ValueAdviserAssociates


# Advice on Components of Regulatory Rate of Return

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## Executive Summary

The current volatility in the capital market presents a particular challenge for estimating a risk premium for debt and for equity as input to estimating a weighted average cost of capital ["WACC"]. The current challenge arises for two primary reasons.

1. Equity risk premiums are generally estimated using the Capital Asset Pricing Model ["CAPM"]. Practice is to use a beta based on historical estimates and a long term average market risk premium;

2. The cost of debt for regulatory purposes is, in our opinion, best measured over a 10 year maturity horizon (at least) using market data i.e. based on spot market trades. There is a paucity of such trades therefore finding a reliable reference point for the risk premium on Australian domiciled company bonds in the Australian capital market is challenging. It is clear however that BBB rated debt, that does trade does so with higher risk margins after the advent of the so-called Global Financial Crisis;

Given the high current spot debt risk premium ["DRP"], application of the traditional method of deriving an equity risk premium using an average rather than a spot risk premium (point 1.) will lead to a narrowing of the distance between the risk premium on debt relative to that on equity. The second point above means there is a challenge obtaining a suitable benchmark for the risk premium on debt. Combined there is potential for the risk premium on debt to be above the risk premium on equity. This does not make sense in the current high risk economic environment.

Recent estimates of the equity beta for network companies suggest it is lower than that used in prior regulatory price determinations. However the Australian Energy Regulator ["AER"] has used an equity beta above its assessment of the empirical beta. Further a consultant to IPART[1] has recommended a similar action to ensure consistency between the risk premium on debt and on equity i.e. ensuring risk premium on debt is lower than that on equity.

In our view the notion of consistency must prevail. In current economic circumstances this means using a higher risk premium on equity that is assessed by applying a 6% market risk premium ["MRP"] and an empirically estimated beta[2]. This higher equity risk premium can be achieved by either increasing the empirically estimated beta or increasing the MRP. Our preference is to increase the MRP.[3]

There are no direct water company comparables in Australia to guide an assessment of an equity beta for SA Water. Our recommendation is to use the beta of other Australian regulated gas and electricity distribution companies as a proxy. Betas estimated from overseas companies can assist in informing a view on a suitable beta for SA Water, just as they are used for informing a view on other regulated network betas. The final choice from empirical estimates will require an arbitrary increase if the historical MRP is used to derive a risk premium for equity for the reason outlined above.

Our review of the available evidence suggests the 'empirical' estimate of a beta of equity for a benchmark company with gearing at 60% is in the range 0.65 to 7.0. However we do not recommend this be used with a MRP of 6% or 6.5%. Such action would underestimate

[1] SFG Consulting, "Cost of capital parameters for Sydney Desalination Plant", 10 August 2011 ["SFG"]

[2] Regulatory authorities have used 6% MRP historically under more 'normal' economic circumstances.

[3] The method used is described in Bishop S, M Fitzsimmons & B Officer, :Adjusting the market risk premium to reflect the global financial crisis", JASSA Issue 1, 2011. See also various submissions to the AER e.g. "Officer R.R. and S.R. Bishop (2009j). Market Risk Premium: Estimate for 2011-2015,

the current opportunity cost of equity and potentially lead to underinvestment. Our preference is to use an MRP above the historical average to reflect current circumstances rather than adjust the beta of equity.

At this time we support the use of yields on BBB rated bonds issued by Australian companies in AUD, possibly supported by data for Australian company issued debt in USD or currency default swap prices, to derive an estimate of the risk premium on 10 year maturing bonds. To the extent possible we support the use of the Bloomberg fair value curve as an 'independent' estimate of a debt risk margin as an appropriate starting point. The assessment of a DRP from this source for 7 year debt is, in our opinion, the minimum DRP (since 7 year debt it the longest maturity published by Bloomberg at this time). However, this as other options, suffers from lack of data from a well-attended and liquid market. Nevertheless it is an independently assessed input that does require an adjustment to extend the current 7 year maturity data to a 10 year period. Again there is a paucity of date for such extension. We have examined a number of options and recommend an adjustment to the current Bloomberg estimate of 358 basis points for 7 year maturing debt of 20 basis points to reflect the DRP on a 10 year maturing BBB rated bond. This estimate was derived from the difference between 7 year and 10 maturing CDS on Australian bonds. We hasten to point out the estimates are fluid and will require revision over time.

Our best estimate of the current debt risk margin (or premium) is therefore 380 basis points (rounded). This excludes any allowance for the cost of 'fixing' 10 year maturing debt for the regulatory period or any refinancing costs.

## Tasks to be undertaken according to the Consultancy Brief

ESCOSA provided the following brief.

> *"The objective of this Brief is to determine an appropriate equity beta and debt margin for an efficient water utility in Australia.*

### Benchmarked Value of Equity Beta for SA Water

> *The consultant is required to provide advice to the Commission on an appropriate value of equity beta to be used for the purpose of setting SA Water's drinking water and sewerage prices for the three year period commencing 1 July 2013.*
>
> *In providing that advice, key questions that need to be addressed are:*
>
> *Is the equity beta for a water utility different to the equity beta for an electricity or gas utility (after adjustments for any different benchmarked leverage assumption)?*
>
> *Given that there are no listed water utilities in Australia, what reliance can be placed on international benchmarks for the derivation of a water utility's equity beta? What other, if any, variables will need to be adjusted due to the total reliance on overseas data (e.g. MRP)?*
>
> *Given that SA Water has different categories of assets, eg. water distribution pipelines, wastewater networks and treatment plants and desalination plants, is there is different level of risk for each of these categories. If so, can the equity beta for each of these categories be derived? Should a different rate of return be applied to each of these investments?*
>
> *To what extent has systematic risk been transferred from SA Water to its outsourced operator under the Metropolitan Adelaide Service Delivery Contract: Allwater. How can this be quantified such that there is no double recovery of the risk premium?*

### Debt Risk premium

> *The consultant is required to provide advice to the Commission on an appropriate debt risk premium to be used for the purpose of setting SA Water's drinking water and sewerage prices for the three year period commencing 1 July 2013.*
>
> *The current methodology for deriving the debt margin is a two-step process; a benchmarked credit rating is attributed to the utility, and the debt margin is then derived by benchmarking the yields from bonds of utilities with the same credit rating, for a given maturity period. These yields are not observed but derived by Bloomberg, using a proprietary algorithm.*
>
> *The New South Wales economic regulator, IPART, has recently stated that, in its view, there are a number of weaknesses in this current methodology, including:*
>
> - *There are a limited number of bonds in the sample of securities. This number has decreased in recent years, as bonds that have matured (and have therefore dropped out of the sample) have not been replaced at the same rate by new bonds.*

- *There is a lack of clarity about which source should be used for the credit rating indicator if the major ratings agencies are not consistent.*

- *The average term to maturity of the bonds in the sample is relatively low. While the target term to maturity for IPART's benchmark was 10 years, the average remaining term to maturity of the bonds in its sample was 4.3 years. Like most regulators in Australia, IPART found it difficult to base their credit spread estimates on a 10-year term to maturity due to the lack of long-term bonds issued in the Australian market.*

- *The longest available term to maturity for the Bloomberg BBB fair value curve is relatively low. This term has decreased over time due to insufficient market data, and is currently 7 years.*

- *The statistical approach used to set the debt margin may introduce distortion. By using the lowest and highest average yields on the bonds in IPART's sample, this approach gives weight only to the highest and lowest yielding bonds, which are potentially outliers. All other observed yields in the sample receive no weight.*

*For these reasons, IPART undertook a full review of the methodology to derive the debt margin and decided to use a median value for Australian and US currency-based bonds that met a pre-determined set of criteria and included an additional 20 basis points per annum for debt raising costs.*

*The Commission requires that the consultant undertake a similar review and provide advice on how should the Commission derive its debt margin for the purpose of setting SA Water's prices.*

*In providing advice on the debt premium and equity beta, the consultant will need to advise if there are any implications of the advice on any other of the WACC parameters.*

*Commission staff will be responsible for developing positions on the other components of WACC."*

## Introductory Comments

1. Prior to specifically addressing the tasks in the Brief, two matters are addressed which provide background to estimating the cost of debt and equity. These are the matter of the relativity between the risk premium on debt and equity and the matter of promised versus expected yields on debt.

### Relative Risk Premiums for Debt versus Equity

2. Debt issued by a company ranks before the company's equity in the claim on assets in the event of default or liquidation and also in its claim on operating income. In short, under company law and by definition, debt holders are exposed to lower risk than the company's equity holders. Therefore a basic tenet or axiom in finance is that the cost of a company's equity is expected to be higher than the cost of its debt. If this was not so then the debt would 'dominate' the equity and no one would choose to hold equity until equilibrium was re-established rewarding the equity relative to the debt for the additional risk carried by the equity holders.

3. The convention of using a spot yield (or risk premium) on debt and average parameters to estimate the risk premium on equity under the CAPM can provide results which are not consistent with this basic tenet. This is particularly so in the current climate of high volatility in capital markets. Consequently, any estimate that implies debt has a greater expected return than equity must arise from measurement error. Therefore care must be exercised when estimating a weighted average cost of capital ["WACC"] to ensure a consistent view of the debt and equity risk premium and to ensure the economic conditions expected to prevail over the regulatory period are reflected in both the required return on debt and on equity. This is relatively easier to achieve for the debt premium when debt yields are available from a liquid and well attended market but harder for equity when expected yields cannot be directly observed.

4. Although there is not a long history of the differential spread between debt and equity to guide us, we would expect the historical differential between say BBB debt spreads and the equity risk spread for a beta of 1 to at least be maintained in the current environment.[4] The data we have suggest that there would be at least a 480 point differential.

5. Regulators and practitioners have faced challenges in setting a WACC largely because of the practice of using a spot market rate for the risk premium on debt and an average rate for the cost of equity. This has worked satisfactorily when the spot and average rates are close however recent high volatility in capital markets has caused these to be quite different. In such circumstances the gap between the risk margin on debt and on equity arising from the use of spot rates for debt and average rates for equity will narrow, even become negative, which is contrary to reasonable expectations of risk averse investors.

6. The issue is significant in a regulatory environment because the cost of capital is usually set for a five year period – much shorter than the asset life. Consequently setting the WACC using average rates for equity will underestimate the cost of equity and may fail to attract investment in a high risk economic environment and lead to potential over investment in a low risk economic environment.

[4] Since we know of no impediments, we assume integration of debt and equity markets.

7. In a recent paper prepared for IPART, Strategic Finance Group[5] ["SFG"] go some of the way in attempting to obtain consistency in these required rates of return. SFG consider the case where the risk premium of equity over the base rate or risk free rate (government bond rate) is set equal to the risk premium on debt (with adjustments for beta risk). We are of the view that the risk premium on equity should be higher than the risk premium on debt because the risk of equity relative to debt is more than just their covariance risk differences. To the extent that equity has to bear greater diversifiable (insurable) risks than debt, equity will have to show a greater gross return than debt.

8. Additionally, we note that SFG attempt to deal with the need for a higher cost of equity, given a relatively (to historical averages) 'high' risk margin on debt, by increasing the beta of equity above the empirical estimate. This moves towards the more consistent outcome for the cost of equity relative to the cost of debt.

9. In our view greater consistency in expected returns across debt and equity will be achieve by using a market based estimate of the MRP rather than an historical average MRP and adjusting betas. Our recommended method has been documented in submissions to the AER and involves applying a constant required return per unit of market risk to a market-based forward view of risk. This one year view is transitioned to the long term average to obtain a five year view of the MRP and therefore the cost of equity.

## 'Promised' versus 'Expected' Yields on Debt

10. Quoted yields on debt instruments are usually calculated by solving for the discount rate that equates promised interest payments with the traded price / value of the instrument. Promised interest payments are found by applying the coupon rate to the face value of the debt. The price will reflect the probability of default on the payments however the cash flows will not. This is in contrast with the notion of an expected rate of return on equity which relates to expected rather than promised cash flows i.e. the price / value of equity will reflect the present value of the expected cash flows discounted at the required (expected) rate of return. There is a difference in the basis of estimating cash flows across these two instruments arising because of any loss of cash flows to debt investors when default occurs.

11. A recent Queensland Competition Authority ["QCA"] price determination for SEQ Water estimated the cost of debt at 9.69% and the cost of equity at 8.85%. It 'explains' this unusual outcome as follows:

> *"The Authority accepts that the cost of debt should fall below the cost of equity when the cost of debt is defined as the expected rate of return. However, the debt premium and cost of debt commonly used in a WACC calculation relate to the contractual (promised) rate of return on debt – which will generally exceed the expected rate of return because of expected default losses and a premium for the illiquidity of corporate bonds relative to government bonds.*
>
> *A similar point has also been made by Professor Davis (2011). Lally (2011) has noted that, following the global financial crisis and the*

[5] SFG Consulting, "Cost of capital parameters for Sydney Desalination Plant", 10 August 2011

*substantial increase in promised yield debt margins, the promised rates are likely to exceed expected rates 'by a very significant level'.*

*Another reason that the cost of equity is below the cost of debt relates to the Authority's practice of including transactions costs (of swaps and debt refinancing) in the cost of debt. When these transactions are excluded, the cost of equity (8.85%) exceeds the cost of debt on a promised yield basis (7.65%), and more so on an expected rate basis." P 251*

12. 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 higher than the cost of equity.

13. We agree that the observed yields on corporate bonds are calculated using promised rather than expected cash flows, the difference being related to the probability of default and the loss given default. Nevertheless, SFG note that:

*" . . . disaggregating the yield into an expected return and a default premium is a substantial task. However, for some purposes it is the yield itself that is the appropriate reference point, which makes the disaggregation and the estimation of default premiums unnecessary. One such case is the estimation of the WACC, in which it is standard practice to use the yield on debt rather than an estimate of the expected return." (p23)*

14. We agree that it is a substantial task and note that there is a large element of default risk that is systematic i.e. the probability of default is related to the state of the economy, which makes disaggregation challenging as SFG point out.

15. SFG also point out:

*"In summary, there is a distinction between the yield to maturity and the expected return on debt, and disaggregating the yield into an expected return and a default premium is a substantial task. However, for some purposes it is the yield itself that is the appropriate reference point, which makes the disaggregation and the estimation of default premiums unnecessary. On such case is the estimation of WACC, in which it is standard practice to use the yield on debt rather than an estimate of the expected return. In a capital budgeting context, for example, the proponent would have to establish that the proposed new project would generate sufficient cash flows to cover all of the promised payments to debt holders, and that there would be sufficient residual cash flows to enable equity holders to earn their required return. That is, the WACC is estimated on a going concern basis as an estimate of the returns that will be required by investors in order to continue funding the firm as a going concern.*

*A similar rationale underpins the use of the yield when estimating the regulated rate of return, rather than the expected return on debt, and why the regulated return to equity holders should be at least equal to this amount." p23*

16. We agree with these points. Further Davis notes at paragraph 11 that the difference is likely to be small as our analysis presented below suggests[6]:

*"This issue has also been addressed in a report to the NZ Commerce Commission (Franks, Lally and Myers, 2008). "Professors Franks and Myers agree with footnote 32 of the Draft Guidelines, which says that, strictly speaking, the cost of debt should be defined as the expected rather than promised yield on debt, but in practice the expected yield is not easy to estimate. So, in most situations (unless the debt premium is very high, due to a high risk of default), promised yields can be used as proxy for expected yields" (p31).*

17. We have undertaken an indicative analysis to assess the likely size of any difference between expected and promised yields.

18. 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

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

20. 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.

21. By way of illustration, US data points to recovery rates of around 70% for utilities.[7] 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.[8] 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

[6] Davis, K., 'Cost of capital parameters for Sydney Desalination Plant: By SFG Consulting: An initial review for IPART', Australian Centre for Financial Studies, 18 August 2011

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

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

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 therefore making the practice of using promised yields supportable both by the argument of SFG Consulting and by the relatively small dimension of the issue.

22. On these grounds we support the use of promised yields being used as a proxy for expected yields and do not regard it as an adequate explanation for observed debt risk spreads being higher than the cost of equity (as proposed by QCA). Further, we are of the view that the underlying economic drivers of any increase in default risk under current circumstances will also affect the required return on equity and are unlikely to narrow the spread between debt and equity required returns.

## Equity Beta

23. Under the capital asset pricing model ["CAPM"] the cost of equity ($k_e$ )is defined as:

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

where $r_f$ is the risk free rate

$E(k_m)$ is the expected return on the market

$[E(k_m) - r_f]$ is generally referred to as the market risk premium

$\beta_e$ is the relative risk of equity or beta, and

$[E(k_m) - r_f]\ \beta_e$ is the risk premium on equity.

24. While possible estimates of the cost of equity and an estimation process are discussed in subsequent sections we refer to our introductory comments relating the risk premium on equity. This should be higher than the risk premium on debt. In our view this is the important outcome in an assessment of the cost of equity consequently the individual components of the cost of equity must not be considered in isolation of this expected outcome.

25. By way of illustration, a cost of equity that meets this expectation can be derived by adjusting a beta or the MRP if the condition is not met using historical average inputs for the cost of equity and capital market yields for the cost of debt. While we are of the view that adjusting the MRP is more defensible under these circumstances than adopting a higher beta than the empirical estimate, it is the risk premium outcome that is important. A similar result is achieved by using a beta of 0.9 and a MRP of 6.0% (i.e. 5.4%) to using a beta of 0.65 and a MRP of 8% (i.e. 5.2%).

### Is Water Different?

26. A question asked in the Brief was "Is the equity beta for a water utility different to the equity beta for electricity or gas utilities (after adjustments for any different benchmarked leverage assumption)?"

27. Two possible approaches to inform an answer to the question are:

- To examine empirical estimates of beta; and / or

- To assess whether the underlying drivers of an equity beta are different.

28. Both approaches suffer from lack of precision. The first approach lacks precision partly due to the size of standard errors in the estimates of betas derived from regression analysis and partly due to the need for a forward estimate which may be different from historically based estimates. The second approach lacks precision due to the lack of a precise formulation of any relationship between the drivers of beta and a quantitative outcome, let alone the challenge of measuring differences in drivers across different network businesses. Consequently any answer is a matter of informed judgement rather than a matter of fact. In these cases it is desirable to 'surround' judgement with numerous approaches.

29. We have not undertaken an extensive empirical assessment of beta at this time. Instead we draw on empirical work already undertaken in other water, gas and electricity regulatory price determination hearings. Ideally a current empirical analysis should be undertaken using a common approach and time period. The estimates we draw on will not meet this criteria however the outcomes are sufficiently indicative for this initial assessment.

30. We discuss the empirical estimates of beta in a later section. In this section we capture a framework to guide a driver based but largely qualitative assessment of the beta of equity for Water relative to other regulated networks.

31. Three general drivers of an equity beta accepted in general are:[9]

- **Revenue Beta** i.e. how the revenue from the asset(s) is expected to co-vary with the overall market revenue;
- **Operating leverage** i.e. the proportion of fixed operating costs to total costs. The combination of Revenue Beta and Operating Leverage determine the Asset Beta. If operating costs are all variable then the Asset Beta will be the same as the Revenue Beta. The larger the operating leverage the larger will be the Asset Beta (for positive Revenue Betas); and
- **Financial leverage** i.e. the proportion of 'fixed' interest claims to the value of the business. With no debt, the beta of equity will equal the beta of assets. Funding with debt (which is typically of lower risk than that reflected in the beta of assets) will pass risk to equity and increase the Equity Beta relative to the Asset Beta.

32. These drivers have been expanded into a more detailed set by Lally[10]. This has been used in an ARTC price determination hearing to assess a likely beta of rail access. The expanded set, with some commentary, is listed below. A qualitative analysis should be directed to whether these drivers differ in a reaction of revenue or cost to changes in the economy i.e. beta is a measure of how equity returns move relative to a change in the 'market'. Ideally it is informed by underlying data if possible. At this time we do not have access to such data so we have hypothesised in some cases.

[9] See for example Ross, Westerfield and Jaffe, "Corporate Finance", McGraw-Hill Irwin,9 ed. P404,

[10] Lally M, "The weighted average cost of capital for gas pipeline businesses" November 2004 p34 ff

a. Nature of product or service – elasticity of demand. Higher elasticity would mean a higher beta. Our hypothesis is that this would be similar across gas, electricity and water networks. All are essential services however there may be more substitutes for water than for gas or electricity e.g. rainfall, tank-water making it potentially more sensitive to factors affecting the economy therefore beta.

b. Nature of customer – public or private sector; residency mix; personal business mix. It is likely that residential, commercial and industrial customers will have different sensitivities in demand to changes in the economy. We hypothesise that residential customer demand would be relative insensitive to change in the economy whereas industrial customers will be more sensitive. At this time we do not have data to establish whether the mix of these customer types is different across water and other utilities but we do not anticipate so.

c. Pricing structure: fixed, variable pricing mix – all networks have a fixed charge and a 'usage' charge. This may affect the behaviour of demand when there are changes in the economy but we are unable to inform an analysis of any differences across networks at this time.

d. Duration of contract prices with customers and suppliers. This may be much the same across the networks, particularly for residential customers, however we have not conducted a detailed analysis. One area of difference may be that suppliers of gas and electricity are generally acting in a competitive market whereas water isn't. This may lead to different contractual arrangements and possibly more certainty for water.

e. Presence of price or rate of return regulation. It is likely that demand risk may be systematic consequently a regulatory regime that leads to demand risk being borne by the regulated company will have a higher beta than a business not facing such risk. This can differ across countries making it challenging to transport beta estimates e.g. from UK water companies to Australian water companies.

f. Monopoly power – we expect this to be similar across water, gas and electricity networks for distribution and transmission services but not the underlying supply of product where there are differences. Water supply is monopolistic (but with substitutes like rainfall) whereas electricity is, to some extent, competitive.

g. Extent of real options – the existence of growth options should make a business more sensitive to macroeconomic shocks and therefore a higher beta. We have no reason to suspect differences across networks in this regard but we have not conducted any form of detailed assessment.

h. Operating leverage – the higher the proportion of fixed to variable costs, the higher the beta. We suspect this is would be similar across networks as all have high fixed costs but data is required to inform a view on this.

i. Market weight i.e. importance in index – the higher the market value of the underlying business or sector the close will its beta be to 1. Since there is a paucity of listed network companies in Australia, this driver is not factored in to

indexes or empirical beta calculations although this is an index measurement issue i.e. stock market indexes do not directly reflect unlisted businesses. At this time we have not attempted to assess the total or relative value of the different networks.

33. In summary, we are not in possession of enough knowledge to make a fully informed judgement at this time. However we suspect it will be difficult to establish significant differences.

## Use of Overseas Betas

34. Systematic risk or "beta", as used in the CAPM, is a forward looking concept but is generally estimated by reference to how historical returns for the company or comparables have moved relative to market movements. The 'market model' is used for this purpose.

35. Estimation of beta by this process can be imprecise and may require judgment to refine historical estimates. This is a particular challenge for SA Water because:

- It is not listed;
- There are no listed equivalent 'pure play' equivalent companies in Australia;
- Overseas listed water companies are not equivalent and operating in different regulatory and economic environments making translation to the Australian environment troublesome and relatively meaningless.

36. While the first two bullet points are self-evident there are some important matters in relation to the last bullet point.

## Different Economic Environment

37. Of concern when considering using overseas betas to represent an Australian beta is the potential lack of comparability due to differences in the relativity of the water sector in the UK to the UK index and the relativity of the Australian water sector to the Australian index due to differences in the economic environment. Relative risk (i.e. $\sigma_i / \sigma_m$) is a driver of beta.

38. Beta is defined as the co-variance of cash flows of the company of interest with the cash flows of the market divided by the variance of the market cash flows. It is a relative construct. The beta of the market is 1 and the beta of the company of interest is relative to this. Consequently two companies in different economies with the same variability in cash flows can have quite different betas simply because the risk of the market is different. For example, Australia has greater exposure to the relatively volatile minerals sector than the UK.

39. Further, different countries may also have different degrees of aggregate financial leverage suggesting a need to adjust for this when translating betas across countries.

*". . . if betas are detined against national share portfolios, and the leverages of such portfolios differ across the two countries in question, then the foreign beta estimate must be corrected for this difference in*

*"market" leverage. Failure to do so can lead to substantial beta errors, with flow on effects to the cost of capital."*[11]

## Different Regulatory Regime

40. The regulatory regime will affect the variability of cash flows of the regulated entity and potentially the co-variability with the market cash flow (beta). In general, if the volatility of a cash flow stream is reduced, ceteris paribus, the lower the beta. Reducing the standard deviation will reduce beta for a given correlation. Note that correlation will generally be less than 1 so it attenuates the impact of the standard deviation of the cash flow stream. Since risk does not disappear, any impact of the regulatory regime on a regulated business means a transfer of risk to some other part of the value chain.

41. As a consequence of regulatory regimes differing and therefore affecting the volatility of cash flow streams for the regulated companies differently, it is challenging to infer betas, and therefore the cost of equity, across regimes.

42. There are areas whereby the UK regulatory system for water companies may differ from that potentially facing SA Water from a risk perspective. These may mean a higher beta for SA Water. For example:

- Although slowly changing, the UK has a relatively lower amount of metering meaning a much greater proportion of fixed charges to customers. Metering was around 37% in 2009[12]. A constant charge better matches the fixed cost nature of the business than the case for SA Water where we understand volumetric charges are a higher proportion of household bills[13]. This decreases the volatility in cash flow stream (smoother) and can be anticipated to reduce co-variability (smoother income stream given the variability in the market overall). Put another way, under such circumstance UK companies have less exposure to demand risk. Also evident is the forecast of a 0% change in household bills for unmetered customers between 2009-10 and 2014-15[14] and the relatively small change in metered household bills of 5% signifying small demand risk in the UK;

- Rainfall differences across the countries are likely to mean that SA Water relies on more storage capacity (therefore higher fixed costs and beta) than in the UK where rainfall more reliably replenishes water usage;

- The UK regulatory regime does provide some certainty to investors about unexpected events that arise within a price setting period.[15] This is evident by the ability of water companies to seek to recover unanticipated losses or costs. Prices can be adjusted between determinations. To the extent that these mechanisms are not available to SA Water then the asset and equity betas will differ.

43. Overall, use of overseas betas are helpful, particularly when little other information is available, in that they provide information about relative risk of water

[11] Lally, M " Betas and Market Leverage", Accounting Research Journal, Vol. 15, No. 1, pp. 91-97, 2002.
[12] Ofwat, "Future water and sewerage charges 2010 – 15 Final Determination", p54
[13] This has not been confirmed but hypothesised.
[14] Op cit p31
[15] Op cit p19

companies in that country. Care must be exercised when inferring a beta for SA Water from such betas because, as noted above:

- The absolute level of risk can differ across countries (different industry mix);
- Financial leverage in the country can differ;
- Regulatory regimes can transfer risk across the value chain in a manner that differs across countries.

44. **Other variables to adjust if use overseas data?** In general we would not be using other parameters estimated from overseas countries.

## Empirical evidence on betas

45. In this section we summarise estimates of betas for water and network businesses.

### Summary of Betas from other Regulatory Price Determinations

46. Table 1 summarises some recent estimates of the beta of equity and beta of assets (when provided) for Water and other network businesses from regulatory hearings.

TABLE 1 BETAS FROM RECENT REGULATORY HEARINGS

| | Offwat Draft 2009 | Ofwat 2010-15 | QCA | IPART | ACCC Draft | AER 2009 | AER 2010 | AER 2010 |
|---|---|---|---|---|---|---|---|---|
| | | | SEQ Water | State Water | ARTC | Elec Dist | Elec Distrib | Qld Elec Distrib |
| Beta of Assets | 0.36 | 0.4 | 0.35 | na | 0.5 | | | |
| Beta of Equity | 0.9 | 0.9 | 0.66 | 0.8 - 1.0 | 1 | 0.8 | 0.8 | 0.8 |

47. When contrasted with the summary in Table 2 it is evident that some recent decisions have reduced the beta below the ealier electricity network estimates which were generally in the range 0.9 – 1.0.

TABLE 2 PRIOR DECISIONS FOR ELECTRICITY NETWORK BUSINESSES

| Service provider | Source | Equity beta |
|---|---|---|
| Transmission (all jurisdictions) | NER | 1 |
| Distribution (NSW) | NER | 1 |
| Distribution (ACT) | NER | 1 |
| Distribution (Tasmania) | OTTER (2007) | 0.9 |
| Distribution (Victoria) | ESC (2006) | 1 |
| Distribution (Queensland) | QCA (2005) | 0.9 |
| Distribution (South Australia) | ESCOSA (2005) | 0.9 |
| Overall range | | 0.90 or 1.00 |
| Final Detemination | AER (2009) | 0.8 |

Source: AER Final Decision "Review of the weighted average cost of capital (WACC) parameters" May 2009 p241

48. When reducing the beta of equity to 0.8 for use in electricity network businesses the AER concluded:

*"In forming its view of the equity beta of a benchmark efficient NSP the AER observes that:*

- *the highest average of Australian individual equity betas of 0.71 is well below the previously adopted equity betas of either 0.9 or 1.0*
- *the highest Australian individual portfolio equity beta estimate of 0.68 (ACG – 2003 to 2005) is well below the previously adopted equity betas of either 0.9 or 1.0*
- *it can be rejected for approximately 75 per cent of the portfolio equity beta estimates that the true value of the equity beta is 0.9, and*
- *the upper bound of Henry's estimates for the longest period using the United States electricity, and, electricity and gas businesses sample is 0.71.*

*The AER considers if only the point estimates of equity betas were to be considered that an equity beta of 0.7 may be appropriate."*[16]

49. Despite this view the AER settled on 0.8. The reasoning is summarised in the following extracts.

*"Market data suggests a value lower than 0.8. However, the AER has given consideration to other factors, such as the need to achieve an outcome that is consistent with the importance of regulatory stability. Having taken a broad view, the AER considers the value of 0.8 is appropriate.*

*Accordingly, the AER considers that there is persuasive evidence to depart from either the previously adopted equity beta of 1.00 or 0.90.*

*In determining the value of the equity beta, the AER has also taken into account the revenue and pricing principles. The market data suggests a value lower than 0.8, however, the AER has given consideration to other factors, such as the need to achieve an outcome that is consistent with the NEO (in particular, the need for efficient investment in electricity services for the long term interests of consumers of electricity). The AER has also taken into account the revenue and pricing principles and the importance of regulatory stability. Having a taken broad view, the AER considers that an equity beta of 0.8 for a benchmark efficient NSP is appropriate.*

*On this basis, the AER considers that its proposed value achieves an outcome that is consistent with and is likely to contribute to the achievement of the NEO."*[17]

50. We have not re-estimated betas for electricity and gas networks but it does appear that they are lower than the estimates uses in the early determinations as summarised in Table 2. Also notable from Table 1 is that there is a difference between IPART estimates for Water compared with the recent QCA estimate for SEQ Water.

51. The recent SEQ Water determination by the QCA relied on betas estimated by Dr Martin Lally. The selected asset beta of 0.35 was relevered at 60% gearing to an equity beta of 0.66. Table 3 captures the output from Table 1 p 246 of the QCA determination.

[16] AER Final Decision "Review of the weighted average cost of capital (WACC) parameters" May 2009 p332

[17] Op cit pp 343-4

**TABLE 3 ASSET BETAS REPORTED BY QCA USED FOR SEQ WATER**

| | *No. of Companies* | *Data Period* | *Asset Beta* |
|---|---|---|---|
| UK water companies | 3 | 2004-2009 | 0.22 |
| US water companies | 9 | 2004-2009 | 0.38 |
| Australian energy network companies | 9 | 2002-2008 | 0.30 |
| US electric utilities | 11 | 1990-1998 and 2002-2008 | 0.37[a] |
| *Mean* | | | *0.32*[a] |
| ***Mean excluding UK water companies*** | | | ***0.35***[a] |

*Source Lally 2010.[a] See Lally (2011).*

52. This choice contrasts with estimates from CEG in the range 0.8 – 1.0 which were estimated for Australian listed regulated business.[18] The CEG estimates were derived over a period of high risk (150 days around when the ASX reached its lowest point in March 2009), under an argument that this is the most relevant view under the market conditions that existed then (and now).[19] Herein is a challenge when a cost of capital is set for the 5 year period because it should reflect the expected beta over that period. We are of the view that a higher MRP is more relevant than a high beta since beta is a relative measure of risk and there is less reason for this to fundamentally change than for the MRP to change in unusual economic circumstance. It is possible for the historically estimated betas to change (especially if estimated over short time frames) but these can be affected by 'outliers'. By example there is reasonably broad acceptance that the so-called 'tech-wreck' in the early 2000's biased OLS based utility betas downward.

53. As noted these estimates are lower than prior decisions however they are broadly consistent with an analysis of US and UK water utilities recently conducted by SFG for IPART. A summary of some of the output from the SFG estimates is captured in Tables 4 and 5. The column headed 'OLS Raw" captures the slope coefficient of an ordinary least squares regression of the share market return on the stock against the return on a domestic index of stocks i.e. it is an estimate of the equity beta of the company given the gearing of the company (as appears in the last column of Table 5). This has been relevered to reflect an assumed gearing of 60% for a benchmark water company (the column headed 'Regeared'). The increase in the beta of equity arising from this adjustment signals that the comparable companies employed gearing less than the assumed benchmark gearing of 60%. This is also apparent from the average gearing in Table 5 of 43%.

54. The column headed 'Vasichek Estimate' is an adjustment to the raw beta that captures a 'correction' for a potential bias in the estimate where the correction is related to the standard error of the estimate for the particular company. This adjustment contrasts with the 'Blume adjustment' which generally applies a constant adjustment to all beta estimates regardless of the standard errors.

[18] CEG "Estimating the cost of capital for Queensland Water Distribution Retailers", July 2010

[19] Op cit p 23

TABLE 4 SUMMARY OF BETA ESTIMATES FOR WATER COMPANIES AS ESTIMATED BY SFG

| | OLS | | Vasichek | | |
|---|---|---|---|---|---|
| | Raw | Regeared | Estimate | Regeared | Source |
| Average Individual Water Coys | 0.44 | 0.55 | 0.46 | 0.57 | Table 2 |
| Equal Weighted portfolio | 0.45 | 0.53 | 0.46 | 0.54 | Table 4 |
| Average Individual Water Coys - excl outliers | 0.43 | 0.53 | ? | 0.55 | Table 6 |
| Equal Weighted portfolio - excluding outliers | 0.44 | 0.51 | 0.44 | 0.52 | Table 8 |

55. SFG did not separate the estimates for UK and US companies however the report did identify estimates by company. Comparables by country have been extracted and summarised in Table 5. It is hypothesised that the UK is more highly regulated than both the US and Australia giving rise to less risk in the UK, consequently the separation can help inform this view.

TABLE 5 BETAS OF WATER BUSINESSES BY COUNTRY

| | OLS Raw | OLS Relevered | Vasichek Raw | Vasichek Relevered | Gearing |
|---|---|---|---|---|---|
| **UK** | | | | | |
| Northumbrian | 0.34 | 0.32 | 0.39 | 0.37 | 0.65 |
| Pennon | 0.42 | 0.47 | 0.44 | 0.5 | 0.48 |
| Severn Trent | 0.39 | 0.47 | 0.41 | 0.4 | 0.41 |
| United Utilities | 0.51 | 0.61 | 0.52 | 0.62 | 0.44 |
| York Water | 0.33 | 0.4 | 0.36 | 0.46 | 0.32 |
| **Average** | **0.40** | **0.45** | **0.42** | **0.47** | **0.46** |
| **US** | | | | | |
| American States Water | 0.28 | 0.3 | 0.29 | 0.32 | 0.46 |
| American Water Works | 0.41 | 0.46 | 0.46 | 0.45 | 0.61 |
| Aqua America | 0.36 | 0.41 | 0.37 | 0.43 | 0.44 |
| Artersian | 0.22 | 0.22 | 0.24 | 0.25 | 0.54 |
| Cadiz | 1.14 | 1.55 | 1.11 | 1.51 | 0.38 |
| Cal Water | 0.29 | 0.32 | 0.29 | 0.34 | 0.37 |
| Conneticut Water | 0.33 | 0.37 | 0.34 | 0.38 | 0.45 |
| Consolidated | 0.95 | 1.65 | 0.96 | 1.66 | 0.09 |
| Middlesex Water | 0.37 | 0.41 | 0.37 | 0.42 | 0.47 |
| Pennichuk | 0.17 | 0.16 | 0.21 | 0.21 | 0.44 |
| SJW | 0.56 | 0.73 | 0.57 | 0.74 | 0.36 |
| **Average** | **0.46** | **0.60** | **0.47** | **0.61** | **0.42** |
| **Overall Average** | **0.44** | **0.55** | **0.46** | **0.57** | **0.43** |

56. It would appear from the data summarised above that a beta of equity in the range 0.8 – 1.0 as has been used by IPART for example, is hard to sustain. Nevertheless it is important to recognise that there is a considerable lack of precision in the beta estimates as evidenced by the high standard errors accompanying the estimates.

57. There are no Australian comparable listed water companies to inform a beta for SA Water. We are of the view that the UK regulatory environment means the beta for UK companies may understate the beta for Australian companies essentially

because of the different exposure to demand risk. Whether any difference in demand risk is systematic is another matter which is difficult to assess.

58. Our judgement is that the noise in estimates of beta and the challenge in differentiating between the drivers of an equity beta across electricity, gas and water mean that use of the same beta of equity is supportable (assuming similar leverage).

59. We express concern that the estimate of beta is derived without a view to what the equity risk premium is. As noted we are most uncomfortable with an outcome that leads to a narrowing of the historical gap between the risk of debt and the risk of equity.

## Different Risks for Categories of Assets

60. The question asked in the brief was whether the different categories of assets of SA Water would mean a different equity beta for each and whether a different equity beta could be derived.

61. Certainly the answer to the second component of the question is 'most unlikely' or 'near impossible' on a quantitative basis. Suitable pure play comparables are unlikely to exist. Any such derivation would be qualitative rather than quantitative. There are large enough measurement issues associated with estimating a water utility beta relative to one for gas and electricity let alone subsets of assets.

62. The answer to the first question is essentially the same. Any assessment will be more qualitative than quantitative. A qualitative assessment could be undertaken using the driver assessment described above. However we would not expect detectable differences. An area to explore however is whether there are substantial differences in customers that drive differences in the cyclicality of revenue. A priori we suspect this is not the case.

63. One possible exception to the view that the systematic risks are similar could be different contractual arrangements across the asset classes. This can transfer risk e.g. desalination plants may well have contracts that provide a different revenue flow to the underlying demand. Similarly filtration plants may be subject to an availability charge thereby of lower systematic risk. We do not have the detailed knowledge to undertake the assessment required. Even with more knowledge, the assessment would be qualitative. It is important to recognise that betas are additive so any part of the business enjoying lower risk means that it is at the expense of another part of the business incurring higher risk. The beta of the total operation will not change under different contractual arrangements.

## Has Systematic Risk Been Transferred to the outsourced operator?

64. This may be possible through contractual arrangements however we have not reviewed the contracts to make such an assessment at this time.

## Recommendation

65. It is reasonable to use a beta assessed with reference to water and other regulated network betas i.e. gas and electricity distribution. At this time we do not think the estimation process is sufficiently accurate to distinguish water from gas and electricity networks.

66. Further, it is important that the combination of beta and MRP provide an equity risk premium that is higher than the debt risk premium. Consequently the equity beta should not be considered in isolation of the MRP and the debt risk premium, particularly in the current economic environment reflected in higher than usual debt risk premiums on BBB debt and higher than average MRP.

67. The empirical evidence suggests a beta of equity in the range 0.6 to 0.7. However, in our view this should be used in association with an MRP above the historical average. Unless this is implemented then the risk premium differential between debt and equity will narrow or potentially become negative. This outcome is inconsistent with expectations since equity investors bear more risk than debt investors.

68. Other regulators (with the exception of the QCA most recently) use an equity beta in the range 0.8 – 1.0 but use it in conjunction with an MRP of 6.0% or 6.5%.

## Debt Risk Premium

69. We have been asked to provide advice on how the Commission should derive its debt margin for the purpose of setting SA Water's prices.

70. The Brief referred to a recent IPART review of debt margin data and it summarised the following findings from IPART:

- *There are a limited number of bonds in the sample of securities. This number has decreased in recent years, as bonds that have matured (and have therefore dropped out of the sample) have not been replaced at the same rate by new bonds.*
- *There is a lack of clarity about which source should be used for the credit rating indicator if the major ratings agencies are not consistent.*
- *The average term to maturity of the bonds in the sample is relatively low. While the target term to maturity for IPART's benchmark was 10 years, the average remaining term to maturity of the bonds in its sample was 4.3 years. Like most regulators in Australia, IPART found it difficult to base their credit spread estimates on a 10-year term to maturity due to the lack of long-term bonds issued in the Australian market.*
- *The longest available term to maturity for the Bloomberg BBB fair value curve is relatively low. This term has decreased over time due to insufficient market data, and is currently 7 years.*
- *The statistical approach used to set the debt margin may introduce distortion. By using the lowest and highest average yields on the bonds in IPART's sample, this approach gives weight only to the highest and lowest yielding bonds, which are potentially outliers. All other observed yields in the sample receive no weight.*

71. The debt margin (or spread) will be a determined by the risk faced by debt investors. This, in turn will be a function of (at least) the variability of the unlevered cash flows, gearing and debt maturity.

72. The general practice by other Australian regulatory authorities is to assume 10 year maturing debt and assume that a benchmark network business will have gearing at 60% of RAB. This is close to the median gearing for a BBB rating for utilities as published by Standard & Poor's.[20] It is further assumed that the network will be rated in the BBB range under these conditions. Consequently the challenge becomes one of assessing an estimate of a debt risk margin that reflects current economic conditions.

73. Ideally we would use data on the level and variability of operating cash flows for SA Water to test what gearing it could sustain to achieve a BBB (or other selected) rating. The analysis would look at the ratios generally used by rating agencies to derive a rating under different assumed gearing to form a view about the level of gearing it could sustain while maintain the selected rating.

74. At this time a RAB has not been set for SA Water and we do not have data on the variability of operating cash flows consequently we have not assessed a gearing

[20] See S& P, "Corporate Rating Criteria" 2006 p43

level that SA Water could sustain. Consequently we have assumed that the gearing will be set to achieve a BBB rating and therefore focus on how a debt risk margin can be estimated for such a rating.

75. The discussion evolves as follows:

- It identifies and comments on a set of evaluation criteria;
- It recommends the use of long dated debt;
- It reviews the current challenge in obtaining 10 year BBB bond benchmark yields / margin;
- It outlines some options for estimating a benchmark margin;
- It provides an outline of the trade-offs to consider when choosing the method to select debt risk margin for the WACC;
- It examines data available under each option to assist inform a view as the a reasonable estimate of the DRP.

## IPART's Decision and Assessment Criteria (To be discussed with ESCOSA)

76. The recent IPART review of its approach to assessing an appropriate debt margin identified three criteria for assessing options for establishing a debt risk margin for determining a WACC.[21] The three are that it would result in a cost of capital that:

- Reflects the commercial cost of capital for the benchmark firm;
- Is consistent with its approach to setting the WACC; and
- Is transparent and easily replicated by stakeholders.

77. These criteria were settled upon after excluding an earlier additional item being "stability over time". We agree that it was appropriate to remove this item as there stability does not exist in capital markets and the DRP and ERP should reflect market conditions.

78. We have not confirmed these with criteria with ESCOSA but we largely agree with the first and third listed criteria. We have not explored the meaning of a benchmark firm here but interpret it to mean not SA Water specific but rather to be a commercially owned Australian business operating with competitive neutrality in a quasi-commercial environment. We also recognise the need for any approach to minimise regulatory risk.

79. IPART's final decision was:

1. *We will use data from Australian and US bond markets and the Bloomberg fair 5-year value curve. We will sample bonds from the Australian and US market that met the following criteria:*
   - *bonds are issued either in AUD or USD by Australian firms;*
   - *bonds have a credit rating of BBB to BBB+ according to Standard & Poor's;*
   - *bonds are fixed, unwrapped and have no embedded options;*
   - the issuing company is not affected by such factors as M&A activity;
   - prices are available from Bloomberg.
2. *We will adopt the median of the sample of observations to select a point estimate for the debt margin.*
3. *We will target a 5-year term to maturity for the debt margin, inflation adjustment and risk free rate.*
4. *We will include an allowance of 20bp per annum on the debt margin for debt raising costs." p2*

80. We take issue with the decision to use a 5 year maturing bond as the benchmark bond and with the associated use of 5 years for the risk free rate (used to assess the debt margin) and the inflation adjustment. In our view this should be the longest dated bond for which benchmark data is available form a liquid and well attended market. This has generally been interpreted in the regulatory setting to be a bond with a 10 year maturity. We are comfortable with 10 years as capturing commercial practice. Our view on maturity is summarised in the next section.

[21] IPART, "Developing the approach to estimating the debt margin: Other industries – Final Decision", April 2011. See also the draft decision, February 2011 and Discussion Paper, November 2010

81. Our preference is to use the Bloomberg 10 year fair value assessment when sufficient data is available as a 'professional and independent' source however it is currently not available due to lack of trades. Consequently the challenge is to find market based data to inform the choice of a representative debt risk margin for a 10 year bond. With the exception of the 5 year focus we support the IPART sampling guidelines.

## Maturity of Debt

82. The general guideline for financing decisions is that firms should match the length of their financing maturity with the life of the asset. The notion applies to financing with debt as well as equity. This minimises the risk to the business associated with rolling over financing during the asset's life as well as minimising transaction costs. It is the nature of the assets that influences the choice of financial instrument maturity not an artificial division of the life into discrete period for regulatory purposes.

83. However debt financing is generally not available for the same life as the long-lived assets invested in by SA Water. Consequently it faces roll-over risk. In such circumstances it is seen as good practice to spread the timing of debt roll-over over time i.e. ensure all debt does not come up for 'renewal' at the same point of time (and at the same time as other regulated businesses if either fund raising or 'swapping' from variable to fixed was to occur at the time the regulator set a WACC). The recent GFC with high debt rates and challenges in raising debt illustrates the folly in having all debt mature at a similar point in time – a number of firms met their demise form circumstances of this type e.g. Centro Properties and Babcock and Brown.

84. A consequence of spreading the timing of debt roll-over across time is that firms will appear to have debt of different maturities and the average maturity at a point in time will be lower than the typical maturity of the debt when originally raised. For example, debt may be raised with a 10 year maturity but if this is spread evenly over time then the average maturity will be closer to 5 years. It would be a mistake to look at the average maturity of debt in a balance sheet and view this as the typical maturity of debt when it is raised.

85. Equally, assuming regulated firms can hedge all debt for the regulatory period at the time when the cost of debt is set is also problematic[22]:

> *"At the same time [when WACC is set], market research indicated that credit default swap contracts were not generally available for the volume of debt required by QUU based on the current structure of the Australian credit default swap market."*[23]

86. This not only identifies a problem with rolling over all debt at a point in time but also demonstrates one of challenges associated by the view that the relevant maturity of debt is the regulatory period. It is not apparent that regulated firms can either roll-over debt or swap the debt to a fixed rate for the regulatory period.

[22] This appears as implicit assumption of Davis and Lally when they argue for the maturity of debt to match the regulatory period.
[23] QCA op cit p 249

87. It also appears the QCA accept that infrastructure businesses raise long term debt and include the cost of swapping for a fixed term equal to the regulatory period.[24]

88. NSW Treasury has estimated the average term of debt it has raised for Utilities at the time of draw-down is just under 10 years. It notes "… *this aspect of TCorp's strategy satisfies the need to adopt a prudent funding strategy to match the long economic life assets of the utility by accessing long dated funding within the liquidity constraints of the debt capital markets.*"

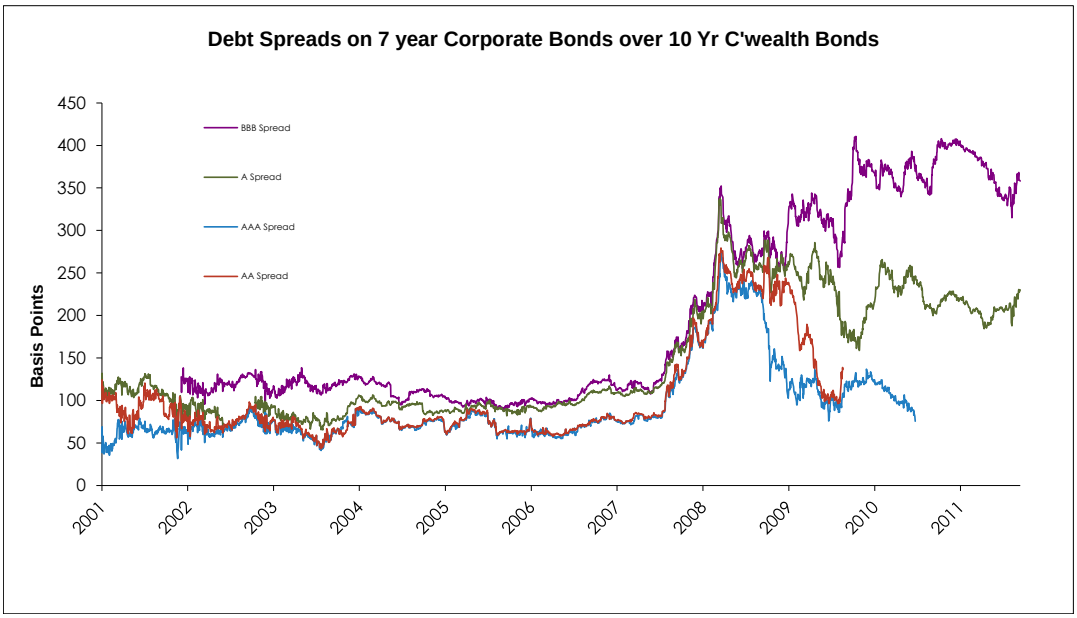
89. Cleary both debt and equity investors are 'signing up' for risk and therefore a required return of greater than the regulatory period. Given the long term nature of the underlying assets and the relative depth and liquidity of the ten year market, we support the use of a ten year maturing proxy for the risk free rate used if its own right in the CAPM and used as the basis for estimating and adding a risk premium for debt and equity.

90. This suggests the most appropriate term to maturity for debt should be the longest possible with 10 year debt an acceptable benchmark maturity.

## Spreads on BBB Bonds

91. The global financial crisis and aftermath has had a profound effect on debt risk margins. This is illustrated in Figure 1 which shows margins for different rated Australian traded bonds. The impact has not only been felt through higher margins but also through supply. Few new corporate bonds of long maturity have been issued in recent years. Bloomberg no longer provide market data for 10 year maturing bonds essentially because there are few or none with this maturity that trade. The longest maturity for which they provide margins is 7 years as presented in Figure 1.

FIGURE 1 DEBT RISK MARGINS AN AUSTRALIAN TRADED CORPORATE BONDS




[24] See QCA op cit p 248

## Options for deriving a benchmark margin

92. The most appropriate method for deriving a debt margin is to use market data for debt of the same maturity, credit rating and industry. Second best is extrapolation from market data with other model based methods falling further behind.

93. It is practice to use yields or spreads on debt to estimate the cost of debt in a WACC calculation because it is market / transaction based data. Unfortunately such data are not available for estimating the cost of equity thus the necessity to use a model. The most widely used model for this purpose, despite its deficiencies, is the Capital Asset Pricing Model. Given this model, the preferable approach to establishing the inputs is market data. Ideally the data for either direct or model based input is derived from the same economy with other economy data being of second preference. We apply these criteria to the debt markets when transaction data is not available.

94. Given the current paucity of data from the Australian corporate bond market on yields for 10 year (or longer) bonds the Commission has to look to other avenues for informing the choice of a benchmark debt risk margin. The options we consider are listed below and not necessarily exhaustive.

a) Use the data set of comparable trades set by the AER and extrapolate using either a Bloomberg or CBASpectrum method or an average of the two;

b) Expand the set of BBB rated bonds beyond the AER set to include all BBB $AUD denominated rated bonds that appear on published rate sheets and extrapolate to a 10 year maturity if required;

c) Expand the set of BBB rated beyond the set of $AUD denominated bonds to include other currency denominated but Australian company bonds and extrapolate to a 10 year maturity if required (IPART are considering this approach);

d) Use overseas BBB rated margins and convert to an Australian BBB margin;

e) Reduce the term on the maturity of debt to 5 years rather than 10;

f) Use Credit Default Swap ["CDS"] data from overseas markets to derive a proxy for the Australian margins. These could be CDS on Australian Bonds or CDS on US utility bonds;

g) Use an option pricing model to assess the probability of default on Australian comparable debt and convert to a rating and therefore a margin applicable for the rating;

h) Use the actual cost of debt for SA Water;

i) Seek guidance from the South Australian Financing Authority and / or survey Banks engaged in infrastructure finance as to what, in their opinion, would be the current cost of raising 10 year debt at a BBB rating.

95. A qualitative assessment of the advantages and disadvantages of the options is outlined below followed by a description and discussion of the data obtained under each option.

## Advantages and Disadvantages of options

96. The advantages and disadvantages of options identified above are presented in the Table below.

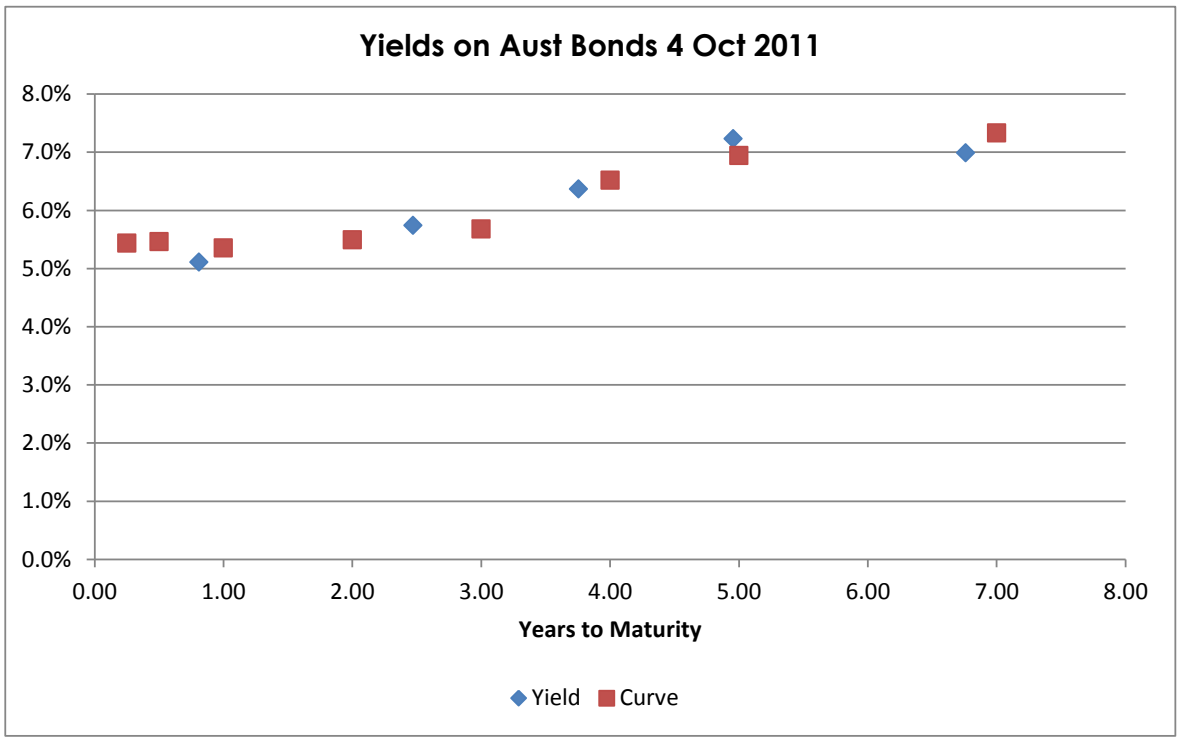
| Suggestion | Advantages | Disadvantages |
|---|---|---|
| a) Use the data set of comparable trades set by the AER and extrapolate using either a Bloomberg or CBA method or an average of the two | Retains use of Australian bond yield data<br>Restricts data set to those considered most comparable | Very few data points<br>Relies on extrapolation which is a function of assumptions rather than market data |
| b) Expand the set of BBB rated bonds beyond the AER set to include all BBB $AUD denominated rated bonds that appear on published rate sheets and extrapolate to a 10 year maturity if required | Expands the number of 'market based' reference points<br>Will, most likely, expand the maturity profile | BBB ratings may not be comparable across industries introducing potential bias<br>Quotes on rate sheets are not always trades and may reflect a trader's judgement<br>Data set may still be small<br>May require extrapolation to obtain a 10 year maturity (see above) |
| c) Expand the set of BBB rated beyond the set of $AUD denominated bonds to include other currency denominated but Australian issued bonds and extrapolate to a 10 year maturity if required. Since there are only a few non US currency issued bonds then the set is US currency bonds | Expands the number of market based reference points beyond the first two suggestions<br>Will, most likely, expand the maturity profile reducing the extent of extrapolation to a 10 year maturity<br>Is consistent with commercial fund raising activities by Australian firms<br>Does requires translating margins in other currencies to AUD denominated rates by use of swaps to convert to AUD rates but this is consistent with sound commercial practice | BBB ratings may not be comparable across industries introducing potential bias<br>Quotes on rate sheets are not always trades and may reflect a trader's judgement<br>The spreads may reflect market conditions in other countries |
| d) Use overseas BBB rated margins and convert to an Australian BBB margin | Expands the number of market based reference points beyond the first two suggestions<br>Will, most likely, expand the maturity profile<br>Uses data from much more liquid market e.g. US | BBB ratings may not be comparable across industries introducing potential bias<br>Quotes on rate sheets are not always trades and may reflect a trader's judgement<br>Requires translating margins in other currencies to AUD denominated rates<br>Introduces another unknown variable viz. whether margins for bonds issued by firms domiciled in other countries can be translated to Australia<br>Is potentially inconsistent with a regulatory desire to use only data for Australian companies |

| Suggestion | Advantages | Disadvantages |
|---|---|---|
| e) Reduce the term of the maturity of the debt to 5 years | Overcomes paucity of data for 10 year maturing bonds thereby enabling the use of market data and the Bloomberg fair value curve<br>It may be possible to add a premium to move from 5 to 10 year maturity based on historical differences | Inconsistent with financing practice and principles<br>Could change funding practices exposing businesses to higher roll-over risk |
| f) Use Credit Default Swap ["CDS"] data from overseas markets as a proxy for the Australian margins | Increases observation substantially and trades are in an increasingly liquid market<br>Margins captured from rate sheets are firm bid and ask quotes committing the dealer to trade at these rates<br>Uses direct market evidence on credit spreads and relevant utilities can be targeted | Is potentially inconsistent with a regulatory desire to use only data for Australian companies if suitable CDS on Australian company, USD denominated bonds are not available (unlikely to be long enough maturity)<br>IPART had challenges converting from USD to AUD denomination – we have not attempted this as yet. Figure 5 is US spread<br>Raises the spectre as to whether BBB ratings across countries and sectors are really the same – still some questions about this<br>May include some counterparty risk |
| g) Use an option pricing model ["OPM"] to assess the probability of default on Australian comparable debt and convert to a rating and therefore a margin applicable for the rating | A probability of default for bonds can be derived from market data if the equity is traded<br>The data set can be expanded to include Australian companies that debt that is not traded | No Australian Water Utilities are listed and there are only a small number of listed Australian Utilities (2)<br>The approach relies on being able to translate the relative probability of default derived from the OPM to a credit rating |
| h) Use the actual cost of debt for SA Water | Does provide an objective rate and allows recovery of actual costs | Is inconsistent with the underlying construct of the WACC reflecting the opportunity cost of capital<br>Will not encourage investment when the cost of additional debt is higher than the historical cost and may encourage over-investment when the cost of debt is lower than the historical cost |
| i) Survey South Australian Financing Authority and Banks for an estimate of the current cost of 10-year BBB debt for a regulated authority | Can provide an 'independent' assessment from those 'closest to the market when hard data is unavailable or apparently inconsistent | Brings in a sense of subjectivity and potential lack of independence |

## a) Extrapolate Bloomberg data

97. Bloomberg derive a fair value curve for BBB rated debt with maturities up to 7 years. Figure 2 shows both the underlying trades (yields) and the fair value curve ["FVC"] (points) for 4th October 2011 for Australian denominated bonds. Bloomberg list 10 BBB rated Bonds from which it draws data for its fair value curve / index. Of these only 5 traded.

FIGURE 2 TRADED YIELDS AND BLOOMBERG FAIR VALUE CURVE




98. It is evident that there is very little data across all maturities and none with a 10 year maturity. The fair value curve yield was 7.33% for a 7 year maturity. Using a linear interpolation between the reported yield on a 5 and a 10 year Commonwealth Treasury Bond of 3.75%, this corresponds with a debt risk premium of 358 basis points.

99. Bloomberg advise that they do not extrapolate beyond the data they have so a 10 year extrapolation is not available from that source. We have not attempted to replicate its proprietary model nor attempted to extrapolate its yield curve.

100. Possible methods of deriving an estimate of the yield or risk premium on a 10 year BBB bond include:

- Derive the additional premium on other rated bonds and assume it will also apply to BBB rated bonds. The UBS Rate sheet showed a DRP for a 9 year bond (Macquarie University) rated Aa2 and a DRP for a 7.5 year bond (GE Capital) also rated Aa2. The difference was 28 bp. Adding this to the 358 bp provides a DRP of 386 bp;
- Derive the additional premium on 10 year Australian issued BBB rated CDS compared with 7 year. There were 8 CDS in the BBB range providing an average 21 bp spread between 7 and 10 year contracts. Adding this to the

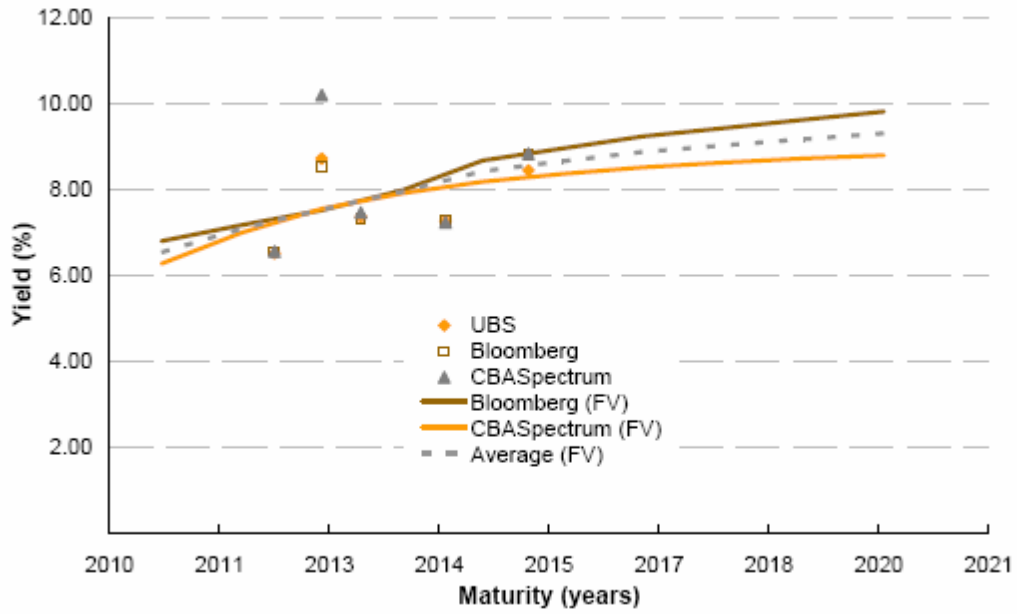
358 bp risk spread for 7 year bonds from the Bloomberg yield curve provides a DRP of 379 bp.

101. The DRP from this approach is in the range 379 to 386 basis points with a mid-point of 382 basis points.

### b) Extrapolate beyond the set used by AER

102. The AER used a subset of the corporate bonds issued by Australian companies in the May 2010 determination. This was partially on the grounds of obtaining a data set that was considered most comparable to a distribution network service provider and partially on the grounds of concerns about structural change in some of the underlying companies.[25] This led to a small number of data points and none for the 10 year period of interest. This is apparent from Figure 11.3 extracted from the Final Determination (p252). It shows the challenge faced in attempting to obtain a margin for 10 year maturing bonds when there aren't any trades and very few data points. Clearly it has to rely on extrapolation rather than hard data. It is not clear how the extrapolation was achieved from our reading of the Final Determination document.

**Figure 11.3: Fair value and observed yield analysis based on BBB+ bond sample**




Source: Bloomberg, CBASpectrum, UBS, AER analysis.

103. As noted above, we have not tried to replicate the Bloomberg fair value curve although there are a number of explanations of how it is derived and attempts to replicate it.[26] We are of the view that the proprietary nature of the approach to developing the curve isn't as much of an issue as the paucity of market based data. Under economic circumstances that are not as unusual as the GFC and

[25] AER, "Queensland distribution determination 2010-11 to 2014-15: Final decision', May 2010

[26] See Hird T & B Grundy, "Critique of Available Estimates of the Credit Spread on Corporate Bonds: A report for the ENA", NERA, May 2005

aftermath we would be comfortable with the use of the Bloomberg benchmark BBB rate given the desire of regulatory authorities to use an Australian company based benchmark rate, which we support in principle.

104. As a consequence we have gone beyond the Bloomberg data to examine one source of its inputs.

105. The primary data sources for traded data for Bloomberg and CBA Spectrum are Rate Sheets prepared by bond traders e.g. UBS, NAB Markets, RBS.

106. The Rate Sheets may not contain actual trades. In this regard CEG note:

> *"Bonds are not generally traded in a centralised exchange but are bought and sold 'over the counter' it can be difficult to observe the prices on the trades that actually take place. Even in normal market conditions yields attributed to a bond will generally not represent the results of actual trading on that day. Indeed Bloomberg has stated in 2007, before the full onset of the financial crisis, that up to 90% of the prices in its bonds database were indicative, not executable. The prices reported by financial institutions, to a large extent, simply reflect the informed opinion of industry players about a fair price for a particular bond."*[27]

107. The issue of indicative yields is problematic if they cannot be identified or if there is a bias in the estimates. To some extent, differences in estimates may be smoothed if there are a large number of observations for each maturity of interest. As we understand it there may not be sufficient observations for this purpose.

108. Table 6 captures some data from a UBS Rate Sheet dated 30 September 2011 with additional overlay. Amongst other information, the sheet provides ratings by S&P, Moody's and Fitch. The bonds listed in Table 6 show the S&P rating but not the other ratings. Bonds selected for the table were those rated in the BBB range by S&P plus 3 bonds rated A- that were used by the AER in a prior price determination.

109. The column marked "Maturity Margin" captures a risk premium of the yield over an assessed risk free rate for a similar maturity. This is taken directly from the rate sheet. The column headed "10 year Margin" is the yield less the yield on a 10 year Commonwealth Bond as at 30 September 2011 i.e. the maturities don't generally match.

110. The second column headed "Bloomberg" is intended to show data that was actually used by Bloomberg to derive its Fair Value Curve ["FVC"] for the day. The bonds with a tick against them are the initial set used to derive the FVC however some bonds did not report a price for that day and were excluded from the FVC calculation. These have a cross in addition to the tick.

111. The column headed "AER" signals the bonds considered by the AER as appropriate benchmarks in the recent Queensland Distribution determination. There would be a challenge using these to derive a debt risk margin now as three have been re-rated A- and the remaining two have maturities less than 5 years.

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[27] CEG, "Estimating the cost of 10 year BBB+ debt during the period 17 November to 5 December 2008", September 2009 p13

## TABLE 6 DEBT YIELD DATA, 30 SEPTEMBER 2011

| Issuer | Bloomberg | AER | Maturity Date | Remaining Maturity @ 30/06/2011 | Coupon Rate | S&P Rating | Yield | Maturity Margin | 10 Yr Margin |
|---|---|---|---|---|---|---|---|---|---|
| COLES MYER | ✓ | ✓ | 25/07/12 | 1.07 | 6.000 | A- | 5.2415 | 112.7 | 102.2 |
| TRANSURBAN | ✓ | | 24/03/14 | 2.73 | 7.250 | A- | 5.8015 | 218.4 | 158.2 |
| SYD AIRPORT | ✓ | | 06/07/15 | 4.02 | 8.000 | BBB | 6.9555 | 326.3 | 273.6 |
| MIRVAC FINANCE | ✓ | | 16/09/16 | 5.22 | 8.000 | BBB | 7.0275 | 324.3 | 280.8 |
| SYD AIRPORT | ✓ | | 06/07/18 | 7.02 | 7.750 | BBB | 6.7325 | 277.8 | 251.3 |
| WESFARMERS | ✓X | ✓ | 11/09/14 | 3.20 | 8.250 | A- | 5.3820 | 171.7 | 116.2 |
| HOLCIM | ✓X | | 07/08/12 | 1.11 | 8.500 | BBB | 5.6665 | 192.2 | 144.7 |
| CLP AUST | ✓X | | 16/11/12 | 1.38 | 6.250 | BBB | 5.9145 | 180.0 | 169.5 |
| LEIGHTON | ✓X | | 28/07/14 | 3.08 | 9.500 | BBB | 7.0670 | 345.0 | 284.7 |
| DBCT FINANCE | ✓X | | 09/06/16 | 4.95 | 6.250 | BBB+ | 7.8070 | 402.2 | 358.7 |
| SNOWY HYDRO | | ✓ | 25/02/13 | 1.66 | 6.500 | BBB+ | 6.4080 | 273.8 | 218.8 |
| SANTOS | | ✓ | 23/09/15 | 4.24 | 6.250 | BBB+ | 6.0770 | 232.5 | 185.7 |
| GPT | | ✓ | 22/08/13 | 2.15 | 6.500 | A- | 5.6905 | 202.1 | 147.1 |
| TABCORP | | | 13/10/11 | 0.29 | 6.500 | BBB | 6.1865 | 207.2 | 196.7 |
| BANK QLD SUB | | | 04/06/13 | 1.93 | 10.750 | BBB | 7.0110 | 334.1 | 279.1 |
| MIRVAC | | | 15/03/15 | 3.71 | 8.250 | BBB | 6.6630 | 297.1 | 244.3 |
| GAIF | | | 19/05/16 | 4.89 | 7.750 | BBB | 6.8115 | 302.7 | 259.2 |
| ADEL AIRPORT | | | 20/09/16 | 5.23 | 6.250 | BBB | 7.0715 | 328.7 | 285.2 |
| BRIS AIRPORT | | | 09/07/19 | 8.03 | 8.000 | BBB | 6.7825 | 271.8 | 256.3 |
| APT | | | 22/07/20 | 9.07 | 7.750 | BBB | 7.0790 | 292.4 | 285.9 |
| DBNGP | | | 29/09/15 | 4.25 | 8.250 | BBB- | 7.2230 | 347.1 | 300.3 |
| ORIGIN ENERGY | | | 06/10/11 | 0.27 | 6.500 | BBB+ | 6.0465 | 193.2 | 182.7 |
| AMEX | | | 05/12/11 | 0.43 | 6.500 | BBB+ | 5.9780 | 186.3 | 175.8 |
| LEASE PAUST | | | 24/02/14 | 2.66 | 7.750 | BBB+ | 6.4055 | 280.6 | 218.6 |
| DB RREEF | | | 21/04/17 | 5.81 | 8.750 | BBB+ | 6.8530 | 301.6 | 263.3 |
| | | | | | | | | | |
| DOWNER | | | 29/10/13 | 2.33 | 9.750 | | 9.3895 | | |
| SALLIE MAE | | | 10/05/12 | 0.86 | 6.000 | BBB- | 10.8755 | | 665.6 |

*Source*: UBS Rate Sheet and Bloomberg, $AUD Denominated Bonds
*Explanations*: A tick in the Bloomberg column means the bond was in the set used by Bloomberg to calculate its fair value curve ["FVC"]. The added cross means there was no price on that day so it was not used to calculate the fair value curve. No tick in the Bloomberg column means it was in the UBS rate sheet but not used by Bloomberg for its FVC.
A tick against AER means it was a bond used by the AER in the Qld Distribution Determination. Note three of the five have been reclassified to A- and would fall out of the AER set.

112. Figure 2 showed the yields and estimated points to derive the FVC for the bonds with a tick only in Table 6.

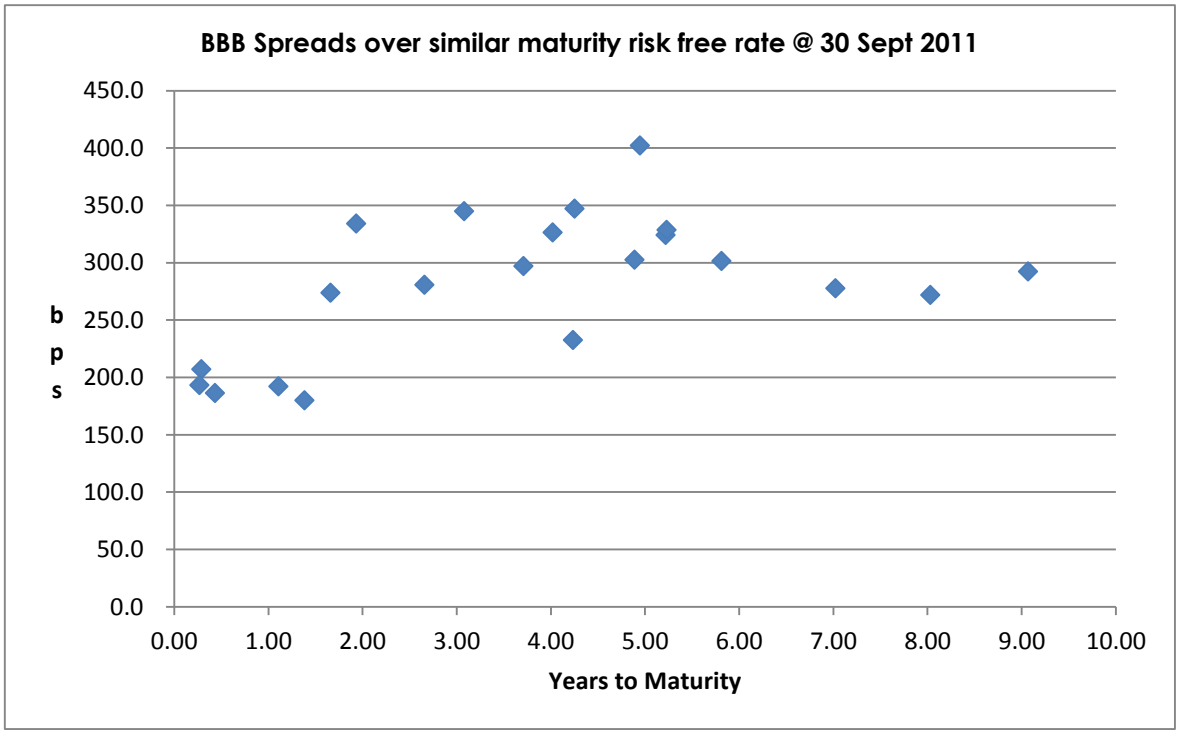
113. Bloomberg do not appear to use all data (we are yet to establish exactly why at the time of writing), and no yield data beyond 7 years was used. Bloomberg state:

> *"The curve is populated with Australian dollar-denominated fixed-rate bonds issued by Australian companies. The bonds have ratings of BBB+, BBB, BBB from S&P, Moody's Fitch and/or DBRS. The yield curve is built daily with bonds that have either Bloomberg Generic (BGN) prices, supplemental proprietary contributor prices or both. The bonds are subject to option-adjusted spread (OAS) analysis and the curve is adjusted to generate a best fit."* Bloomberg Screen

114. It is not clear how "supplemental proprietary contributor prices" are generated and what the impact of them may be. We suspect they are a combination of broker rate sheets.

115. The risk spread data by maturity from the UBS Rate sheet is captured in Figure 3. Normally this would be upward sloping along the curve. Of interest for the regulatory process is the premium for 10 year bonds for which there is only one observation near that maturity i.e. Australian Pipeline Trust with a risk margin of 292 bp from the rate sheet and 293 bp derived from the 8 reported trades in the prior 20 trading days.

FIGURE 3 BBB RISK MARGIN (SPREAD) OVER A RISK FREE RATE OF SIMILAR MATURITY




## c) Use data on Australian company bonds issued in other currencies

116. Our understanding is that IPART expanded its data set to include bonds issued by Australian companies in USD. IPART reports 12 such bonds in its BBB to BBB+ sample but these were not of a long maturity.[28]

117. In addition to the data shown in Table 6, Bloomberg has yields on Australian corporate bonds issued in other currencies. On 4th October there were 36 bonds listed in USD, 2 in Euro and 2 in GBP. Unfortunately 33 of the USD bonds were callable making them not suitable for the current purpose. Of the remaining 3, 2 had a maturity of 3.8 years and therefore unsuitable with one (Leightons) having a maturity of 8.9 years and a DRP of 463 bp.

118. There was one bond in GBP with 11 years to maturity (AMP). The calculated spread was 698 bp. We have excluded this as an outlier. There was an Amcor issued bond with a 7.5 year remaining term with a DRP of 248 bp.

[28] IPART, "Developing the approach to estimating the debt margin" Discussion Paper November 2010 p38

119. These data provided one spread at 463 bp and another at 248 bp (an average of 356 bp).

### d) Use US utility debt and convert to an Australian equivalent.

120. Another reference point is the yields on 10 year maturing BBB bonds issued by US Utility companies. Yields on debt instruments will differ across countries due to differences in underlying interest rates e.g. US rates are lower than Australian at the moment. The US yields have been converted to an Australian risk premium over 10 year CTB. The bonds and the premiums are shown in Table 7. The average premium over 10 year CTB is 491 bp.

**TABLE 7 US UTILITY BBB YIELDS ON 10 NEAR 10 YEAR BONDS CONVERTED TO AUD MARGINS OVER 10 YEAR RISK FREE RATE**

| Issuing Company | Time to Maturity (Yrs) | US Swap Margin bp | Margin over swap $A terms | Debt Risk Premium (over 10 yr CTB) |
|---|---|---|---|---|
| EQT Corp | 9.0 | 373.0 | 446 | 503 |
| EQT Corp | 9.0 | 362.0 | 442 | 499 |
| EQT Corp | 9.9 | 378.0 | 455 | 518 |
| EQT Corp | 9.9 | 382.0 | 460 | 523 |
| EQT Corp | 9.9 | 386.0 | 460 | 523 |
| EQT Corp | 10.0 | 380.0 | 457 | 520 |
| Southwest Gas Corp | 10.3 | 272.0 | 331 | 394 |
| EQT Corp | 11.4 | 363.0 | 440 | 515 |
| Energen Corp | 10.8 | 299.0 | 363 | 426 |
| Average | | | | 491 |

121. We have not included this reference data in our final deliberations because the issuing company is not Australian.

### e) Reduce the maturity to 5 years and add an estimate of the additional premium for 10 years

122. This is a variation on a) above except it uses a maturity of 5 years rather than 7. The possible benefit would be that there are more 5 year bonds and the market is more liquid than 10 year bonds. Following a similar procedure to a), there was only 1 longer term Aa2 rated bond with a 9 year maturity and 1 with a 5 year maturity. The difference in risk premium across these Aa2 rated bonds of different maturity was 31 bp. Adding this to Bloomberg FVC for BBB of 335 bp for 5 year bonds gives an estimate of a 10 year DRP of 366 bp. Since Aa2 is less risky than BBB this may understate the DRP.

123. An alternative source of the DRP for the 5 to 10 year maturity BBB debt is from CDS data. The difference in the pricing of 5 to 10 year CDS on Australian debt is 53 basis points. This data is presented in Table 8. Adding this to the 335 bp from Bloomberg leads to an estimate of 388 bp.

### f) Use Credit Default Swap data on Australian and US company bonds

124. Credit default swap pricing provides a market view of the credit risk of the underlying company. These instruments are used to enable investors to hedge the

risk of default on bonds. Their trading price will reflect an assessment of the default risk of the issuer. It will also reflect counterparty risk so there may be an overstatement of the credit risk of the company. Additionally it will reflect the recovery rate on the debt should the issuer default. We understand that the S & P rating does not reflect recovery rates so there may be some lack of comparability in spreads from the two sources. It is challenging to quantify the impact of these differences.

125. Pricing data on Australian companies with CDS contracts available is presented in Table 8. This was extracted from Bloomberg on 17th October 2011. The average DRP implied by these contracts is 263 bp whereas the median was 187. The issuing companies were not utilities so there is a comparability issue, especially as recovery rates are likely to be different across sectors.

**TABLE 8 CREDIT DEFAULT SWAP DATA FOR AUSTRALIAN BBB RATED BONDS**

| Name | S&P Rating | 10 Year | 7 Year | 5 Year | 7 -> 10 | 5 -> 10 |
|---|---|---|---|---|---|---|
| Qantas Airways Ltd | BBB | 348 | 325 | 295 | 23 | 53 |
| Lend Lease Group | BBB- | 572 | 512 | 422 | 60 | 150 |
| CSR Ltd | BBB+ | 145 | 142 | 137 | 3 | 8 |
| Coca-Cola Amatil Ltd | BBB+ | 118 | 108 | 104 | 10 | 14 |
| Coles Group Ltd | BBB+ | 138 | 132 | 103 | 6 | 35 |
| Foster's Group Ltd | BBB+ | 152 | 136 | 111 | 16 | 41 |
| Santos Ltd | BBB+ | 408 | 382 | 340 | 26 | 68 |
| Woodside Petroleum Ltd | BBB+ | 221 | 197 | 170 | 24 | 51 |
| Average | | 263 | 242 | 210 | 21 | 53 |
| Median | | 187 | 170 | 154 | 20 | 46 |

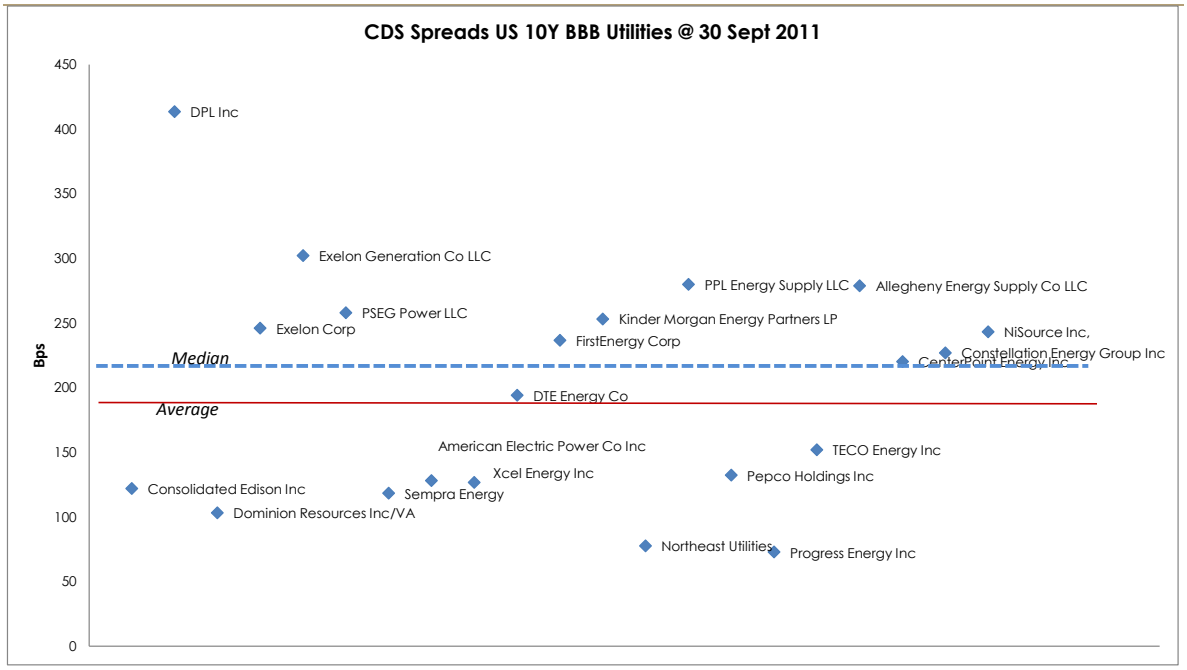
*Source: Bloomberg 17/10/11*

126. Other overseas data available includes pricing of Credit Default Swaps on US Utilities.

127. Figure 4 shows the spreads for US utility companies rated in the BBB band as at 30 September 2011. This provided 21 data points. The y axis just spreads the companies across the page and has no other meaning.

128. The average spread was 194 bp with a median at 220 bp.

FIGURE 4 CDS SPREADS FOR 10 YEAR US BONDS @30 SEPT 2011




129. These data were examined for reference only as the CDS are written against US rather than Australian company debt and reflects the risk of default in a US setting.

## g) Other options – g), e) and f)

130. Option g) involved using an Option pricing model to derive a probability of default and spread. The probability of default is mapped to a rating. The model was applied to Australian listed companies operating in the utility sector and those providing a BBB range rating were Envestra and SPAusNet. The DRP's assessed by this approach were 220 and 208 bp respectively. There are numerous assumptions required to use the model however it is another useful reference point.

131. We have not pursued options e) and f) at this time and have suggested them as an additional source of information should the Commission deem it worthy.

## Summary

132. Table 9 summarises the results from options considered reasonable i.e. reflect market based data on Australian company issued debt. As a consequence of the Australian company issued overlay, the Table does not have numbers against some of the options.

133. The range of DRP is wide from 248 bp to 463 bp with a simple average at 348 bp and median at 373 bp.

TABLE 9 SUMMARY OF DRP DERIVED FROM OPTIONS

| Option | | DRP (bp) |
|---|---|---|
| a) | Extrapolate Bloomberg 7 year | 379 |
| | Extrapolate from Rate Sheet data | 386 |
| b) | Use Rate Sheet 9 year traded bond (APT) | 293 |
| c) | Include Australian companies with USD denominated bonds | 463 |
| | Include Australian companies with other currency denominated bonds | 248 |
| d) | Use USD issued & denominated BBB rated yields and convert to AUD spread | |
| e) | Reduce term to 5 years and add premium for extra 5 years | |
| | - using Aa2 as a reference | 366 |
| | - using BBB CDS as a reference | 388 |
| f) | CDS data on Aust company bonds in USD | 263 |
| | CDS data on US Utility company bonds in USD | |
| g) | Merton Model OPM assessment | |
| Average | | 348 |
| Median | | 373 |

134. In summary:

- There is a paucity of Australian issued bonds denominated in AUD that trade frequently i.e. the market is not particularly liquid, especially for long dated bonds;
- Reported yields are a mix of trade-based and indicative data. Separating the two appears challenging;
- The Bloomberg FVC does not extend to 10 year maturity currently and does not appear to use all available data;
- There is additional market based yields available for Australian issued bonds denominated in other currencies, principally USD. These include some with maturities around 10 years and longer; and
- CDS data for US utility issued bonds is available and the market is seen as deeper and more liquid than the Australian market (for bonds).

## Initial view and recommendations

135. There is no 'best' outcome under current economic conditions because there is limited trading of 10 year or longer Australian issued BBB bonds. Consequently there is no way to assess whether the proxy measures match market trade data since it doesn't exist. Any choice of method involves judgement and will therefore lead to the potential for challenge if others have different judgement / weighting on the trade-off between benefits and costs.

136. In our judgement, obtaining more market based data is preferable to model based solutions.

137. The median in the Table appears to be representative of the range of estimates that Australian traded bond data however there is a high margin for error.

138. We would not recommend using 5 year maturity data alone (as IPART concluded) unless other avenues do not provide a sensible result. Under the more usual conditions of an upward sloping yield and risk spread curve, it would require an additional risk margin to convert it to 10 year equivalent margin.

139. Once trading in BBB bonds of 10 year maturity resumes we would recommend reverting to prior regulatory practice of using the Bloomberg fair value curve as an independent source of data. We recommend use of the current estimate for 7 year maturing debt as the minimum DRP. To this we recommend adding a component to reflect the additional return investors require for investing in longer dated 10 year debt. Our best estimate of this under current circumstances is around 20 basis points.

140. Given the paucity and apparent diversity in the spreads from the different sources we recommend a debt risk margin for 10 year BBB rated bonds of 380 basis points. To this we would allow for the cost of swapping long dated debt for the regulatory period and the cost of debt raising. The swap cost was estimated as 0.174% by QCA in the distribution determination. We have not updated this number but expect it to be similar currently. Nor have we estimated a cost associated with debt raising.

141. There are two further 'opinion' related options to pursue given the current paucity of data. These would be 'temporary' arrangements arising purely because of the lack of data:

- Use the actual cost of debt for SA Water however this does not reflect the opportunity cost;
- Seek guidance from the South Australian Financing Authority and / or survey the Banks as to what, in their opinion, would be the current cost of raising 10 year debt at a BBB rating.

# Appendix 1: Estimation of the likely difference between promised and expected yield

**Inputs**

| | |
|---|---|
| Assumed Rf | 5% |
| Coupon Rate | 5% |
| Face Value | 100 |
| Recovery Rate | 0.7 |
| 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 |
| **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 | 5.10 | 5.14 | 5.16 | 5.14 | 5.11 | 5.08 | 5.12 | 5.05 | 5.00 | 102.98 |
| Expected Baa2 | -79.3 | 5.10 | 5.19 | 5.23 | 5.35 | 5.27 | 5.24 | 5.19 | 5.16 | 5.19 | 100.97 |

| | |
|---|---|
| Promised Yield | 8.10% |
| Expected Yield Baa1 | 8.05% |
| Difference | 0.046% |
| | |
| Expected Yield Baa2 | 8.00% |
| Difference | 0.095% |
| | |
| Promised spread to rf | 3.10% |