evidence points to a scale of global demand for risk-free assets that allows shifts in the demand curve to dominate any changes in domestic supply****. Since ~80% of Treasury holdings are offshore, and swap rates are primarily driven by domestic funding costs, it is more likely that swap spreads increase when global yields are significantly lower than Australian yields (bringing the marginal*

[33] UBC Investment Research, "ANZAC Rates Strategy", 4 July 2012

Treasury buyer to the AUD market). This effect was clearly seen in June 2008 and June 2012, which supports our view."

189. From this analysis it is likely that the liquidity of the CGS market has increased relative to the stock market thereby understating the cost of equity capital when the current 10 year CGS rate is used in the CAPM equation.

Relationship between the risk free rate and the MRP

190. A critical question when selecting the risk free rate and the MRP for estimating the cost of equity is whether it is appropriate for the MRP and $R_{f,t}$ (the risk free rate at point of time t) to be estimated over different periods of time, or during different market conditions. The widespread practice of using the average MRP (estimated over a long period of time) and a spot risk free rate has come under scrutiny particularly in the current environment when the risk free rate is seen to be 'low'. Unless the relationship between R_f and R_m is such that a change in R_f is mirrored by a change in R_m, such circumstances are of concern because, effectively, an average risk free rate has been used to estimate the MRP however use of the current 'low' risk free rate as the first term in the CAPM equations means regulated businesses will not be compensated for the gap between the average risk free rate and the spot. At a minimum, there appears a persuasive argument to adjust the MRP for this gap (which can be positive or negative depending upon how the spot compares with the average implicit in the MRP estimation).

191. In theory, the task for estimating $R_{f,t}$ is made easy because it is assumed constant and 'known for certain' at the time the rate is set. In practice there is no observed $R_{f,t}$, instead the yield on a 10 year Commonwealth Government Bond/Security ("CGS") is used as the surrogate. This yield should theoretically be taken from the CGS as close as practical to the start of the regulated period. It is only in circumstances where this yield is determined to be unrepresentative for the time period or, more relevantly, the current yield is inconsistent with the estimation of the other parameters used to estimate the cost of capital estimate that an alternative estimate such as the average yield over a particular time period may be justified. The rate should reflect all the conditions that give rise to the rate or yield on the government security for that time period.

192. The task is not so simple for the $E(MRP_t)$ because theory does not give us clear guidance as to how we should estimate the expectations operator 'E' of the MRP. We know the MRP is stochastic. If it was a constant it would not attract any risk premium and it would be set at zero. However, the process by which 'E' is formed in the market place is not clear. Implicitly it is often assumed that 'E' will reflect the long term average of the MRP but this is a naive forecast and evidence is mounting that better forecasts can be made reflecting current economic conditions.

193. In the circumstances, it is tempting to set the $R_{f,t}$ to reflect current rates and set the $E(MRP_t)$ to reflect the long term average, on the basis that getting one of the variables as close to the relevant time period is better than neither. This would be a reasonable approach if the two variables were independent of each other, i.e. the value of one variable was not related to the value of the other variable. However, by construction this will not occur since $E(MRP) = E(R_m) - R_f$, both variables contain R_f. Moreover, if the (observed MRP and R_f) were negatively related, then periods of low R_f would be associated with high observed MRP and

conversely. The correlation coefficient for changes in the risk free rate and changes in the historical MRP is -0.15 over the period 1883 to 2011 using annual observations. The negative relationship is stronger in a falling market than a rising market. Put another way, when R_f falls, this is generally consistent with a rise in the observed MRP and vice versa.

194. However a number of scenarios can be constructed which show that there is potential for the relationship to be positive, negative or none at all. Consequently establishing the relationship in practice is really an empirical matter. The different predictions about the relationship between R_f and R_m can be seen by the commentary below.

195. If R_m was independent (unlikely) of R_f then a fall in R_f would result in an expected increase in MRP and conversely.

196. If over the longer term R_m and R_f are positively correlated, as one would expect, since they both reflect capital costs, the MRP could to be 'stationary' (in the statistical sense).

197. However, unexpected changes in R_f could have different effects on R_m and MRP depending what was inducing the changes in R_f, the discussion below illustrates why it is difficult to predict the short term relationship between R_m and R_f, and **why it is necessary to frame the estimates of R_f and R_m for comparable time frames.**

> Suppose R_f was lowered by the RBA purchasing bonds and reducing the money supply, the 'economic shock' could cause a reduction in R_m and MRP (positive correlation) but not the expected or required R_m and MRP since the 'shock' inducing a price decline would reduce the observed R_m but increase expected or required yields $E(R_m)$ and the required MRP (negative correlation in the forward view), compensating for the risk associated with the monetary shock. Alternatively if R_f was lowered by an unexpected increase in the money supply through the RBA buying Treasuries (which are then spent by government) then we might expect an increase in prices and R_m. This will not necessarily flow to the MRP if the increased government activity 'crowded out' private investment. In this case we might get a subsequent lowering in expected R_m and MRP if the 'economic stimulus' did not lead to inflation and increased uncertainty.

198. If MRP is set at an 'average or normal level,' which is representative of a long run mean or expected value over the long term, and R_{ft} is at a low level, such as exists at the moment, this will under-estimate the return to equity $E(R_{e,t})$ and penalise the regulated entity, and conversely when R_f is at a 'high level'. Therefore, setting the parameters on the basis of different time periods when one is set at the current time may lead to greater error than if they were both set on the basis of the same or 'normal' time period even though this is not representative of the current period.

199. The extent of the possible measurement error depends on the degree of negative correlation between the two variables (either MRP and R_f or R_m and R_f) under circumstances like those being experienced recently. The greater the correlation the greater the chance of error in the MRP estimate when the variables are measured at different time periods. Ideally, we would estimate both variables at

the current time period but if the measurement error for estimating current MRP was great relative to approximating a current cost of capital by a 'long term average' then we might be better estimating both variables and therefore the cost of capital as a 'long term average'.

200. At this time we have not extracted data to test the expected positive correlation between observed R_f and MRP under occasions when the RBA has changed interest rates.

201. If the difficulties in estimating a current MRP are such that the estimates are unreliable and create additional uncertainty then a 'long term average' or more 'normal' time period for estimating the MRP is likely to be more appropriate. In these circumstances it is likely that the measurement error of the estimate of the company's cost of capital will be reduced by adopting a similar time period for estimating R_f, that is, a 'long term average'.

202. If, on the other hand, we believe a current estimate of MRP can be obtained that is more representative of current conditions and does not create the unreliability and uncertainty mentioned in the previous paragraph then it might be determined that current estimates of both MRP and R_f might be more appropriate. We identified such an approach using options on a market index discussed in the last major section.

203. Recent levels of risk have been high and required returns, reflecting this risk, have been greater than 'normal'. One only has to look at the 'spreads' on corporate bonds and like instruments to see clear evidence of greater required returns reflecting greater risk. We know that the MRP cannot be constant but we have limited empirical evidence on the relevant parameters that determine its values, as a consequence, at a practical or operational level one is obliged to use methods that give some semblance of approximating reality even if there is limited evidence supporting such approaches.

204. Further, the current experience and estimates clearly illustrate the inverse relationship between the R_f and the observed MRP; interest rates on 10 year government bonds are at 40 year lows and MRP's are at record high levels.

Broader Evidence of Inverse Relationship between R_f and $E(R_m)$ (therefore MRP)

205. There is evidence and opinion that there is an inverse relationship between the risk free rate and the MRP to use in the CAPM to estimate the cost of equity. Evidence exists in the UK and USA as well as in the Australian Market.

206. Europe Economics noted a finding by Smithers & Co (in a submission to the cost of capital for a regulated Airport) that the sum of the risk free rate and the equity risk premium is more stable than the individual components.[34] Smithers and Co conclude:

"There is considerably more uncertainty about the true historic[al] equity premium and (hence the risk-free rate) than there is about the

[34] "Cost of Capital and Financeability at PR09: Updated Report by Europe Economics", October 2009, p 1 and 26. See Wright, Stephen, Mason, Robert, and Miles, David (2003) "A study into certain aspects of the cost of capital for regulated utilities in the UK" London: Smithers & Co Ltd

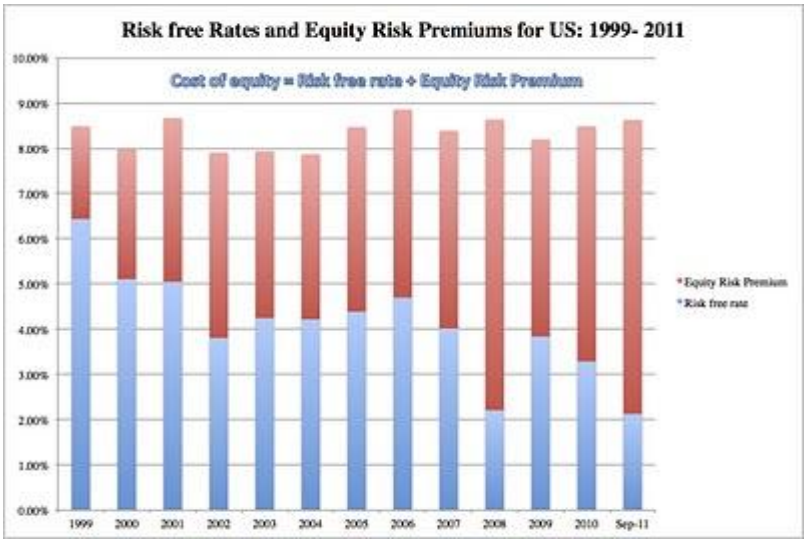
true cost of equity capital. From the perspective of the regulators, however, this ranking of uncertainty is fortunate, since the latter is far more important, for firms with risk characteristics not too far from those of the average firm.For this reason we regard the standard approach to building up the cost of equity, from estimates of the safe rate and the equity premium, as problematic. We would recommend, instead, that estimates should be derived from estimates of the aggregate equity return (the cost of equity for the average firm), and the safe rate."

. . .

"Given our preferred strategy of fixing on an estimate of the equity return, any higher (or lower) desired figure for the safe rate would be precisely offset by a lower (or higher) equity premium, thus leaving the central estimate of the cost of equity capital unaffected." P 49

207. This view is shared by Aswath Damodaran[35] as examining US data. As he states:

"If you define the expected return from stocks as the sum of the risk free rate and the equity risk premium, the last decade has seen changes in that composition. Note that while the overall expected return on stocks (backed out from level of the S&P 500 index and expected cash flows from stocks) has been in a fairly tight range (8%-9%), the proportions coming from the risk free rate and equity risk premium have changed."



208. CEG provide similar evidence that there is a negative relationship between the MRP and the risk free rate in Australia.[36]

209. CEG also provides evidence that the risk premium derived from yields on various financial instruments has risen when the level of the risk free rate has generally fallen. By inference it is reasonable to expect the same relationship with (unobservable) equity yields.

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[35]Aswath Damodaran, "Musings on Markets", September 2011. Also "Equity Risk Premiums (ERO): Determinants, Estimation and Implications – A post Crisis Update", October 2009

[36] CEG, "Internal consistency of risk free rate and MRP in the CAPM", Prepared for Envestra, SP AusNet, Multinet and APA, March 2010

"The evidence from all these sources points at trends towards higher risk premiums at times of lower CGS yields, such as those experienced in early 2009 and the current time." P 10

210. In summary, the practice of estimating the parameters used in the CAPM in regulatory determinations (and more broadly) consolidate an inherent mismatch between the time period used to estimate the MRP (essentially a long term average) and that used to estimate the risk free rate (usually a spot rate). This is exacerbated by a negative relationship between the MRP and the risk free rate. One outcome is that estimates of the cost of equity will track changes in the risk free rate. This outcome is in conflict with evidence that the cost equity is more stable than the risk free rate implying a negative relationship between the risk free rate and the MRP.

Quantifying the Impact

211. The impact of volatility of the inputs on the WACC can be quantified from the distribution of the difference between the cost of capital that can occur in the regulatory period and the cost of capital set at the beginning of the regulatory period.

212. However the challenge then is to be able to select a WACC from this distribution to compensate investors for the regulatory risk arising from the fixed pricing regime (at least fixed from a WACC perspective).

213. We have not seen specification of relative loss functions associated with an 'overstatement' or 'understatement' of the WACC that enable a formal analysis of this issue. Nevertheless we have observed statements in the Australian, UK and NZ context(noted earlier) which recognise the potential asymmetry of the cost of discouraging investment through a WACC being set too low relative to the cost to the community of allowing an element of economic rent through prices being set too high arising from an overstatement of the WACC. On these grounds we are comfortable with an adjustment to recognise this asymmetry. However, without the relative loss functions, the choice of the estimate above the 50thpercentile is essentially arbitrary.

214. The use of a standard error in the estimate of the WACC is the process followed in NZ to determine a range of estimated of the WACC. The range is set as the distance between the 25th and 75th percentile. The Commerce Commission will select a WACC from this range, generally above the mid-point.

215. At this time we have not attempted to quantify this standard error.

Appendix 1: Promised Versus Expected Yield on Debt

Calculation of Difference between promised and expected yields on Corporate Bonds

Inputs

Assumed Rf	5%	
Coupon Rate	5%	
Face Value	100	
Recovery Rate	0.5	0.5
Price	79.3	

Cash Flow

Year	0	1	2	3	4	5	6	7	8	9	10	
No Default	-79.3	5	5	5	5	5	5	5	5	5	105	Coupon X Face Value
Default Rate Data from TCorp letter to Sydney Water												
Default Rate Baa1		0.14%	0.36%	0.62%	0.87%	1.09%	1.29%	1.55%	1.73%	1.86%	2.09%	
Survival Probability Baa1		99.86%	99.64%	99.38%	99.13%	98.91%	98.71%	98.45%	98.27%	98.14%	97.91%	
Marginal Probability		0.14%	0.22%	0.26%	0.25%	0.22%	0.20%	0.26%	0.18%	0.13%	0.23%	
Default Rate Baa2		0.14%	0.43%	0.80%	1.37%	1.85%	2.32%	2.76%	3.18%	3.67%	4.29%	
Survival Probability Baa2		99.86%	99.57%	99.20%	98.63%	98.15%	97.68%	97.24%	96.82%	96.33%	95.71%	
Marginal Probability		0.14%	0.29%	0.37%	0.57%	0.49%	0.48%	0.45%	0.43%	0.51%	0.64%	
Calcs												
Expected Baa1	-79.3	5.07	5.10	5.11	5.09	5.06	5.04	5.06	5.01	4.98	102.93	Coupon x Face Value x Recovery Rate
Expected Baa2	-79.3	5.07	5.13	5.16	5.23	5.16	5.14	5.10	5.07	5.08	100.83	
Promised Yield	8.10%											
Expected Yield Baa1	8.00%											
Difference	0.098%											
Expected Yield Baa2	7.90%											
Difference	0.197%											
Promised spread to rf	3.10%											
Conditional Probability											0.64%	i.e. Get to year 10 without defaulting
Expected Baa1	-79.3	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	104.66	
Expected Yield	8.072%											
Difference	0.027%											

Doubling of default risk

Default Rate Data from TCorp letter to Sydney Water												
Default Rate Baa1		0.28%	0.72%	1.24%	1.74%	2.18%	2.58%	3.10%	3.46%	3.72%	4.18%	
Survival Probability Baa1		99.72%	99.28%	98.76%	98.26%	97.82%	97.42%	96.90%	96.54%	96.28%	95.82%	
Marginal Probability		0.28%	0.44%	0.52%	0.51%	0.45%	0.41%	0.53%	0.37%	0.27%	0.48%	
Default Rate Baa2		0.28%	0.86%	1.60%	2.74%	3.70%	4.64%	5.52%	6.36%	7.34%	8.58%	
Survival Probability Baa2		99.72%	99.14%	98.40%	97.26%	96.30%	95.36%	94.48%	93.64%	92.66%	91.42%	
Marginal Probability		0.28%	0.58%	0.75%	1.16%	0.99%	0.98%	0.92%	0.89%	1.05%	1.34%	
Calcs												
Expected Baa1	-79.3	5.13	5.20	5.21	5.18	5.13	5.09	5.13	5.02	4.96	100.86	Coupon x Face Value x Recovery Rate
Expected Baa2	-79.3	5.13	5.26	5.31	5.47	5.33	5.28	5.21	5.15	5.18	96.69	
Promised Yield	8.10%											
Expected Yield Baa1	7.90%											
Difference	0.196%											
Expected Yield Baa2	7.71%											
Difference	0.392%											
Promised spread to rf	3.10%											
Conditional Probability											1.34%	i.e. Get to year 10 without defaulting
Expected Baa1	-79.3	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	104.30	
Expected Yield	8.042%											
Difference	0.056%											