The Allen Consulting Group

Queensland Distribution Network Service Providers

Cost of Capital Study

December 2004

Report to Queensland Competition Authority

The Allen Consulting Group

The Allen Consulting Group Pty Ltd

ACN 007 061 930

Melbourne

4th Floor, 128 Exhibition St

Melbourne VIC 3000

Telephone: (61-3) 9654 3800

Facsimile: (61-3) 9654 6363

Sydney

3rd Floor, Fairfax House, 19 Pitt St

Sydney NSW 2000

Telephone: (61-2) 9247 2466

Facsimile: (61-2) 9247 2455

Canberra

Level 12, 15 London Circuit

Canberra ACT 2600

GPO Box 418, Canberra ACT 2601

Telephone: (61-2) 6230 0185

Facsimile: (61-2) 6230 0149

Perth

Level 25, 44 St George's Tce

Perth WA 6000

Telephone: (61-8) 9221 9911

Facsimile: (61-8) 9221 9922

Brisbane

Level 11, 77 Eagle St

Brisbane QLD 4000

PO Box 7034, Riverside Centre, Brisbane QLD 4001

Telephone: (61-7) 3221 7266

Facsimile: (61-7) 3221 7255

Online

Email: info@allenconsult.com.au

Website: www.allenconsult.com.au

Contents

Executive Summary

The Brief

The Queensland Competition Authority ('QCA' or 'the Authority') is presently establishing revenue caps for the Distribution Network Service Providers (DNSPs) in Queensland for the regulatory period commencing 1 July 2005. The Queensland DNSPs are ENERGEX Limited (Energex) and Ergon Energy Corporation Limited (Ergon). As part of this review process, the Authority must determine a weighted average cost of capital ('WACC') that will apply to the DNSPs. The Authority employs the Capital Asset Pricing Model ('CAPM') for this purpose.

The Authority has engaged The Allen Consulting Group ('ACG') to undertake an independent study to make recommendations with respect to:

- Capital structure – Estimate an industry benchmark, based on evidence from the Australian capital market.
- Credit rating – Determine a benchmark credit rating by assessing the relative business risk profile of the DNSPs and the DNSPs' financial risk profile based on the industry benchmark capital structure.
- Cost of debt – Estimate a debt margin above the risk free rate based on current market conditions and reflecting the benchmark credit rating.
- Equity and asset betas – Calculate the equity beta for the DNSPs by:
  - Identifying a selection of appropriate asset betas based on an analysis of comparable asset betas;
  - Analysing factors affecting the stability of their cash flows; and
  - Re-levering the selected asset beta to account for the electricity distribution businesses' debt to equity ratio.

Executive Summary

Our recommendations with respect to the major issues contained in the Brief are outlined below.

Capital structure

We have reviewed market evidence on the capital structure of Australian energy distribution and transmission companies that are comparable to the DNSPs. This evidence shows that such companies generally gear their operations to at least 60% of their Regulated Asset Value (RAV) and their Market Value (MV) unless they are engaged in M&A activities or have significant non-regulated operations. Based on such evidence, Australian regulators have without exception assumed a 60% gearing for energy distribution and transmission companies. Having reviewed market evidence, regulatory precedent, and the relative risk of the DNSPs, we recommend that a 60% gearing level be applied by the QCA.

Credit rating

We have reviewed the S&P Ratings credit analysis ratios for Australian network distribution companies that are geared at around 60% and compared the DNSPs' ratios at a 60% notional gearing with international S&P ratios. The evidence suggests that the DNSPs would attract a BBB+ or A- credit rating. Given these considerations, and erring on the side of conservatism, we recommend that the QCA apply a BBB+ rating to the DNSPs.

Debt margin

The use by regulators of a benchmark such as the CBASpectrum service provides an incentive for regulated utilities to innovate in their financing, and is a fundamental tenet of the CPI-X benchmark regulation framework.

On the balance of the evidence, ACG recommends that the QCA adopt a debt margin that lies within the range of CBASpectrum and Bloomberg benchmark debt margins, applying a 20-day average. Using 27 October 2004 as the cut-off date, ACG would therefore recommend the following ranges of debt margins for The DNSPs:

- 101 (being the CBASpectrum benchmark margin) to 127 bp (being the Bloomberg benchmark margin) for a 10-year time horizon; and
- 92 (being the Bloomberg benchmark margin) to 95 basis points (being the CBASpectrum benchmark margin) for a 5-year time horizon.

Combined debt margin and allowance for debt issuance costs

While the DNSPs' submission on cost of capital did not explicitly mention debt issuance transaction costs, these costs have been recognised by Australian regulators as a legitimate component of the overall financing cost which may be added to the debt margin. Thus, on a combined basis, assuming a 12.5 bp debt issuance transaction cost, reasonable ranges for the total debt margins for the Queensland DNSPs would be:

- 114 to 140 bp for a 10-year horizon.
- 105 to 108 bp for a 5-year horizon.

In recent regulatory decisions regulators have adopted the CBASpectrum margin (for 10 year bonds) and have not considered other evidence, such as the Bloomberg estimates. Adoption of Bloomberg estimates or of a mid-point between the CBASpectrum and Bloomberg estimates would be a departure from recent regulatory practice in Australia. However, the use of information from both services would expand the information set that is used to derive debt costs, and hence is an improvement.

Asset and equity beta

In 2000-01 the QCA reviewed the systematic risk of the DNSPs. That review coincided with a dramatic collapse in the observed betas of proxy energy distribution and transmission companies in Australia and the US. In the circumstances the QCA revised downwards its assessment of the DNSPs' systematic risk and an equity beta of 0.71 was allowed. This meant that the DNSPs' allowed equity beta was significantly lower than that allowed by other Australian regulators, who have generally applied an equity beta of around 1.00 for an assumed level of gearing of 60 per cent debt-to-assets.

The DNSPs' submission

The DNSPs' current submission to the QCA on cost of capital, which was prepared by its adviser, Strategic Finance Group (SFG) was somewhat unconventional in that it did not explicitly identify an appropriate equity beta. Instead, it argued that based on a series of assumptions about the range and probability distributions of key WACC parameters, and applying Monte Carlo simulation, a probability distribution of WACC outcomes could be generated. SFG held that a WACC result should be applied by the QCA under which there would be only a 25% chance that in any year the outturn WACC might be less than the allowance. This vanilla post-tax nominal WACC level was identified as 9.9%.[1]

While the use of Monte Carlo analyses may have theoretical attractions for addressing uncertainty in certain situations, we consider there to be a number of reasons to make it inappropriate to apply for estimating costs of capital for regulated entities. In particular, the information required to derive a probability distribution for a WACC is not available – and the use of the method would imply that the view that a regulator took on the precision (variance) of the various WACC inputs would become almost as important as the view taken on the point estimate of the inputs, and hence the method would increase the matters for dispute between the regulator and regulated entities. The use of Monte Carlo analyses reduces the transparency of the estimation process. Moreover, as discussed further below, the main reason for proposing the Monte Carlo approach is to find a scientific approach for 'erring' in favour of the regulated entities. However, most regulators would consider that they already err in favour of the regulated entities through their choice of the point estimates for the various WACC inputs, and so care is required to ensure that any intended conservatism is not built in twice.[2]

With respect to equity beta, we have calculated on the basis of SFG's 'mid-point' parameters and application of SFG's preferred re-levering formula, that at SFG's nominated gearing level of 55%, its implied 'mid-point' equity beta would be 0.76. With 60% gearing the equity beta suggested by SFG's methodology and other 'mid-point' parameters would be 0.82. However, given the methodology employed by SFG, we have been unable to reproduce an equity beta consistent with SFG's WACC estimate.

---

1 SFG's paper was attached as Appendix 1 of the Energex submission, which argued that an additional 1% should be added to the cost of equity for 'asymmetric risk', resulting in a WACC proposal of 10.3%. See Energex (August, 2004), *Submission to the Queensland Competition Authority: The Weighted Average Cost of Capital (WACC) 2005-2010 Electricity Price Review*, p. 7.

2 From our discussion below, however, it follows that we do not consider that SFG's proposed central estimate of beta (0.82 for a gearing level of 60 per cent) was already a conservative value.

Effects of the dot-com 'bubble'

One of the difficult issues for the estimation of betas for all utility activities at the present time is the consequences of the dot-com 'bubble' that occurred between about mid 1998 and mid 2001. The dot-com 'bubble' was most pronounced in the US market, where 'new economy' stocks came to dominate the entire market. In Australia the effect were seen in the movements of the telecommunication and utilities indexes relative to the ASX 200 index. However, as the 'bubble' burst in May 2000, the selling of the new-economy stocks and buying of utilities stocks led to the utilities index in both the US and Australia moving up significantly relative to the market as a whole. The sharp relative rise in the utilities index in both markets coincided with a large fall in the measured equity betas over this period. We believe the evidence suggests that the dot-com bubble (or rather, the bursting of the bubble) had a dampening effect on utility stocks (in both the US and in Australia) and that the betas measured over this period are likely to understate the expected future beta for utility activities. Hence, any estimates of beta that include observations from over this period (which will include estimates of betas that include 4-5 years of monthly observations) are unreliable indicators of the actual level of systematic risk faced by utility companies.

Our approach to dealing with the dot-com bubble is two-fold. First, we have derived beta estimates for relevant firms from the period prior to the dot-com bubble, using conventional sampling frequency (i.e. monthly observations) and sample size (5 years). Secondly, we have also obtained current estimates of betas using observations drawn over a shorter period (60 weeks) and using more frequent sampling of observations (namely, weekly observations). While beta estimates using weekly observations over a shorter period are more variable that those estimated over a longer period, our analysis suggests that a 'rolling' estimate of beta applying 60 weeks of weekly observations is a leading indicator of the movement of 5-year beta using monthly observations.

For an Australian proxy group of network electricity and gas distribution and transmission companies we found that the measured equity beta (regeared to 60%) using 60 monthly observations has been declining since 1999, but which we consider is biased as a result of the dot-com 'bubble'. However, the equity beta using 60 weekly observations has been steadily increasing since the beginning of 2003, and now averages 0.73.

We undertook a similar analysis for US electricity and gas distribution companies and found current average equity betas using 60 weekly observations have been increasing and now stand at 0.69 and 1.37 respectively. Applying a different approach, which excludes monthly observations during the dot-com 'bubble' period, we found that monthly equity betas for US electricity companies currently average around 0.80. These results for the US should be treated with some caution, however, since the regulatory framework differs from the CPI-X benchmark regulation approach applied by the QCA. In general, however, we should expect an electricity distribution company subject to a 5-year CPI-X regime to have higher systematic risk than an otherwise similar company regulated by rate-of-return.

Recommendation on equity beta

The Allen Consulting Group considers that the empirical evidence, together with the desirability of maintaining stability in regulatory decisions across time and consistency in regulatory decisions across companies justifies the use of an equity beta of 1.00 (for a gearing level of 60%) for the average regulated electricity distributor. However, we are of the view that there are a number of unique factors to the Queensland regulatory regime that would suggest that the systematic risk of the Queensland electricity distributors is less than their interstate counterparts. As such, we consider an equity beta of 0.90 for a gearing level of 60% when deriving the revenue caps for the Queensland DNSPs can be justified.

Our conclusion on the empirical evidence about equity betas has taken account of the current market evidence, but taking account of measurement difficulties created by the dot-com 'bubble'.

Our conclusion about the systematic risk associated with electricity distribution in Queensland compared to their interstate counterparts has been arrived at by taking account of:

- The revenue cap regulation applied to the DNSPs by the QCA, which would reduce systematic risk relative to distributors regulated under price caps (which apply to most of the interstate distributors);
- The fact that changes in distribution prices are not passed through to final customers for much of the market (but rather are borne by the Government through its CSO arrangements) and so some of the risk is effectively passed on to the Government;
- Advice from the QCA that it intends to put in place pass-through arrangements to m itigate the downside risk that the distributors may face if the growth in peak energy demand and customers exceeds the forecasts for the next regulatory period; but
- Mitigated by the relatively high operating leverage of the DNSPs relative to some other proxy companies in the energy sector, which would tend to raise systematic risk relative to some Australian DNSPs.

The equity beta of 0.90 is consistent with an asset beta of 0.45, a debt beta of 0.10 and the use of the Conine de-levering approach. The asset beta of 0.45 compares with an asset beta of approximately 0.76 for the average company in the market (geared at 30%), reflecting the lower risk nature of the DNSPs' operations. Our analysis has also demonstrated that, compared with DBCT's estimated equity beta of 0.67, the equity beta of 0.90 estimated for the DNSPs would be justified by the much higher operating leverage of the latter even if in all other respects the assets were equivalent. However, we recognise the shortcomings of analyses of operating leverage and note that it is only one of the factors to which we have had regard. The recommended equity beta of 0.90 is slightly below the average beta used by regulators when regulating energy sector assets. We believe that this differential is justified by the systematic risk reduction implicit in the revenue cap and other specific regulatory arrangements outlined above.

Chapter 1

Introduction

1.1 The brief

The Queensland Competition Authority ('QCA' or 'the Authority') is presently establishing revenue caps for the Distribution Network Service Providers (DNSPs) in Queensland for the regulatory period commencing 1 July 2005. The Queensland DNSPs are ENERGEX Limited (Energex) and Ergon Energy Corporation Limited (Ergon). As part of this review process, the Authority must determine a weighted average cost of capital ('WACC') that will apply to the DNSPs. The Authority employs the Capital Asset Pricing Model ('CAPM') for this purpose.

The Authority has engaged The Allen Consulting Group ('ACG') to undertake an independent study to make recommendations with respect to:

- Capital structure – Estimate an industry benchmark, based on evidence from the Australian capital market.
- Credit rating - Determine a benchmark credit rating by assessing the relative business risk profile of the DNSPs and the DNSPs financial risk profile based on the industry benchmark capital structure.
- Cost of debt – Estimate a debt margin above the risk free rate based on current market conditions and reflecting the benchmark credit rating.
- Equity and asset betas – Calculate the equity beta for the DNSPs by:
    - Identifying a selection of appropriate asset betas based on an analysis of comparable asset betas;
    - Analysing factors affecting the stability of their cash flows; and
    - Re-levering the selected asset beta to account for the electricity distribution businesses' debt to equity ratio.

1.2 Outline of the study

The report is structured in two parts, with each chapter flowing logically from, and being dependent upon, the earlier chapters.

Part A – Capital structure, credit rating and debt margin

In Chapter 2 we assess the efficient capital structure of the DNSPs on the basis of market evidence, regulatory precedent and comparables. Based on the capital structure recommended in Chapter 2, in Chapter 3 we assess the credit rating that would be likely to apply to the notional gearing of the DNSPs. In Chapter 4, based on the notional credit rating of the DNSPs, we assess the debt margin would be likely to apply in raising debt finance.

Part B – Equity and asset beta

In Chapter 5 we review the factors affecting the DNSPs' relative systematic risk profile. In Chapter 6 we review currently available market data for relevant proxy energy distribution and transmission companies in order to estimate an asset and equity beta for the DNSPs.

First, however, a number of comments are relevant on the distributors' overall proposed approach to the estimation of the cost of capital for their regulated distribution activities.

1.3 The DNSP's Overall Approach for Estimating the Cost of Capital

The distributors' current submissions to the QCA on cost of capital, which was prepared by their adviser, Strategic Finance Group (SFG), adopted a non-standard approach for deriving the estimate of the WACC for the distributors' regulated activities. Rather than adopting an estimate for each of the required inputs and then inserting the estimates into the CAPM and WACC equations, a probability distribution was posited for each individual input. An estimate of the implied probability distribution for the resulting WACC has then been derived using a Monte Carlo simulation. A Monte Carlo simulation involves generating a random numbers from each of the probability distributions and calculating the WACC, and repeating this process a large number of times. The result is an estimate of a probability distribution for the WACC. It was then proposed to take a WACC estimate from the upper end of the range, in particular, a WACC estimate where there was only a 25% chance of true WACC exceeding the WACC estimate (but, equally, a 75% chance of the estimated WACC exceeding the true WACC).

While the use of Monte Carlo analyses may have theoretical attractions for modelling uncertainty, there are a number of reasons to make it inappropriate to apply for estimating costs of capital for regulated entities.

An important implication of the use of the Monte Carlo method is that, while at present regulators need only form a view on the inputs for the various CAPM and WACC inputs, the use of the Monte Carlo method will also require a view to be taken of the probability distribution of that estimator for the relevant input, and the precision (variance) of that estimator. Not only would this approach expand the set of assumptions required by a regulator, it would require judgements to be formed on inputs for which there is less empirical information than the set of inputs currently required. The use of the Monte Carlo method also reduces substantially the transparency of the WACC estimation process.

Most importantly, however, an imperative for the proposal to use the Monte Carlo method is to derive a 'scientific' approach to determine the amount by which the regulator should 'err' in favour of the regulated entity when deriving the required rate of return. However, irrespective of the merits of such 'erring', most regulators would consider that many of the parameter inputs they have adopted to estimate the WACC already contain a degree of conservatism. Accordingly, if the Monte Carlo method were to be applied, it would need to be ensured that the expected values for the various inputs reflected unbiased estimates of the expected values, and hence did not already contain an element of conservatism.

Of the parameters the SFG have proposed, the equity beta is addressed expressly in this report. Anticipating the conclusions, we do not think that the midpoint of the SFG proposal is already conservative, and indeed, have proposed a higher equity beta (we have proposed 1.00, which compares to the SFG proposal of 0.82, when converted to a 60% level of gearing). However, it is our view that the use of an equity risk premium of 6% overstates the expected value of this input. While we routinely recommend to regulators that the use of 6% as an equity risk premium is appropriate, we consider there to be good reasons for considering the expected value for this parameter to be somewhat lower.[3]

Lastly, we would also note that, notwithstanding the substantial experience of utility regulation in the US, UK and other like jurisdictions, no evidence has been presented that any other jurisdiction has adopted an approach to estimating the WACC similar to the approach that has been proposed. We would caution the QCA against adopting a 'unique' solution for what is a standard regulatory problem, but rather advise the QCA to draw to the maximum extent upon the experience and lessons learned already overseas.

1.4 Adjustment for asymmetric risk

In its submission to the QCA, Energex claimed that a one-percentage point premium should be added to the WACC to account for asymmetric risk.[4] Energex engaged KPMG, which furnished the estimated effect of asymmetric risk.[5] A full consideration of these arguments is beyond the scope of our brief, however, we consider that such a claim is not justifiable as a general proposition that would require a one percentage point adjustment to the cost of capital.

The proposition that regulated businesses require a premium to compensate for 'regulatory truncation' of returns was proposed by the Productivity Commission in its Final Report on the National Gas Access Regime.[6] This approach argues that investment in infrastructure will be distorted since regulators will disallow high rates of return whilst allowing regulated companies to bear the consequences of below-average rates of return. It is argued that in such circumstances investment will be distorted unless there is a compensating increase in the regulatory cost of capital.

[3] The Allen Consulting Group (March, 2004), *Review of Studies Comparing International Regulatory Determinations*, Report to the Australian Competition and Consumer Commission, pp. 7-31.

[4] Energex Limited (August, 2004) *Submission to the Queensland Competition Authority: The Weighted Average Cost of Capital (WACC) 2005-2010 Electricity Price Review*, p.19 and pp.23-24.

[5] KPMG (March, 2004), *The Treatment of Asymmetric Risks: 2005 Electricity Distribution Price Review*, Report to Energex Ltd and Ergon Energy Corporation Ltd.

[6] Productivity Commission (2004) *Review of the Gas Access Regime: Final Report*.

The asymmetric risk argument appears to have originated in the US, where rate of return regulation predominates.[7] The argument cannot be translated easily to the CPI-X incentive regulation approach followed by Australian regulators, including the QCA. Under the approach to regulation pursued by the QCA, operating targets are set at the beginning of a 5-year regulatory period, and can be exceeded by the company in order to earn a higher than estimated rate of return. Whilst adjustments are made to revenues under the revenue cap formula and the arrangement for cost recovery in the event of demand forecasting errors, these adjustments are symmetrical. Hence, the probability of earning both exceptionally large and exceptionally low rates of return are reduced.[8]

1.5 The DNSPs: Profile of Energex and Ergon

Energex Ltd and Ergon Energy Pty Ltd operate as distribution entities under the *Queensland Electricity Act 1994*, as well as performing a number of other functions. Distribution activities, however, account for the vast majority of their activities, especially in the case of Ergon. Both are government-owned enterprises.

The electricity distribution network is owned and managed by Energex primarily services the densely populated south east corner of Queensland. Its service area encompasses Brisbane, the Gold and Sunshine Coast, Ipswich and Gympie. Energex also owns and manages the gas distribution network south of the Brisbane River, on the Gold Coast and Toowoomba. In addition to energy distribution, Energex is a retailer of electricity and gas.

Its total customer base for these activities is in the order of 1.1 million. This comprises residential, industrial and commercial customers. Total assets are estimated at approximately $4.5 billion, with distribution assets worth more than $3 billion.

Ergon's electricity distribution network covers all parts of Queensland outside the south-east corner serviced by Energex – mostly rural and regional areas and centres. Its total service area is estimated to cover over one million square kilometres. Like Energex, Ergon also operates an energy retailing business, although these operations are outside the scope of the current review since we are concerned only with the distribution assets.

Ergon's total assets are around $3.8 billion, of which distribution assets comprise $3 billion. Its total customer base is in the order of 600,000.

Table 1.1 provides summary financial information for each of the DNSP's from their regulatory accounts. The figures therefore cover distribution activities only. Despite the different service areas and geographical bases, in 2002-03 the two corporations were broadly equivalent in terms of assets, borrowings and equity. Energex's earnings before interest and tax (EBIT) exceed those of Ergon by over $70 million, leading to a return on total assets differential of over 2 percentage points.

[7] See, for example, Kolbe, A. Lawrence, William B. Tye, and Stewart C. Myers (1999), *Regulatory Risk: Economic Principles and Applications to Natural Gas Pipelines and Other Industries*, Kluwer Academic Publishers, Boston/Dordrecht/London.

[8] For further discussion of asymmetric risk issues see ACG (July, 2002), *Empirical Evidence on Proxy Beta Values for Regulated Gas Transmission Activities*, Report for the Australian Competition and Consumer Commission, pp. 13-15 and pp. 51-55.

Table 1.1

QUEENSLAND DNSPS: SUMMARY FINANCIAL INFORMATION (2002-03)

	Energex	Ergon
Total revenue	$791.4m	$772.9m
Expenses	$513.4m	$566.3m
Earnings before interest and tax	$278.0m	$206.5m
Total assets	$3,362.3m	$3,295.7m
Return on regulated assets	8.7%	6.3%
Borrowings	$1,782.3m	$1,423.2m
Total equity	$1,478.1m	$1,475.7m

Source: DNSP regulatory accounting statements provided by the QCA

Chapter 2

Capital Structure

2.1 Introduction

This chapter considers issues relevant to the determination of a regulatory capital structure for the DNSPs. It begins with a brief discussion of the importance of a firm's capital structure within the WACC framework applied by the QCA. Comparator entities that may form a basis for establishing a benchmark are then considered. Relevant regulatory precedents are then assessed. This process concludes that a gearing level of 60% is reasonable for the DNSPs.

2.2 Capital structure and the cost of capital in access price determinations

In the course of an access price determination, regulators assess the regulated asset in question on a forward-looking basis to determine a weighted average cost of capital (WACC). The WACC is applied within the building block methodology to estimate a price path that, under forecast volumes and operating efficiencies will provide an appropriate return of and on capital. The aim of this methodology is to derive the revenue stream and regulated price path that will generate returns adequate to attract debt and equity sources to continue to fund the growth of the regulated business and provide the appropriate level of services to customers.

The assumed capital structure determines the weight to be attached to the equity and debt components of the calculation. This is demonstrated in the formula for calculating a nominal 'vanilla' WACC, within the Capital Asset Pricing Model (CAPM) framework applied by the QCA:

$$WACC = k_e(E/V) + r_d(D/V)$$

Where k_e is the cost of equity, r_d is the cost of debt, E is equity, D is debt and V is enterprise value.

The seminal work of Modigliani and Miller established the principle that under certain assumptions, the cost of capital is independent of capital structure. In terms of the equation above, while the replacement of equity with low-cost debt may at first sight appear to reduce the WACC, the cost of equity rises with gearing (as gearing raises the risk that is faced by the equity providers). If it were true that the WACC was independent of capital structure, then the assumption that was adopted about the capital structure would be largely immaterial (provided, or course, that all inputs were derived consistently with the gearing level – most importantly, the equity beta).

However, since the work of Modigliani and Miller there has been considerable academic debate as to the degree to which capital structure affects the WACC in practice. As that debate is unresolved (and goes beyond the scope of our brief), regulators typically adopt a capital structure that is considered appropriate for the regulated entity, on the basis of first principles, regulatory precedent and appropriate comparators.

We will consider the costs of equity and debt in turn.

Cost of Equity

In the above equation, the cost of equity, ke, is defined as follows:

$$ke = r_f + b_e(MRP)$$

Where, r_f is the risk free rate on government bonds, MRP is the Market Risk Premium and b_e is the level of systematic risk (also known as beta risk).

Only the systematic (i.e. correlated to the general market index) component of a company's total risk profile is relevant in determining its beta risk. This is because, in a diversified portfolio of company securities, those returns that are uncorrelated to the market index may be expected to cancel each other.

Cost of Debt

Cost of debt (r_d) is calculated as the risk free rate on government bonds (r_f) plus a risk margin to compensate for the extra risk associated with the debt of the asset:

$$r_d = r_f + \text{debt margin}$$

The size of the debt margin will depend on the relative risk of the debt. Higher risk debt will require a higher margin than lower risk debt. Debt risk is usually assessed in the form of credit ratings, which are discussed later.

A method that may be employed by a regulator in establishing an appropriate debt margin for debt related to a regulated asset is to derive a credit rating for the debt, and then to determine a debt margin appropriate to that debt rating using market observations.

It is important to note that in the assessment of credit risk associated with debt, in contrast to equity, the total volatility of the cash flows is important. This is because a breaching of debt covenants can result in business failure. Thus, a low beta risk company may only be able to support relatively low gearing if it has highly volatile cash flows.

Utilities tend to be characterised by stable, low risk, consistent cash flows. These characteristics imply that utilities generally are able to support a high level of gearing relative to other businesses. This is evident in the actual gearing levels of utility companies, which are discussed in the following sections. Other things being equal, utility businesses that have a revenue cap form of regulation should be able to attract a lower cost of debt than under price cap regulation.

Determining a benchmark capital structure

The use of a benchmark based on efficient behaviour in regulation ensures that regulated companies bear the cost of inefficient decisions. In the context of capital structures, efficient behaviour in relation to an entity is best identified through comparison with similar entities. Observation and comparison are the cornerstones of benchmarking.

Accordingly, the following sections consider a benchmark capital structure for the DNSPs by analysing comparable entities in Australia and other jurisdictions, in electricity distribution and similar industries. Regulatory precedents in Australia are also considered.

2.3 The DNSPs' position on capital structure

The DNSPs' position on capital structure was put forward in a submission to the QCA prepared by the Strategic Finance Group (SFG). In their submission, SFG proposed a benchmark capital structure in the range of 50% to 60% based on 'comparables and regulatory decisions'. According to SFG:[9]

> The current leverage ratios for comparable firms are predominantly below 60%. In Australia, AGL and Alinta each have market-value leverage ratios below 30%. The average leverage of Electricity distribution companies in the U.S. is 50.9% and is 47.2% in the U.K. For this reason, we recommend that a range of leverage from 50-60% be used, given the uncertainty over the firms' optimal leverage.

It is noted that SFG does not list the US and UK companies used to generate its results, although the results for the US firms are not substantially different to the results presented below. However, we do not consider that SFG's conclusions accurately report the experience of Australian utilities. When a wider set of utilities is considered, gearing levels of more than 60 per cent are common – particularly when measured against the regulatory value of the relevant entity. Regarding the two Australian companies cited by SFG, both undertake substantial non-regulated activities and are acquisitive (and hence be expected to keep a flexible financial structure), which would suggest that their gearing levels would be expected to understate that of a pure-play regulated DNSP. That is, the benchmarking undertaken for regulation of the DNSPs should exclude financial flexibility requirements for companies that intend to expand through M&A activity as such activity is outside of the regulated business. In Chapter 3 we find that Alinta's credit rating has also been lower than would be indicated by its capital structure and coverage ratios.

2.4 Capital structure benchmarks

This section considers the actual capital structure of privately-owned Australian energy utilities in addition to electricity and gas distribution companies listed on stock exchanges in the United States.

Capital structures of privately-owned Australian energy utilities

Table 2.1 lists gearing levels of a sample of privately-owned Australian energy utilities. Gearing has been calculated using three different methods – as debt to total capital using varying measures of equity, and as debt to regulatory asset value (RAV). 'Market gearing', which uses a market valuation of equity, is only measurable for the five listed companies.

[9] SFG, (24 June, 2004), *Cost of Capital Estimation for Energex/Ergon Energy*, p. 13.

Book levels of gearing exhibit considerable divergence – from 20% in CitiPower to over 90% for Envestra, while the average is around 60%. Using the market value of equity for the listed companies reduces observed gearing with one exception. We note that using the book value of an entity to derive a gearing level is generally eschewed in financial economics, as accounting values may provide a misleading impression of market values. However, a number of the Australian energy utilities have been sold recently in trade sales, where it would be expected that the book values of the entities were reset at the purchase price. In this case, the book values of the entities are likely to provide a reasonable proxy for their market values. The Australian entities below for which book values are expected to be a good proxy for their market values are ETSA Utilities, CitiPower Trust, Powercor, ElectraNet and SPI PowerNet.

There are two general problems with using Australian energy utilities as capital structure benchmarks in this assessment:

- the small number of listed, privately-owned companies; and
- the fact that such companies typically undertake a range of functions beyond the regulated activity. Book and market values therefore incorporate activities outside the regulated component, distorting observations.

For example, as well as being an electricity and gas distributor, AGL is one of the largest energy retailers in Australia. It also has significant power generating interests, including a 32.5% interest in Loy Yang Power (although as this was purchased in 2004 it is not part of the figures in Table 2.1). In 2003, AGL's gas and electricity distribution network assets comprised less than 46% of its total assets[10]. Similarly, Alinta is Western Australia's largest gas retailer.

These non-regulated activities tend to be riskier than energy distribution, suggesting that in isolation they could support a lower level of debt. Accordingly, such interests are expected to dilute the company-wide gearing level.

[10] See AGL (2003) *Full Financial Report 2003*, accessed as http://www.agl.com.au, p. 11.

Table 2.1

GEARING LEVELS OF AUSTRALIAN UTILITIES (DECEMBER 2002)

Entity	Date	Book gearing (debt/total capital)	Market gearing (debt/total capital)	Gearing (debt/RAV)
Australian Pipeline Trust	Jun 2003	66.4%	51.5%	*
AGL	Jun 2003	36.5%	29.2%	*
Alinta	Dec 2002	49.2%	33.3%	*
Envestra	Dec 2002	93.8%	72.5%	103.5%
GasNet	Dec 2002	67.2%	69.8%	121.2%
ETSA Utilities	Dec 2002	63.5%	–	87.4%
CitiPower Trust	Dec 2002	20.6%	–	36.1%
Powercor	Dec 2002	39.7%	–	78.7%
ElectraNet	Dec 2002	72.6%	–	92.5%
SPI PowerNet	Dec 2002	79.8%	–	88.7%

** not estimated due to these companies having numerous interest across a range of regulated utilities.*

Gearing levels (debt/total capital) taken from Bloomberg and Standard and Poor's (2003), Utilities Report Card, October. RAVs are estimates from published regulatory decisions except for ETSA Utilities, where the value is taken from its regulatory accounts.

Source: Bloomberg and ESCOSA (2004), Preliminary Views – Electricity Distribution Price Review: Return on Assets, January, p. 68.

A third complexity when determining the benchmark gearing level for a regulated entity is the fact that both the market and book values have tended to exceed the regulatory values of the entities. Thus, the level of debt as a proportion of the regulatory value would be expected to be much higher than that of the market or book value of the entity. Table 2.1 also includes gearing using the RAV of the utility, where the RAV is calculable with reasonable certainty. As these figures incorporate the debt of the entire company, they may overstate the gearing levels of the regulated businesses. Nevertheless, they suggest gearing as a proportion of the regulated activities is significantly higher than book and market values, with only one observation below 70%.[11]

Capital structures of listed US electricity and gas distribution companies

Given the limited evidence on efficient capital structures in the Australian market, we turn in this section to electricity and gas distribution companies in the US. 'Book' and 'market' gearing levels for a sample of such companies are provided in tables 2.2 and 2.3. Descriptions of these companies are contained in Appendix A.

[11] The NAB reported in February 2003 that following a restructuring, CitiPower's total debt would be $1,075 million out of a total capital of $1,662 million (i.e. 64.7%). This debt would represent over 100% of CitiPower's RAV. See Bayley, Philip and Michael Bush, (February, 2003), *CitiPower*, NAB Credit Research, p.32.

As in Australia, gearing levels are lower when the market value of equity is used. Average gearing for the electricity companies are 61.1% (book equity) and 50.5% (market equity). Because book values also represent regulatory asset values in the US, 'book gearing' also reflects debt-to-RAV. A problem, however, with electricity companies in the US is that they are usually integrated. Most have interests in electricity generation, which is commonly recognised as a riskier enterprise than distribution. So, for similar reasons as in Australia, the observed company-wide gearing levels are likely to understate the gearing a company solely distributing electricity could support.

Table 2.2

GEARING LEVELS OF MAJOR US ELECTRICITY DISTRIBUTORS (2003)

Company	Book gearing (debt/total capital)	'Market' gearing (debt/total capital)
Clesco Corporation	68.9	56.7
CentrePoint Energy	88.8	82.2
DTE Energy	61.0	56.2
Edison District Electric	52.8	43.6
El Paso Electric	55.8	50.0
Entergy	47.5	38.5
Elexon	64.7	42.0
FirstEnergy	58.3	51.0
Florida Power and Light	58.9	45.4
MGE Energy	49.1	30.6
Progress Energy	58.9	49.3
Westar Energy	68.6	60.6
Average	*61.1*	*50.5*

Book gearing calculates total capital using the book value of equity; 'market' gearing uses the market value of equity.

Brief company descriptions are provided in Appendix A

Source: Bloomberg

Table 2.3 shows the same analysis for the US gas companies. Average gearing levels using both book and market values of equity are around 4 percentage points below those for the electricity companies. Nevertheless, the observed gearing levels for the US gas utilities using the book value of equity (RAV) are only marginally below 60%.

Table 2.3

GEARING LEVELS OF US GAS DISTRIBUTION COMPANIES (2003)

Company	Book gearing (debt/total capital)	'Market' gearing (debt/total capital)
Atmos Energy	53.6	44.6
Cascade Natural Gas	60.0	43.6
Delta Natural Gas	55.0	48.5
EnergySouth	52.6	38.0
The Laclede Group	63.5	50.4
Northwest Natural Gas	53.6	42.3
Southern Union	74.6	70.0
WGL Holdings	49.1	37.8
Average	*57.8*	*46.9*

Book gearing calculates total capital using the book value of equity; 'market' gearing uses the market value of equity.

Brief company descriptions are provided in Appendix A

Source: Bloomberg

2.5 Regulatory Precedents

This section reviews estimates of capital structures that have been made in regulatory determinations for energy, water and port companies, in Australia. Recent regulatory decisions are shown in Table 2.4. While such regulatory precedents should be noted, the specific evidence reviewed by the regulators should also be considered. At best, such precedents are a guide to the reasoning and evidence applied by regulators in the past.

While regulatory capital structures for non-energy activities have varied to some degree – usually due to specific circumstances – there is consensus among regulators of 60% benchmark gearing in the energy sector. Accordingly, there is no Australian regulatory precedent in the energy sector that would suggest a 50% to 60% gearing structure is justified, as claimed by SFG on behalf of the DNSPs.

Table 2.4

AUSTRALIAN REGULATORY DECISIONS ON CAPITAL STRUCTURE

Regulator	Year	Industry	Gearing (%)
ESCOSA**	2004	Electricity distribution	60
ICRC	2004	Electricity distribution	60
IPART	2004	Electricity distribution	60
ACCC	2003	Electricity transmission	60
ACCC*	2002	Electricity transmission	60
QCA	2001	Electricity distribution	60
GPOC	*2004*	*Water (Tas)*	*50*
ICRC	*2004*	*Water*	*60*
IPART	*2003*	*Water*	*60*
QCA	*2003*	*Water*	*50*
OffGAR	2003	Gas transmission	60
ACCC	2002	Gas transmission	60
ESC	2002	Gas distribution	60
QCA	2001	Gas distribution	60
QCA**	2004	Ports (Coal Loading)	60
ORG	2000	Ports (Container)	40

** refers to two electricity determinations (ElectraNet and SPI PowerNet)*

*** draft/preliminary position*

Source: published regulatory decisions

2.6 Capital structure conclusions

This chapter has reviewed market evidence, regulatory precedent, and the relative risk of the DNSPs in considering a regulatory capital structure.

For energy companies, Australian regulators have consistently applied 60% gearing. In other sectors the variation in assumed capital structures is quite small; regulators have generally applied gearing levels of between 50% and 60%.

Australian energy utilities typically exhibit 'book' gearing levels in the order of 60%, with gearing based on the market value of equity somewhat lower. However, these estimates incorporate company-wide resources rather than those involved solely in regulated activities. Using RAVs in gearing calculations suggests gearing levels for regulated activities may be well above 60%. For electricity and gas distribution companies in the US, gearing measured using RAV (book values of equity) is in the order of 60%.

In light of these findings, ACG recommends that a 60% gearing level be applied.

Chapter 3

Credit Rating

3.1 Introduction

This chapter examines methodological issues associated with determining company credit ratings and considers a rating for the DNSPs. We begin by describing the ratings methodology applied by S&P Ratings, and then outline the benchmarks that may be applied to the DNSPs. The DNSPs' position on credit rating is considered, and a simple sensitivity analysis of the DNSPs' S&P ratios is undertaken.

3.2 Credit rating methodology

Standard and Poor's (S&P) is a leading credit rating agency that rates numerous companies around the world. An S&P rating for company debt is developed through a process of analysis based on current and prospective company data, information relating to the company's risk environment, and discussions with management about its plans for the company. The framework for analysis considers the business profile and the financial profile of the company. Business profiles consider broad, overarching risks faced by the industry and business of operation, irrespective of its financial structure. The financial profile delves into company financial specifics, covering strategic plans, financial policies and performance. These factors are highlighted in Table 3.1.

Table 3.1

S&P RATINGS: CORPORATE CREDIT ANALYSIS FACTORS

Business Risk	Financial Risk
Industry Characteristics	Financial Characteristics
Competitive Position: Markets	Financial Policy
Competitive Position: Technology	Profitability
Competitive Position: Efficiency	Capital Structure
Competitive Position: Regulation	Cash Flow Protection
	Financial Flexibility

Source: Standard and Poor's (2004) *Credit Ratings Criteria*, p. 17.

Companies that have less risk in their operating environment (their *business profile*) are generally able to sustain greater risk in their financial profile (eg, more gearing) for a given rating category.

The analysis of the business / operating risk focuses on:

- regulation, which should be timely and allow consistent, predictable performance;
- markets, including the outlook for the local economy and correlation between electricity demand and economic growth and diversity of the customer base;

- operations, including the capacity, quality and efficiency of service;
- competitiveness, which most often occurs through benchmarking; and
- management.

In assessing the risk inherent in a firm's balance sheet (*financial risk*), S&P will review financial ratios that reveal the firm's capital structure and then assess the cash flows available to support the capital structure, including during times of stress.

Factors reviewed to assess an electricity utility's financial profile include:

- Capital structure as measured by total debt to total debt plus equity;
- Cash flow analysis including:
  - Funds from operations interest coverage
  - Funds from operations to average total debt
  - Funds from operations minus dividends to capital expenditures
  - Capital expenditures to average total capital (debt plus equity);
- Financial flexibility including the company's ability to accomplish its financing program without damaging creditworthiness; and
- Profitability as measured by return on average equity, pretax interest coverage, pretax return on average capital and operating margins.

S&P also takes a utility's ownership structure into account, in terms of how ownership may impact upon financial flexibility. S&P considers government ownership to provide implicit and explicit support from what is usually a more credit-worthy parent. S&P then takes into account any prior action of a government in relation capital injections and other actions during periods of stress.

Financial ratios

As discussed, S&P calculates a number of financial ratios in their assessment of a company's financial risk. These cover the broad spectrum of areas assessed, including profitability, capital structure, cash flow protection and capacity to meet debt obligations. Reliance on ratios is tempered by other qualitative information, such as the impact of future plans on the financial profile of the company. Common ratios calculated by S&P to assist in the ratings process are outlined in Appendix A.

Standard & Poor's credit rating benchmark

The product of the assessments of business and financial risks is a company credit rating, which S&P defines as "a current opinion of the creditworthiness of an obligator with respect to a specified financial obligation, or a specified financial program … [taking] into consideration the creditworthiness of guarantors, insurers, or other forms of credit enhancement on the obligation…" [12]

[12] Standard & Poor's (2004), Credit Ratings Criteria, p. 7.

Long-term credit ratings are assigned to categories reflecting the obligator's capacity to meet financial commitments. The range of long-term ratings is from AAA to C, with a D rating signifying that a default has actually occurred. In Australia, most regulated utilities tend to be assigned an investment grade rating between A and BBB. The descriptions of the A and BBB ratings assigned by S&P are as set out in Table 3.2 below. Ratings from 'AA' to 'CCC' can be modified by the attachment of a '+' or '–' suffix, indicating relative standing within the category.

Table 3.2

STANDARD AND POOR'S LONG TERM CREDIT RATINGS

Rating	Description
A	An obligation rated 'A' is somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions than obligations in higher rated categories. However, the obligator's capacity to meet its financial commitment on the obligation is still strong.
BBB	An obligation rated 'BBB' exhibits adequate protection parameters. However, adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity of the obligator to meet its financial commitment on the obligation.

Source: Standard & Poor's

In addition to the above, S&P has published ratio guidelines for international transmission utilities. The ratios are relevant to the DNSPs as they are based on data for 75 utilities operating in the high investment grade rated countries of continental Europe and Australasia.

Table 3.3

RATIO RANGES FOR INTERNATIONAL TRANSMISSION UTILITIES

	AA	A	BBB
Pretax interest coverage (x)	2.0-3.0	1.5-2.5	1.0-1.7
FFO interest coverage (x)	3.0-4.0	2.0-3.3	1.5-2.0
FFO to total debt (%)	12–17	10–15	5 – 10
Total debt to total capital (%)	50–60	55–70	65 – 80

Source: Standard & Poor's, Project and Infrastructure Finance Review, *International Utility Ratings and Ratios,* p. 59

S&P ratings vs regulatory credit rating assumptions

It is important to note that the credit rating that is assumed by a regulator in order to determine a benchmark debt cost for a regulated entity can be expected to differ to the actual credit rating of the regulated business for a number of reasons.

The most fundamental difference is the fact that an objective of the regulator is to set prices with reference to the cost of providing the regulated services. Thus, to the extent that a credit rating assumption is important, it should relate to an entity that provides only those regulated services, that is, is not biased upwards or downwards because of the other activities the entity may undertake. Accordingly, to the extent that the entity undertakes other activities, then its own rating may differ.

A second reason for potential divergence between ratings assumed in an price determination and that observed in the market for the same assets, is the actual level of gearing undertaken by the regulated company compared with the gearing assumed by the regulator. As discussed already, the standard approach of Australian regulators is to adopt benchmark assumptions about financing arrangements, a component of which is to assume a capital structure based on observations for actual companies in a similar line of business. Consistency requires that the regulator's credit rating assumption when deriving the cost of debt be consistent with the notional capital structure that is adopted – and thus, for example, not assume that the entity is highly geared when deriving the WACC but assume that it has a low level of gearing when deriving the cost of debt. Again, as the regulated entities' actual gearing levels may differ to the notional level assumed by the regulator, their own credit ratings may also differ to that assumed by the regulator.

An example of the effect of a utility's potential non-regulated operations has been observed in the UK water industry, where highly geared, and relatively highly rated capital structures have been achieved through covenants restricting (or 'ring fencing') operations to strictly water utility activities.

Therefore, in determining an appropriate credit rating to apply to establish the cost of debt for a utility's regulated assets in the context of an access price determination the regulator must approach market ratings of other utilities with caution. Two factors reduce the comparability of ratings for a regulated utility that is part of a rated entity that owns other, non-regulated assets:

- First, if the gearing applied by the rated entity is higher (say 80%) than the regulatory gearing level (say 60%) the impact of the higher gearing will most likely be expressed in a reduced credit rating level,
- Secondly, if the rated entity undertakes non-regulated activities that are higher risk than the regulated assets, the ratings of the rated entity in the market can be expected to be lower, as a rule, than the assumption made by the regulator in determining a cost of debt in an access price review.

3.3 The DNSPs' submission on credit rating

The DNSPs's adviser on cost of capital issues, SFG, proposed the following with respect to credit rating:[13]

> The QCA has tended to be fairly consistent regarding the assumed credit rating, and in each of the two recent decisions, a BBB rating was assumed as appropriate. We concur with this approach.

However, in its last decision the QCA did not apply a BBB rating, but rather a BBB+ rating, as summarised in its Final Decision:[14]

[13] SFG, (24 June, 2004), p.13.

> The Authority's own analysis suggests that, if the prescribed distribution activities were considered in isolation from the DNSPs' total business activities, and if gearing levels used were those associated with the proposed industry average debt to total capital ratio of 60 per cent (as discussed below), then the effective credit rating would be in the range of A- to BBB… Debt rated at BBB+ attracts a margin of approximately 165 basis points.

The QCA, in its Final Decision assumed a margin of 165 bp as the debt margin.

3.4 Actual credit rating benchmarks

This section considers actual credit ratings and financial ratios for a range of comparator organisations. Ratios and ratings are analysed to provide benchmarks for the analysis of the DNSPs' financial ratios provided in the following section. The sample of comparator organisations comprises credit-rated Australian network companies.

Australian benchmarks

Table 3.4 lists those Australian network companies with a known credit rating, ordered by gearing level. Two other important financial ratios – FFO to debt and EBITDA cover – are also shown. The companies are all in the energy sector.

Table 3.4

RATED AUSTRALIAN NETWORK COMPANIES – ENERGY

	Gearing (%)	FFO / Debt (%)	EBITDA cover	Rating
Envestra Ltd	80.8	4.2	1.6	BBB
Energy Partnerships (Gas)	80.7	6.9	1.9	BBB
United Energy Distribution	80.1	8.3	1.7	BBB
SPI PowerNet	79.8	8.2	2.4	A+
ElectraNet	72.6	8.0	2.3	BBB+
GasNet Australia	68.9	6.8	1.9	BBB
Country Energy	68.3	10.1	2.2	AA
TXU Australia Holdings	63.8	12.2	2.5	BBB
ETSA Utilities Finance	63.5	9.8	2.3	A–
Alinta Ltd	56.2	17.2	5.7	BBB
Integral Energy	55.4	8.6	2.5	AA
CitiPower Trust	54.1	13.7	3.4	AA–
EnergyAustralia	51.4	11.8	3.3	AA
Ergon Energy Corp	49.3	17.9	4.3	AA+
Powercor Australia	38.1	19.2	3.6	A–
Average	61.3	10.9	2.8	

Source: Standard and Poor's (2004) *Australia and New Zealand Credit Stats 2004*, pp 33-34.

[14] QCA, (May, 2001), p.85.

Some caution must be taken analysing Table 3.4. As discussed, S&P considers the involvement of parent companies in determining company credit ratings. This may lead company ratings to be artificially high. In Table 3.4, SPI PowerNet is one such company – its rating is strongly influenced by its parent, Singapore Power. Alinta Limited is another aberration, as its lower rating reflected an expectation of future higher gearing due to M&A activity.

The relationship between the financial ratios and associated ratings is quite clear. Obviously, companies with higher levels of debt will generally exhibit lower FFO to debt and EBITDA cover ratios, and a lower credit rating. Treating SPI PowerNet as an exception, points to note are:

- no company with an EBITDA cover ratio below 2.0 is rated above BBB;
- companies with less than 60% gearing tend to be in the A range; and
- companies with FFO to debt ratios below 9% tend to be BBB rated.

3.5 The DNSPs' business and financial profile

Business profile

The DNSPs' business profile is described in more detail in Chapter 1. The key point is that they are monopoly businesses, which provide an essential service to the economy of Queensland. Their operations are relatively dispersed, and they are regulated under a revenue-cap, CPI-X benchmark regulatory framework. These characteristics suggest a strong business profile.

Financial profile

Assessing the financial profile of a company for the purpose of assigning a credit rating typically involves modelling and analysis of cash flow performance. Financial ratios for the DNSPs over recent years are shown in Table 3.5 on the basis of 60% notional gearing. The debt level assumed in the table is based on an RAV equivalent to the DNSPs' total assets. The interest cost assumes a 150 bp margin over the 10-year bond rate in each year.[15]

The Base Case ratios for FFO/Debt and FFO cover for both Energex and Ergon are in the A rating category for international transmission utilities. On the basis of FFO cover and EBITDA cover, both companies should be rated at A. In the Low Revenue Case (i.e. –10% revenue, whilst holding costs constant), the ratings would be reflective of BBB. It should be noted that is a modelling scenario, which must be considered to be a highly unlikely occurrence. Thus, on balance, we would expect at least a BBB+ or A- rating for the DNSPs. Erring on the side of conservatism, we would recommend a BBB+ rating for 60% gearing, which is in line with the assumption made by the QCA in 2001.

[15] Ideally, such an analysis should be undertaken with respect to forecast revenue and cost numbers based on the financial and operating benchmarks.

Table 3.5

THE DNSPS FINANCIAL RATIOS: 2002 AND 2003, WITH NOTIONAL 60% GEARING

Scenario	Year	FFO / debt (%)	EBITDA cover	Pretax cover	FFO cover
Energex					
Base Case:	2002	11.1	2.7	1.7	2.5
	2003	12.8	3.1	2.0	2.9
Low Revenue Case (-10%)	2002	7.8	2.2	1.3	2.1
	2003	9.3	2.5	1.5	2.4
Ergon					
Base Case:	2002	10.2	2.5	1.3	2.4
	2003	11.0	2.8	1.5	2.6
Low Revenue Case (-10%)	2002	6.9	2.1	0.8	1.9
	2003	7.6	2.2	0.9	2.1

Source: The DNSPs accounts, ACG analysis

3.6 Conclusions

Credit rating is an important determinant of the cost of debt to an entity. S&P develops ratings that consider a range of factors, including the nature of the industry/business and the financial strategies and performance of the company. Other things being equal, a more highly geared capital structure will attract a lower S&P debt rating, and therefore imply a higher cost of debt.

In assessing financial performance, S&P relies on a number of financial ratios, whose primary purpose is to measure a company's ability to repay debt. These ratios, applied to the DNSPs and benchmarked against comparator organisations, suggest the DNSPs should be rated as BBB+ or A-.

Basic modelling has been undertaken to establish the relative sensitivity of cash flows and interest coverage ratios under alternative scenarios. This showed that even with a 10% fall in revenue scenario, relatively healthy interest cover ratios are still achieved. Furthermore, we would note that under a revenue cap, the 10% fall in revenue scenario would be highly unlikely. Given these considerations, and erring on the side of conservatism, we recommend that the QCA apply a BBB+ rating for the DNSPs.

Chapter 4

Debt Margin

4.1 Introduction

This chapter draws upon our findings in earlier chapters to assess the debt margin that is appropriate for The DNSPs' operations under the benchmark assumptions. That is, we investigate the debt margin that is likely to reflect the cost of debt to the DNSPs based on the company adopting a 60% gearing level relative to RAV, and being rated BBB+. To estimate the margin that may be applicable, we rely on the CBASpectrum service and Bloomberg. We then add a margin for debt raising transaction costs to derive an 'all-inclusive' debt margin for the DNSPs.

4.2 Regulatory Practice

In Australia regulatory practice has been to establish a debt margin appropriate to the credit rating assigned to the regulated utility. A debt issuance cost margin is then estimated. In some cases, the debt issuance costs are added to cash flows, while in others the combined cost of debt (including debt margin and debt issuance cost) is incorporated in the WACC. This section reviews Australian regulatory practice in relation to:

- Estimating a debt margin for the regulatory WACC.
- Use of the CBA Spectrum benchmark to set a debt margin.
- Estimation of a debt issuance cost benchmark.
- Incorporation of debt issuance costs in the WACC or directly through cash flows.

Australian regulatory practice on debt margin

As noted above, the standard approach amongst Australian regulators has been to adopt benchmark assumptions about the credit rating and term of debt for the regulated entity, and to attempt to obtain an observation of the current cost of that form of debt finance. The dominant practice approach amongst regulators over recent years for deriving the current cost of debt finance has been to use the information provided by the CBASpectrum service. The CBASpectrum service estimates a 'fair market' yield curve for various maturities and issue credit ratings for Australian corporate bonds. Table 4.1 provides a summary of recent Australian regulatory decisions in relation to debt margins.

Table 4.1

RECENT DETERMINATIONS IN RELATION TO DEBT MARGINS

Regulator	Year	Industry	Margin* (basis points)	Benchmark credit rating
IPART	2004	Electricity distribution	90-110	BBB to BBB+
ESCOSA**	2004	Electricity distribution	148.25	BBB+
ACCC	2003	Electricity transmission	91	A
ACCC	2002	Electricity transmission	110	A
OFWAT*	2004	Water (UK)	80-140	BBB to A
GPOC	2004	Water (Tas)	70	n.a.
ICRC	2004	Water and elec. dist	112	BBB+
IPART	2003	Water	70-100	n.a.
QCA	2003	Water	180	BBB
QCA	2003	Water	160	BBB
OffGAR	2003	Gas transmission	120	n.a.
ACCC	2002	Gas transmission	159	BBB+
ESC	2002	Gas distribution	165	BBB+
QCA*	2004	Ports	117.5	BBB+

** Margin excludes allowances for debt-raising costs*

*** Preliminary/draft position*

Source: various regulatory determinations

The use of the CBASpectrum service implies that the dominant practice of Australian regulators has been to use the cost of raising debt through Australian corporate bonds to determine the benchmark cost of debt. However, as explained recently by ESCOSA, this assumption does not imply that the regulator expects that all debt raised by a company through this means. Rather, the use of Australia corporate bond yields as a benchmark only requires the assumption that the all-up cost of obtaining debt finance from Australian corporate bonds will provide an unbiased estimate of the all-up cost raising debt across all sources.

Regarding the source of information on corporate bond yields, there has been an acceptance of the CBASpectrum service by regulators, and until recently, advisers of regulated companies have also relied upon the CBASpectrum service. For example, in recent submissions on behalf of energy industry clients Alinta and AGL Gas Networks to the WA Economic Regulation Authority and IPART, KPMG has proposed debt margins based on CBA Spectrum. However, in a recent submission on behalf of ACTEWAGL, NERA argued that the CBASpectrum service underestimates the debt margin, citing evidence that the Snowy Hydro 10 year bond consistently trades above the CBASpectrum rate.[16]

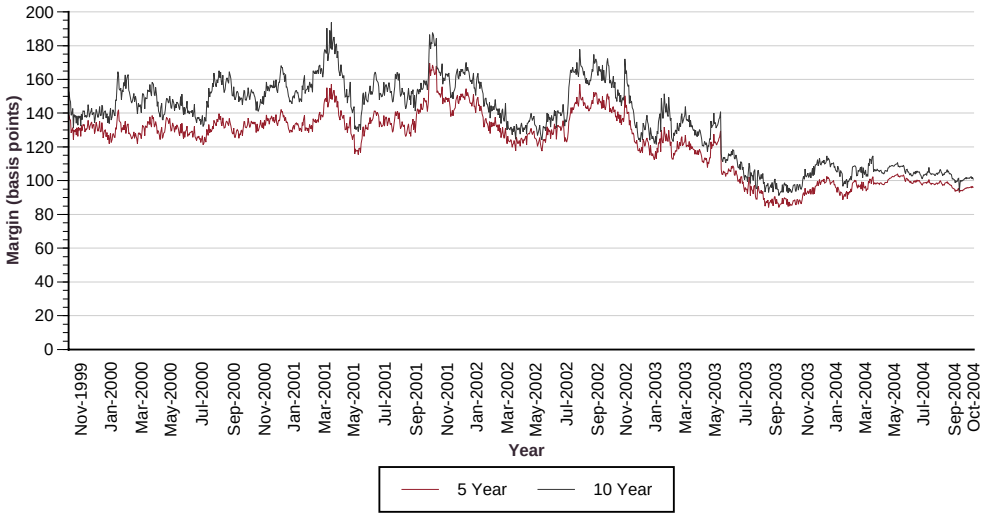
[16] NERA (February, 2004), *Estimating the Debt Margin for ACTEWAGL*, A Report for ActewAGL.

The CBASpectrum service estimates a 'fair market' yield curve for various maturities and issue credit ratings for Australian corporate bonds. The yield that is presented is the predicted yield for a corporate bond of the relevant term and credit rating using an econometric method, drawing on the available traded corporate bonds. A similar service is provided by Bloomberg. As stated by Bloomberg, such estimates are 'constructed with an optimisation model that solves simultaneously for all maturity points, or term structures, and volatilities to best fit the existing data.' The pricing influences of various options (such as callability) attaching to different bonds are backed out so that a more comparable 'option adjusted spread' (OAS) can be determined.

While the CBASpectrum estimate of debt margins has been the dominant influence on Australian regulators setting regulatory debt margins, it has come under recent criticism, amongst others by NERA (on behalf of its client ACTEWAGL) which has argued that the CBASpectrum estimates result from an inaccurate, statistically based instrument that does not accord with reality. By way of example, it noted that on February 24, 2004, CBASpectrum estimated that a BBB+ 10 year bond should trade at 100 basis points over the government bond rate. The only bond with a similar maturity actually in the market is Snowy Hydro, which on that date was trading at 137 basis points. NERA's proposed approach was to rely upon the long-term average of the CBASpectrum rates, rather than upon the latest observation. For BBB rated bonds this would imply attaching a debt margin in the order of 170 basis points. The movement in BBB+ bond spreads for 5 and 10-year bonds is shown in Figure 4.1. Current spreads are near historical lows.

Figure 4.1

CBASPECTRUM BOND SPREADS (BBB+): 5-YEAR HISTORY



Source: CBASpectrum

Recent determinations on debt margins have adhered closely to the appropriate CBASpectrum benchmark at the time. To illustrate:

- the ACCC's December 2002 decision on the debt margin for ElectraNet (111 bp excluding debt-raising costs) was based on the prevailing 10-day average CBASpectrum benchmark spread;

- the ICRC's March 2004 final decision on ACTEWAGL (112 bp excluding debt raising costs) corresponded to the CBASpectrum benchmark in June 2003; and
- the ESC's October 2002 final decision for Victorian gas distributors (165 bp excluding debt-raising costs) was based on the 20-day average of the CBASpectrum benchmark.

The IPART decision for NSW electricity distributors in June 2004 also relied heavily on the CBA Spectrum data, which it considered to be 'observed yields on investment grade bonds with a maturity of 10 years.' However, as noted above, CBASpectrum yields are not 'observed yields' but rather are estimates based upon the available observations. There is only one traded 10-year bond with a BBB+ rating, which is Snowy Hydro.

IPART took the 20-day averages of BBB+ and BBB rated bonds, which were 107 and 117 bp respectively up to and including 5 May 2004. However, IPART chose to apply a lower range of 90 to 110 bp on the grounds that "not all debt issues are rated as low as BBB+ or BBB." The logic of this argument is difficult to see, given that the aim of the CBASpectrum methodology is to provide an estimate of an appropriate debt margin even when not many debt issues are rated as low as BBB+ or BBB. It would need to be demonstrated that the CBASpectrum estimate is incorrect by overestimating the yield that would be appropriate for a given maturity and rating.

Figure 4.1 shows that the last 12 months has been a low point in the history of CBASpectrum's estimates of margins over commonwealth government bond rates. The longer the period over which the average margin is estimated, the higher is the estimate of the margin. Table 4.2 calculates average margins for 5 and 10 year BBB rated bonds over different time periods. The 20-day average is over 50 basis points below the 5-year average, for both 5 and 10-year bonds. The reduction in the spread between 5 and 10 year bond yield margins estimated by CBASpectrum has also reduced markedly over time, and is currently only 6 basis points. Notwithstanding short-term fluctuations, the predominant view in financial economics is that the current level of interest rates is the best predictor of future levels, and we share this view.

Table 4.2

CBASPECTRUM: AVERAGE MARGINS FOR 5 AND 10-YEAR BBB+ RATED BONDS

Period from 27 October 2004	5 year tenor (basis points)	10 year tenor (basis points)	Spread (basis points)
Last 20 days	95.3	100.7	5.4
Last month	95.3	100.8	5.5
Last 6 months	98.6	104.3	5.7
Last 12 months	97.2	104.8	7.6
Last 2 years	104.3	113.5	9.2
Last 3 years	115.3	125.6	10.3
Last 4 years	120.6	133.3	12.7
Last 5 years	122.6	136.0	13.4

Source: CBASpectrum

Regulators have generally selected averaging periods for the CBASpectrum predicted yields to match the periods over which they calculate the risk free rate. The difference in how they calculate the risk free rate is generally marginal. As noted by the ESC[17]:

> …a reasonably uniform practice has emerged amongst Australian regulators whereby the real risk free rate is derived as a recent average (over 20 or 40 days) of the redemption yield (with terms to maturity of either 5 or 10 years)…

A contrast to the standard approach for determining both the risk free rate and the debt margin is the proposal by ESCOSA to adopt the 5-year average for both the risk free rate and the margin. However, in this case, the use of a 5-year average was an explicit requirement of the South Australian regulatory framework.

4.3 Current Market Evidence

In this section we review current market evidence relating to the Australian bond market with an emphasis on determining current yields that may be appropriate for BBB+ rated entities. This evidence includes:

- CBASpectrum and Bloomberg estimates;
- Evidence based on recent BBB+ and BBB rated bond issues; and
- Evidence drawn from other bond issuing options in the Australian market.

CBASpectrum and Bloomberg data

A major problem associated with using CBASpectrum or Bloomberg estimates for 10-year bonds rated at BBB is the fact that there are no such fixed-rate bonds in the Australian market. In addition, there is only one BBB rated bond in the Australian market with a (close to) 5-year maturity: an Energy Partnership (Gas) Pty Ltd (ENP) issue to mature on 29 July 2009. The evidence around 27 October 2004, for bond market data, is displayed in Table 4.3.

Table 4.3

BONDS SPREADS FOR BBB+ RATING AT 27 OCTOBER, 2004

Maturity	CBASpectrum	Bloomberg	CSR	Investa	Snowy Hydro
5 years (at 27/10/04)	95.9	94.5	86.7	98.1	–
5 years (20-day average)	95.3	91.7	84.3	96.9	–
10 years (at 27/10/04)	100.7	129.3	–	–	127.1
10 years (20-day average)	100.7	127.3	–	–	125.7

Source: CBASpectrum; Bloomberg

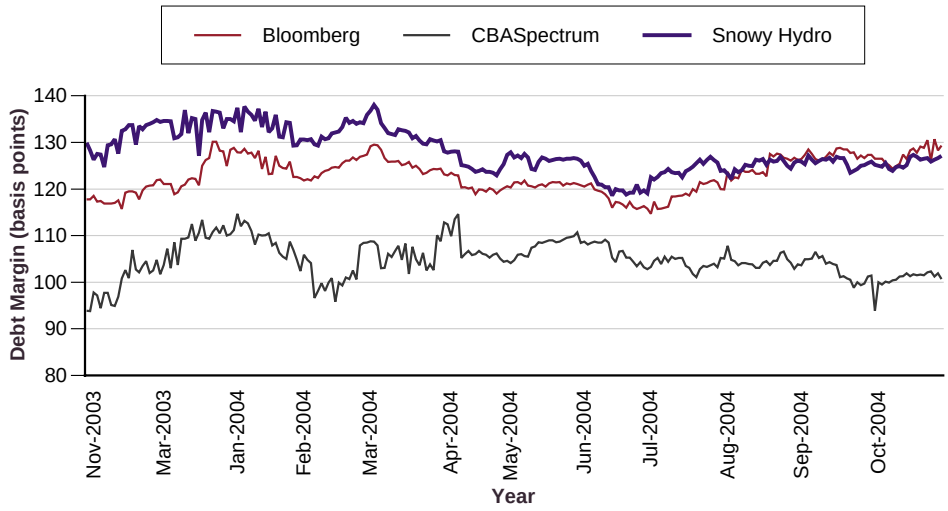
[17] ESC (2002), *Review of Gas Access Arrangements: Final Decision*, p 317.

Table 4.3 shows considerable divergence in the CBASpectrum and Bloomberg estimates of a 'fair market' yield for a 10-year BBB+ rated bond on 27 October 2004. The differential between CBASpectrum and Bloomberg estimates was around 25 bp. For BBB+ bonds with 5-years to maturity, there was a differential of 5.6 basis points in the Bloomberg and CBASpectrum estimates. The CBASpectrum estimates for 5-year maturity are currently closer to observation for the ENP bond.

Figure 4.2 shows movement in the Bloomberg and CBASpectrum estimates for BBB rated bonds with a 10-year maturity over the past year. Bloomberg estimates have exceed the CBASpectrum estimates over the entire period, although the current differential is of the greatest magnitude.

Figure 4.2

SPREADS FOR 10 YEAR BBB+ RATED BONDS, 2003-04

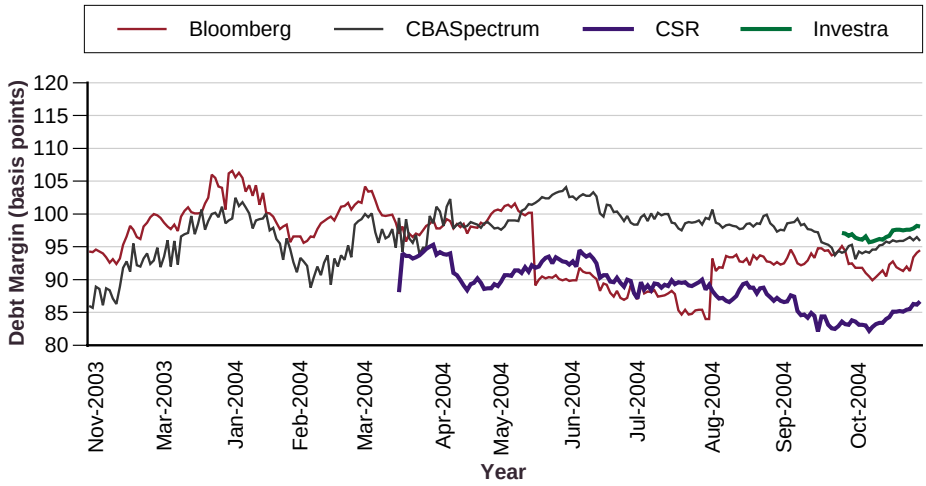


Source: CBASpectrum; Bloomberg

Figure 4.3 shows the spread between Bloomberg and CBASpectrum estimates of the fair market yield for BBB+ bonds with 5-year maturity, along with the observed ENP yield. Over the past year there has been a much closer fit between the Bloomberg and CBASpectrum estimates than for 10-year bonds, although in this instance the CBASpectrum estimates are currently higher. In early May 2004, the Bloomberg estimate dropped significantly to a range around 85-90 basis points.

Figure 4.3

SPREADS FOR 5 YEAR BBB+ RATED BONDS, 2003-04



Source: CBASpectrum; Bloomberg

Evidence from recent Australian corporate bond issues

In this section we review the evidence that exists in the Australian bond market with respect to 5 and 10-year bond issues in the region of BBB credit. In fact, as highlighted, there is little evidence of bond deals with these characteristics. In general, Australian bond markets prefer short term and higher rated debt. Due to this lack of demand for long-dated BBB bonds, Australian corporates respond by:

- credit wrapping their bond issue to achieve a higher rating;
- issuing in private placement markets overseas in the US, Europe or Japan; or
- credit wrapping and issuing in the international markets.

Credit wrapping will be dealt with separately below.

10 year bond benchmarks

There are only two listed bonds that we are aware of that have a BBB or BBB+ credit rating and 10 year tenure. They are Snowy Hydro and AMP Bank, which are discussed below.

- *Snowy Hydro* (BBB+) - This is a $104 million medium term note (MTN) maturing on 25 February 2013 with a fixed coupon of 6.5%, and is traded in the market. Its current yield is around 6.6%, which provides a margin of around 127 bp over the 10-year government bond rate.
- *AMP Bank* (BBB+) – This $100 million MTN was announced on 2 April 2004 and matures on 7 April 2014. It bears a floating tiered coupon at the 3-month Bank Bill Swap Rate (BBSW) plus 93 bp to 4 July 2009 (i.e. 5 years) and +143 bp thereafter.
- *Adelaide Bank* (BBB) – This $12 million issue was announced on 23 August 2004 and matures on 27 August 2014. Its features are similar to the bonds described above – the coupon rate is set at BBSW plus 93.5 bp to August 2009 (i.e. 5 years) and 143.5 bp thereafter.

The decline in yields from April to August this year is reflected in that fact that, despite its enhanced rating, the AMP Bank coupon rate is only a fraction below that for Adelaide Bank. The simple average of the Adelaide Bank bond over 10 years is 118.5 bp, and on a levelised present value basis would be around 114 bp, which swapped to a fixed rate might have been around 120 bp. A BBB+ rated bond would be expected to yield less than a BBB bond of the same maturity. Yet the Snowy Hydro bond, which trades at around 122 bp is above the indicated AMP Bank rate. The Snowy Hydro bond is also yielding slightly above the Bloomberg predicted yield and significantly above the CBASpectrum yield.

5 year bond benchmarks

Even at 5-year maturities there are not many examples of domestically issued bonds at BBB or BBB+ rating levels. Some examples are provided below.

- *Energy Partnership (Gas) Pty. Ltd.* (BBB) – Energy Partnership's $135 million fixed rate BBB rated MTN was announced on 23 July 2004. It was issued at a fixed coupon of 6.5%, which at that date represented a 94 bp spread over 5 year government bonds.
- *AMP Bank* (BBB) – The AMP Bank issue mentioned above has a tiered rate, so that up to 2009 (5 years) the rate is 93 bp over 3 month BBSW. At the time the transaction was announced on 2 April 2004 this represented a 106 bp margin to the 5-year government bond rate.
- *Investa Property Group* (BBB+) – Investa's $135 million MTN was issued on 23 September 2004 at a fixed coupon of 6.25%. This represented a 97 bp spread over the 5-year government bond rate.
- *CSR* (BBB+) – CSR's $200 million Fixed Rate MTN was issued on 12 March, 2004 at a 6% coupon, representing a 78 bp spread to the 5 year government bond rate.

The AMP 5 year bond discussed above is rated BBB and was 106basis points above the 5-year rate at April, 2004. At that time the predicted CBASpectrum and Bloomberg yield spreads were around 100 bp. The CSR observation at March, 2004 suggests that both the Bloomberg and CBASpectrum fair market yield curves may have been over-estimating the market for BBB+ debt. In early May, the Bloomberg curve dropped significantly below the CBASpectrum curve, and soon afterwards the Energy Partnership issue at 94 bp over for a BBB flat rated company suggests that the CBASpectrum curve may currently be over-estimating the yield for 5 year BBB+ issues. The AMP and Energy Partnership BBB issues appear to both hold a margin above the Bloomberg predicted BBB+ curve.

Corporate bond issuing options

Regulators must also be cognizant of the options available to companies in the market for debt, and of the actual financing practices undertaken by companies. The reason that there is so little debt issued directly in the Australian corporate bond market at 10 years (and even 5 years) with BBB or BBB+ ratings would appear to be because this is not the most efficient method of debt raising given market appetite. There are two major options that are followed by relatively (to the market as a whole) highly geared Australian infrastructure utilities. One is to credit wrap the bond and issue for 5 to 7 years (and more rarely 10 years) in the Australian market. The second option is to issue in the international markets (either directly or credit-wrapped), especially the US.

Credit wrapping

Credit wrapping involves the provision of a financial guarantee to the obligations made by the issuer of the bond. There are four major financial organizations (known as "monolines") providing this service (AMBAC, FSA, FGIC and MBIA). They make a non-revokable guarantee to make good to bondholders, on the next business day following notification, the interest and principal that was not paid by the issuer. The monolines are rated AAA and through the payment of an annual fee, provide their own credit rating to the issue. Credit wrapping by non-financial entities in Australia that are credit enhanced has risen from zero in 1998 to around 40% of all issues in 2003. According to the Reserve Bank of Australia, credit wrapping incurs an up-front premium equivalent to 20-60 bp per annum, and is "generally more than half of the spread reduction that the borrower is likely to achieve by issuing a credit-wrapped bond rather than an unwrapped bond".[18] Anecdotal evidence in the market suggests that a wrapping fee of 40 bp is common.

Outlined below are some examples of 10-year credit-wrapped bonds issued in the Australian market by energy and transport infrastructure companies over the last two years.

- *Brisbane Airport* (BBB- to AAA) - On 1 July, 2004, Brisbane Airport announced a $300 million 10 year credit wrapped bond at BBSW+61bp, which at the time of issue was 78 bp above the 10 year government bond rate if a credit wrapping fee of 60 bp is assumed.
- *Brisbane Airport* (BBB- to AAA) - On 8 December, 2003, Brisbane Airport announced a $50 million 10 year credit wrapped bond at BBSW+61 basis points, which at the time of issue was 95 bp above the 10 year government bond rate if a credit wrapping fee of 60 bp is assumed.
- *CitiPower Trust* (A- to AAA) – On 24 February 2003 CitiPower Trust announced a $300 million 10 year credit wrapped bond at BBSW+68 basis points, which at the time of issue was 77 bp above the 10 year government bond rate if a credit wrapping fee of 50 bp is assumed.

[18] Davies, M. and L. Dixon (March, 2004), "Credit Quality in the Australian Non-Government Bond Market," *Financial Stability Review*, p.49.

These issues indicate that by credit wrapping it may be possible for Australian utilities to issue at lower margins to the 10-year government bond rate than indicated by the CBASpectrum or Bloomberg fair market yield curves. Unfortunately, information on credit wrapping fees is not made public. Hence, the estimates made above have been derived by making a conservative assumption about the credit-wrapping fee (60 basis points per annum for BBB- to AAA and 50 basis points for A- to AAA) in terms of the range provided by the Reserve Bank of Australia. In addition to the annual fee, there are some additional documentation costs associated with credit wrapping; however these would not be significant on an annualised basis over 10 years.

International bond issues

Many Australian regulated utilities are currently seeking long-term debt funding at 10 to 15 year tenors in the international markets, particularly in the US "144A" and "Reg. D" private placement markets. Generally credit wrapped, these bonds are popular with the US insurance company market. Current pricing levels, even after credit wrapping fees and currency swap fees, are understood to be very competitive, which explains their popularity. The Australian Pipeline Trust (APT) recently announced a USD325 million placement to retire bank debt, which was lead-managed by Citigroup. The ASX announcement reads as follows:

> **September 10, 2003 - Australian Pipeline Trust completes US $325 million private placement**
>
> The transaction represents APA's first raising in the bond markets. 13 investors were involved in the transaction, through a combination of A$ and US$ tranches. APA raised money at 7, 10, 12 and 15 years, and was able to achieve a weighted average all-in cost of BBSW +94 basis points with an average tenor of 11 years… APA accessed both Australian and US investors, a key funding objective. "We were very pleased to have been able to generate participation from Australian investors as well as the US investor base." Comments Jim McDonald, Managing Director. "APA enjoys a strong credit story and we were very keen to be able to offer exposure to global investors…"

This was 31 bp over the 10-year government bond rate at the time. The AUD component was for 7 years and represented only 20% of the issue. The USD component's weighted average tenor was 12.15 years. The ASX announcement noted that issue was positioned as a high BBB, and the longer tenor was achieved at "all-in pricing comparable to its current bank facility." Bloomberg reports that APT's "general corporate" 5-year term loan of $695 million, with maturity on 29 June 2005 was priced at 90 bp above BBSW. This implies that the pricing of APT's longer tenor debt was around 27 bp above the Australian 10 year government bond rate at the time. Hence, it would appear that credit wrapping was not involved, and that 10-year debt may have been obtained at a margin to the 10-year government bond rate that was significantly below the CBASpectrum or Bloomberg benchmarks.

4.4 Debt raising transaction costs

The DNSPs' adviser on cost of capital, SFG, has made no claims relating to debt-raising transaction costs. A number of determinations by regulators since October 2002 have considered the costs of raising debt for regulated utilities. The decisions are summarised in Table 4.4, along with the allowance granted and the benchmark credit rating applied.

The Victorian ESC made the first explicit allowance for the costs of issuing debt in its determination of gas access arrangements of October 2002. The Final Decision retained the position expressed in the draft that an annualised quantum of 5 basis points be added to the cost of debt for establishment expenses.

The ACCC has adopted a standard practice of using a benchmark debt-raising transaction cost allowance of 12.5 bp for entities that are assumed to be BBB+ rated (gas transmission) and 10.5 bp for entities assumed to be A- rated (electricity transmission). This figure was calculated from estimates provided by Westpac and verified against other sources. That said, in one of the matters – the revisions to access arrangements for GasNet's transmission network in November 2002 – the ACCC's decision was appealed to the Australian Competition Tribunal (ACT), was and in the course of that appeal the ACCC accepted a doubling of the allowance to 25 bppa. However, no empirical work is available publicly to support the level of costs that were accepted in the course of the Tribunal's hearing.

Table 4.4

DETERMINATIONS IN RELATION TO DEBT-RAISING COSTS

Regulator	Year	Industry	Allowance (basis points)	Benchmark credit rating
IPART	2004	Electricity dist	12.5	BBB to BBB+
ICRC	2004	Water and elec. dist	12.5	BBB+
ESCOSA*	2004	Electricity dist	12.5	BBB+
QCA*	2004	Port	12.5	BBB+
ACCC	2003	Electricity trans	10.5	A
ACCC**	2002	Electricity trans	10.5	A
ACCC	2002	Gas trans	25.0***	BBB+
ESC	2002	Gas dist	5.0	BBB+

** Preliminary/draft position*

*** Refers to two ACCC decisions in 2002 (ElectraNet and SPI PowerNet)*

**** This was the position determined in the context of an appeal to the Australian Competition Tribunal that was decided in Dec. 2003.*

Source: various regulatory determinations

ESCOSA has reached a preliminary position (as of January 2004) in its price review of electricity distribution, to add 12.5 basis points to ETSA Utilities' overall cost of debt to cover the cost of raising debt. This is the quantum sought by ETSA Utilities. ESCOSA has accepted the proposal because it is consistent with allowances made by the ACCC where it has applied a BBB+ rated debt benchmark (the initial GasNet determination in November 2002).

In March 2004, the ICRC also accepted the proposal of ActewAGL for an allowance of debt issuance costs of 12.5 bp, consistent with the ACCC's initial GasNet decision. Although the subsequent doubling of the ACCC allowance was acknowledged by ICRC, it retained the initial figure partly because it had aroused no discord from the draft report, and because it claimed the overall rate of return was relatively high.

IPART similarly incorporated debt-raising costs of 12.5 bp in its review of electricity distribution pricing, which it decided in June 2004. The quantum appeared to be calculated with reference to determinations made by other jurisdictions. In this context, IPART considered that 12.5 bp was reasonable.

Whilst the DNSPs' submission on cost of capital made no specific claim with respect to debt issuance transaction costs, ACG recommends that an allowance of 12.5 bp be provided. The cost of raising debt is a necessary cost of providing the regulated services, and hence appropriately included in the revenue caps for the regulated entities. Regarding the quantum of the allowance, we note that 12.5 bp is consistent with previous regulatory decisions, and with the evidence that has been provided to previous reviews by market practitioners. While a higher figure was adopted in the appeal of the GasNet matter, we would advise against adopting the figure of 25 bp (which we note is not in any way binding on the QCA). In particular, we note that no empirical material supporting such a level has been published, and the outcome of the appeal itself is inconsistent with the other empirical information that does exist.

Debt issuance cost adjustment to WACC vs cash flows

In Australia different regulators provide for debt issuance costs either through an adjustment to the total cost of debt, and therefore to the WACC, or through an adjustment in cash flows.

If done consistently, the present value of both allowances should be identical. Notwithstanding the possible theoretical appeal of keeping the WACC free from allowances for transactions costs, we consider that applying the allowance to the WACC has administrative simplicities and hence support this approach. We note that the QCA has previously applied the transaction cost allowance to the estimated WACC.

4.5 Conclusions

Debt margin

Our analysis has demonstrated that, with one exception, recent regulatory decisions on debt margin have generally been referenced from the margin over the 10-year government bond rate estimated by CBASpectrum. We have compared estimates for BBB rated bonds provided by CBASpectrum and Bloomberg over 10-year and 5-year horizons, and shown in the second case that the ENP observation lies between the two estimates. However, we have also provided evidence that the CBASpectrum benchmark may lie above the margins being achieved in the market by utilities through credit wrapping and issuance in international bond markets, particularly the US. The use by regulators of a benchmark such as the CBASpectrum service provides an incentive for regulated utilities to innovate in their financing arrangements.

On the balance of the evidence, ACG recommends that the QCA adopt a debt margin that lies within the range of CBASpectrum and Bloomberg benchmark debt margins, applying a 20-day average. Using 27 October 2004 as the cut-off date, ACG would therefore recommend the following ranges of debt margins for the Queensland DNSPs:

- 101 (being the CBASpectrum benchmark margin) to 127 bp (being the Bloomberg benchmark margin) for a 10-year time horizon; and

- 92 (being the Bloomberg benchmark margin) to 95 basis points (being the CBASpectrum benchmark margin) for a 5-year time horizon.

Combined debt margin and allowance for debt issuance costs

On a combined basis, applying a 12.5 bp debt issuance transaction cost, reasonable ranges for the total debt margins for the Queensland DNSPs would be:

- 114 to 140 bp for a 10-year horizon.
- 105 to 108 bp for a 5-year horizon.

In recent regulatory decisions regulators have adopted the CBASpectrum margin (for 10 year bonds) and have not considered other evidence, such as the Bloomberg estimates. Adoption of Bloomberg estimates or of a mid-point between the CBASpectrum and Bloomberg estimates would be a departure from recent regulatory practice in Australia. However, the use of information from both services would expand the information set that is used to derive debt costs, and hence is an improvement.

Chapter 5

Factors Influencing Beta

5.1 Introduction

In this chapter we examine from first principles the factors that affect a company's asset beta. For convenience, the factors considered below correspond with the list of factors suggested by Associate Professor Martin Lally in his recent advice to the Authority regarding general cost of capital issues.[19] These effects are discussed with respect to their applicability to the DNSPs' services and to assist in the choice of appropriate proxy beta comparators for analysis.

In undertaking this analysis from first principles, we are assuming that a domestic WACC framework operates. In other words, the beta that is being derived is a domestic beta, and this is to be applied in conjunction with a domestic market risk premium (MRP) to determine an equity risk premium (ERP) for the regulated entity.

5.2 Nature of the Product or Service

The first factor is the nature of the product or service. Since we are concerned with the company's sensitivity to movements in the country's GDP, this issue is concerned with the income elasticity of demand. If income elasticity of demand is very high, we would expect a high asset beta, because economic booms (downturns) would result in a large positive (negative) demand response that would have a large impact on the cash flows, and therefore valuation, of the business.

The DNSPs provide electricity distribution services that are linked to GDP growth. In the case of Queensland, the link between GDP growth and electricity consumption is heightened by the fact that Queensland has energy sources, and is growing faster than the Australian economy as a whole. Non-residential consumption of electricity is more sensitive to GDP changes than is residential consumption. In the US, this was recently confirmed in an analysis of monthly data from 1972 to 2000, which found strong evidence that:[20]

> During an economic downturn from a peak, the commercial and industrial sectors will experience significant declines in energy usage. During an economic boom, these sectors will increase their energy usage significantly.

[19] Lally, Martin, (February 26, 2004), *The Cost of Capital for Regulated Entities*, Report prepared for the Queensland Competition Authority, pp.80-84.

[20] Thoma, Mark, (2004), "Electrical energy usage over the business cycle," *Energy Economics*, Vol. 26, p.483.

The historical record for Queensland and Energex indicates that electricity consumption will be sensitive to economic growth. Between 1990 and 2003 the Queensland economy grew at a compound annual growth rate (CAGR) of 4.4%, which was faster than the Australian economy as a whole (3.5%). However, Energex' non-residential electricity load grew at a compound annual rate of 5%. The QCA observed that in the 1990-91 recession, while the growth in consumption of electricity in Queensland fell, it was still positive and greater than that experienced elsewhere in Australia. However, the overall volatility of Queensland's electricity consumption was greater than for Australia as a whole.

5.3 Nature of the Customer

The nature of the customer is important since different customer groups may be expected to have varying sensitivity to domestic GDP shocks. Domestic load is expected to have lower sensitivity to GDP shocks as it represents basic household consumption. There will be some sensitivity, however, since a severe recession can cause households to reduce consumption and there will be a fall in the number of households due to forestalling of household establishment. In the US, Thoma found that households' peak load demand in particular was sensitive to the state of the economy, whilst for industrial demand both peak and non-peak load were sensitive to economic growth.[21] As GDP expands, businesses will increase their demand for electricity, and in a recession businesses will wind down their operations or close. Thus, in a recession, business consumption of electricity will be lower.

5.4 Pricing Structure

Pricing structure is expected to have an influence on asset beta through the mechanism of home country GDP shocks and the flexibility that a company has to protect its revenue stream in the event of a market downturn. If the pricing structure has a significant fixed component, this will cushion the revenue impact of a reduction in volumes during a downturn in the economy – that is, it would reduce the variation in revenues over the business cycle.

The Queensland DNSPs are subject to a revenue cap regime, which means that prices may be adjusted upward to preserve revenues if there is a reduction in volume from that expected. Similarly, prices would need to be reduced if volumes exceeded forecast levels. In such circumstances it can be expected that the level of sensitivity of revenues to GDP movements should reduce. Hence, we would expect some dampening of the systematic risk represented by the correlation between electricity consumption and economic activity.

5.5 Duration of Contracts

The duration of contracts with suppliers and customers is another potentially important influence on asset beta. If contract prices for customers are set for relatively long periods, this will reduce the ability of a monopolistic firm to raise prices in the event of an upturn in economic conditions. Hence, we would expect that longer contracting periods would reduce a firm's asset beta, as these contracts would span more than the length of a period in the economic cycle.

[21] Thoma, Mark, (2004), pp. 481-2.

The DNSPs do not have take-or-pay contracts with retailers or commercial and industrial customers, but have a revenue cap arrangement. Hence, the DNSPs' exposure to volume risk will be mitigated by the revenue cap arrangements, as discussed below.

5.6 Regulatory Framework

CPI-X regulation, because it generally fixes arrangements for a period of years (usually five), exposes utilities to greater systematic risks compared with rate of return regulation. Generally speaking, it would be expected that other things being equal, an increase in the number of years for the price (or revenue cap) reset interval would increase risk. A price-cap will negatively impact the utility in a downturn due to exposure to volume risk. Under a revenue cap risk systematic risk exposure will be lower.

On the other hand, the regulatory framework under which the DNSPs operate has some features that would be expected to reduce systematic risk. Under the QCA's 2001 Determination there was provision for an 'unders and over' approach, under which a less than 2% variance in actual revenue received by the DNSP in any year relative to the forecast was allowed to be recovered from or returned to customers over the next year. With a variance of greater than 5%, the DNSP would need to submit a plan of how the balance was to be corrected. For example, during the last five years Energex's revenue variance was generally within 2% of forecast and was reflected in adjusted for in the succeeding year's distribution price. Only in 2003-04 did Energex's over-recovery of revenue exceed 5%, which the QCA will adjust for in the next period. The QCA intends to continue with this approach in the next regulatory period.

Given the relatively rapid growth environment facing the DNSPs in Queensland, they also face risks associated with additional costs arising from unforseen demand growth. The QCA has advised that it has developed a mechanism to mitigate the risk associated with serving unexpected demand during the next regulatory period. In particular, the Authority has advised ACG that it intends to apply triggers to the key network cost drivers of customer numbers a maximum demand for both Energex and Ergon in the next regulatory period. The trigger mechanisms will have relatively high thresholds to ensure that they are not activated easily. There is also no presumption that activation of a trigger will lead to an automatic pass-through event. The trigger mechanism will be symmetrical with the Authority able to initiate a review if demand growth significantly lower than forecast. These features of the DNSPs' regulatory framework can be expected to reduce systematic risk associated with revenues and costs.

5.7 Degree of Monopoly: Elasticity of Demand

The influence of the degree of monopoly power, or elasticity of demand, on asset beta is an open question, with various studies showing mixed results.[22] Since the services of the DNSPs are subject to regulation by the QCA, this factor is not relevant to the consideration of the DNSPs' asset beta.

[22] See, for example the following exchange: Sullivan, T. (1978), "The Cost of Capital and the Market Power of Firms" *Review of Economics and Statistics*, Vol. 64, pp. 523-25; Curley, A., Hexter, J. and D. Chio, (1982) "The Cost of Capital and Market Power of Firms: A Comment," *Review of Economics and Statistics*, Vol. 64, pp. 519-23; and Sullivan, T. (1982), "The Cost of Capital and The Market Power of Firms: Reply and Correction," *Review of Economics and Statistics*, vol. 64, pp.523-25.

5.8 Real Options

The relative size of real options available to the firm is expected to be positively related to asset beta since the value of growth options should be more sensitive the state of the domestic economy than the value of the firm without them. A characteristic of a real option is that, if exercised, it would generate rent. Yet the fact that the DNSPs are revenue cap regulated suggests that they would not be permitted to capture rents within the regulated activity. Thus, the DNSPs are unlikely to have any rent-generating real options.

5.9 Operating Leverage

Mandelker and Rhee hypothesised that both operating leverage and financial leverage would have a positive impact on beta and found supportive results based on a sample of 255 US manufacturing firms for the period 1957-1976.[23]

The degree of operating leverage (DOL) can be defined as follows:

$$DOL\ at\ Q\ units\ of\ \ output = \frac{Percentage\ change\ in\ EBIT}{Percentage\ change\ in\ output}$$

where EBIT is Earnings Before Interest and Taxes, or Operating Profit. As the percentage of fixed ongoing costs increases relative to total operating costs, DOL increases. As a result of having a relatively larger element of ongoing costs, a company will experience greater sensitivity to economic shocks. Or stated in reverse, a company's operating leverage will be lower as:

- The share of profit in its revenue stream rises (i.e. as the share of profit rises, the proportionate change in EBIT from a given proportionate change in revenue falls);
- The less its revenue varies with output; and

The more operating expenses vary with output.

The relationship between a company's asset beta and the relative level of fixed costs (DOL) has been formalised as follows:[24]

$$\beta_{asset} = \beta_{revenue}\left[1 + \frac{PV(fixed\,cost)}{PV(asset)}\right]$$

This formula shows that for a given level of systematic risk within the revenue stream (which the variable cost stream will approximately mimic), a company's asset beta will rise in direct proportion to the size of the present value of fixed cost relative to the size of the present value of the asset as a whole. In the limiting case, if the PV of fixed costs were zero, the asset beta would equal the revenue beta.

[23] Mandelker, Gershon N. and S.Ghon Rhee (March, 1984), The Impact of Degrees of Operating and Financial Leverage on Systematic Risk of Common Stock," *Journal of Financial and Quantitative Analysis*, Vol 19, pp.45-57.

[24] Brealey, Richard A. and Stewart C. Myers (1996), *Principles of Corporate Finance*, 6th ed. Chapter 9.

Empirical analysis of the interactions between beta, DOL, and financial leverage has often employed proxies for DOL, such as the variance of operating income.[25] Such measures require a long period of observations to provide statistically meaningful results and in that period changes in the nature of a company's operations can render such data economically meaningless.

To assess the relative operating cost exposure of the DNSPs, what we require is a cross-sectional measure of operating cost risk. Hence, we define an empirical Operating Cost Ratio as follows:

$$Operating\ Cost\ Ratio = \frac{Cash\ Operating\ Costs}{EBIT + Cash\ Operating\ Costs}$$

The Operating Cost Ratio is net of depreciation and measures the importance of cash operating costs relative to the revenue required to provide for cash operating costs and a return on investment (EBIT plus cash operating costs):

- If this ratio is high, a relatively small change in revenue or in cash operating costs will have a proportionately large impact on EBIT.
- If the Operating Cost ratio is low, the company's EBIT will be relatively unaffected by a given change in revenue (whether through a change in price or volume demanded) or cost.

For example, a price or revenue-capped, capital-intensive energy distribution company that incurs full operating costs can be expected to have a medium level Operating Cost Ratio. Given a regulated price, it will be vulnerable to changing demand and cost conditions. Table 5.1 below shows the Operating Cost ratios for a number of electricity DNSPs across several states and the ACT. The Queensland DNSPs are found to have around the same average Operating Cost ratio as the New South Wales DNSPs. However, both the Queensland and NSW DNSPs' Operating Cost ratios were relatively high compared with other Australian energy utilities. These cost relativities are largely a reflection of relative density of networks, and do not imply that the Queensland DNSPs are inefficient. Other things being equal, this would tend to increase the systematic risk of Ergon and Energex relative to Victorian and South Australian DNSPs. However, we have seen that the QCA has introduced mechanisms to reduce revenue and cost risk for the Queensland DNSPs.

[25] See Thompson, D.J. (April, 1976), *Sources of Systematic Risk in Common Stocks*, Journal of Business, 49, pp. 173-188. Also see Mandelker, G.N. and S.G. Rhee (March, 1984) "The Impact of the Degrees of Operating and Financial Leverage on Systematic Risk of Common Stock", *Journal of Financial and Quantitative Analysis*, 19, pp.45-57. Their proxy for DOL is the slope coefficient when the log of operating earnings is regressed against the log of sales.

Table 5.1

OPERATING COST RATIO: AUSTRALIAN ELECTRICITY DNSPS

State	Year	Operating Cost ratio	Source
Queensland	2002-03 (actual)	57%	Regulatory accounts
New South Wales	2004-05 (forecast)	56%	Regulatory decision
ACT (ActewAGL)	2004-05 (forecast)	53%	Regulatory decision
South Australia (ETSA)	2005-06 (forecast)	42%	Regulatory decision
Victoria	2002-03 (actual)	38%	Regulatory accounts

Source: Bloomberg, QCA, ACG analysis

5.10 Market Weight

A company's relative weight in the market proxy that beta risk is being measured against can have an influence if that weight is large. The larger is the market weight, the closer to unity will the equity beta be drawn. The DNSPs' RAVs of around $3 billion each indicates a small weight relative to the ASX200 Index.

5.11 Conclusion

Our analysis of the DNSPs systematic risk profile has identified the following key issues:

- As distributors of electricity subject to a CPI-X regulatory regime, we should expect the DNSPs to experience a lower level of systematic risk than the average company in the market.
- The DNSPs will be subject to systematic risk based on the fact that the consumption of electricity is correlated with domestic economic growth. For example, we should generally expect a higher correlation between electricity consumption and the state of the economy than between water consumption and the state of the economy.
- Since the Queensland DNSPs are subject to a revenue cap, they may be expected to have a lower level of systematic risk relative to DNSPs that are subject to price cap regulation. In addition, there are mechanisms in place to adjust the revenue cap when outcomes turn out to differ from assumptions
- The relatively higher growth rate of electricity consumption in Queensland compared with the rest of the country may be expected to raise the systematic risk of the DNSPs' operations relative to similar companies in other states. However, the QCA will be providing the DNSPs with a degree of insulation from cost risks associated with incorrect assumptions about demand levels. Thus, the level of cost risk may be lower than in other states.

- The relative Operating Cost ratios of the Queensland DNSPs (as well as the NSW DNSPs) were found to be significantly higher than those of Victorian and South Australian DNSPs, due most probably to greater relative decentralisation. Other things being equal, a higher Operating Cost ratio could be expected to raise the relative systematic risk of the Queensland DNSPs. However, we have seen that the QCA is proposing to mitigate such cost related risks (outside the control of the DNSP) by reviewing cases in which demand is different from forecasts and allowing revenue adjustments to compensate. This is likely to reduce systematic risks associated with a higher Operating Cost ratio, since these risks are compounded by a high level of fixed costs when demand changes.

Taken as a whole, these indicators of systematic risk would suggest that the asset beta of the Queensland DNSPs would be less than that of the average company in the market. Other things being equal, we should expect that the systematic risks faced by the Queensland electricity DNSPs would not be significantly different from those facing DNSPs in other states. However, the Queensland DNSPs are regulated under a fixed revenue cap, with arrangements in place to adjust the revenue in the event of over or under-recovery. On this basis we should expect the systematic risk of the Queensland DNSPs to be lower than in, say, Victoria where a price cap is applied. Whilst the Operating Cost ratio of the Queensland DNSPs is higher than the Victorian average, the systematic risk impact of this is mitigated by the fact that QCA has stated that to some extent, cost variances associated with non-controllable events will be adjusted for in a symmetrical fashion through the revenue cap.

On balance, we should expect the Queensland DNSPs to have a slightly lower equity beta than DNSPs in other Australian states due to the regulatory arrangements with the QCA, however we would not expect the equity beta to be lower than that of say, metropolitan water distribution companies whose demand is largely dependent on weather conditions.

Chapter 6

Analysis of Betas of Proxy Companies and Sectors

6.1 Introduction

In this section we examine a number of industry sectors relevant to the analysis of the DNSPs' asset beta. We begin by outlining the QCA's previous analysis and decision on the DNSP's beta. This is followed by a review of recent market events surrounding the dot-com 'bubble' that have influenced the measured asset beta of low risk and utility businesses relative to historical experience.

In undertaking the analysis, The Allen Consulting Group has calculated estimates of proxy betas based on a debt beta assumption of 0.10, and de-levering based on the Conine formula.[26] Previously, the QCA has applied the simple Brealey and Myers formula together with a 0.20 debt beta assumption, which was the upper bound of a zero to 0.20 range. ACG has been instructed by the QCA that the new approach and parameters may be applied in the case of the DNSPs. Therefore, for consistency with the approach that will potentially be applied by the QCA, ACG has adopted the same assumptions when analysing proxy betas for the DNSPs.

6.2 QCA's beta analysis in 2000-01

The QCA undertook an analysis of electricity distribution betas in 2000-01, and made its Final Determination in May 2001. In its Final Determination the asset beta of the DNSPs, applying the Brealey and Myers formula and assuming a debt beta of 0.28, was judged to be 0.45. This was lower than the betas sought by Energex and Ergon Energy.

With 60% gearing, the equity beta derived by the QCA was 0.71. The QCA noted that a fall in observed betas had occurred since the Draft Determination had been issued:[27]

---

[26] See Conine, T. (1980), "Corporate Debt and Corporate Taxes: An Extension," *Journal of Finance*, 35, pp.1033-6. It assumes a passive debt management approach. The formulae for equity and asset betas under the Conine approach are as follows:

$$\beta_e = \beta_a + (\beta_a - \beta_d) \times (1-T) \times \frac{D}{E} \quad \text{and} \quad \beta_a = \frac{\beta_e + \beta_d \times (1-T)\frac{D}{E}}{1 + (1-T)\frac{D}{E}}$$

where:
β_e = equity beta
β_a = asset beta
β_d = debt beta
D = value of debt
E = value of equity
T = imputation adjusted corporate tax rate
The QCA's version of the Conine formula defines T as the imputation adjusted tax rate taking account of dividend imputation. Hence, T = t (1 - γ), where γ = proportion of imputation credits that can be utilised by shareholders. The QCA sets t = 0.30 and γ = 0.50. The Conine formula differs from the simple Brealey and Myers formula to the extent that T is positive, and is equivalent if γ = 1.

[27] QCA (May, 2001) *Final Determination: Regulation of Electricity Distribution*, p. 195.

> This represents a significant change from the range of estimated asset betas evident at the time the Authority prepared its Draft Determination where the Australian utilities' equity and asset betas were calculated to 31 August 2000. At that time, listed electricity and gas businesses had asset betas in the range of 0.45 to 0.58. This has now narrowed to 0.42 to 0.47. The asset beta set by the Authority in the Draft Determination (0.50) is clearly inappropriate.

The QCA's data was based on Blume-adjusted equity betas sourced from Bloomberg, thereby biasing observations to a value of unity.[28] The energy distribution companies relied upon were AGL Limited, Envestra Limited, Allgas Energy Limited and United Energy Limited. Regard was also paid by the QCA to beta estimates US electricity and gas generation/distribution companies.

In discussing the risk characteristics of DNSPs, the QCA noted:

- The variability in the consumption and distribution of electricity;
- The sensitivity of electricity consumption to domestic macroeconomic risks;
- Limited exposure to foreign exchange and interest rate risk (due to the CPI-X mechanism); and,
- Minimal exposure to technological risks.

In summary, whilst the QCA found the DNSPs to be subject to market wide (systematic risks), there were also features suggesting lower than average (market) risk.

6.3 The DNSP's submission to the current review

Energex and Ergon retained the Strategic Finance Group (SFG) to advise them on cost of capital issues. The SFG submission does not explicitly state the equity beta that it proposes, since it proposes an approach that focuses on the WACC as a whole, and on estimating a probability distribution of the WACC. Nevertheless, information provided in the submission allows an estimate of the implied proposed 'mid-point' estimate as well as an estimate of the value that is consistent with its WACC estimate (which, implicitly, is a value that is in the upper half of its proposed range).

The SFG submission proposes an asset beta in the range of 0.4 to 0.6 (mid-point 0.50) and a re-levering formula that is equivalent to the Conine approach that is currently being applied by the QCA, albeit with a zero gamma value inserted. To estimate the debt beta, SFG argues that the debt holders' yield is made up of the sum of the risk free rate of return, a risk premium equal to the debt beta times the Market Risk Premium (MRP) and, due to the downward skewing of debt holders potential returns in the event of default, the default risk premium (DRP). Rearranging the terms implies that the debt beta can be derived from the following equation:

$$\beta_d = \frac{yield - DRP - r_f}{MRP}$$

[28] The Blume adjustment applies a .67 weighting to the actual estimated beta and a .33 weighting to the market beta of unity.

Substituting SFG's implied 'mid-point' values of 7% (yield), 0.4% (DRP), 5.8% (r_f), and 6% (MRP) derives a debt beta of 0.19. Taking SFG's implied 'mid-point' asset beta of 0.50, and its 'midpoint' gearing of 55%, and applying its preferred re-leveraging formula derives an equity beta of 0.76. If leverage is adjusted to the 60% uniformly applied by Australian regulators in energy, SFG's implied mid-point for the equity beta becomes 0.82. The SFG methodology implied a WACC of 9.9%, that is 16% above the WACC estimate that is provided by the 'midpoint' estimates (8.52%). Applying this margin to the equity beta implies a proposed equity beta of approximately 0.90. Alternatively, with 60% gearing and the application of the other SFG 'midpoint' estimates, the implied SFG equity beta would need to be 1.41 to derive a WACC of 9.9%.

6.4 Infrastructure Betas, the 'New Economy' and the Stock Market

The techniques for estimating the expected beta for an asset involves estimating the historical relationship between the returns to that asset and the market as a whole. An implicit assumption of this approach is that the historical relationship between an asset (or a particular type of asset) and the market as a whole is an accurate predictor of the expected (future) relationship.

In the late 1990s to the early 2000s, many of the world's major share markets experienced a substantial rise in the share of technology-related stocks and with it their markets as a whole, followed by a later substantial fall in these stocks and the markets as a whole. In parallel with the rise in technology related stocks, the value of safe types of assets – such as utilities – initially fell (as investors substituted 'old economy' stocks for 'new economy' stocks) and then experienced a rise when the prices of technology stocks fell, as investors sought out safe investments.

The effect of utility stocks moving contrary to the general movements in the share market over an extended period was to depress their beta estimates. Whether the lower beta estimates are likely to be accurate estimates of the expected (future) betas then depends upon whether the dot-com 'bubble' is considered a normal or abnormal event. It is now generally accepted that events over this period were extraordinary, and that beta estimates obtained over this period are biased downwards. As noted in a US study of this phenomenon:[29]

> Sharp recent declines in telecom, media and technology valuations suggest that the past three to five years were truly extraordinary… But in assessing future values for betas, most practitioners look to the equity returns of the recent past – and the most recent three to five-year averages and correlations of returns to shareholders are of course quite extreme. By excluding the bubble years entirely, it is possible to calculate betas that are more consistent with the long-term historical results and indicate more accurately the relative risk borne by companies in other sectors. In the absence of such a correction, data drawn from the bubble years may generate artificially low betas for the next couple of years.

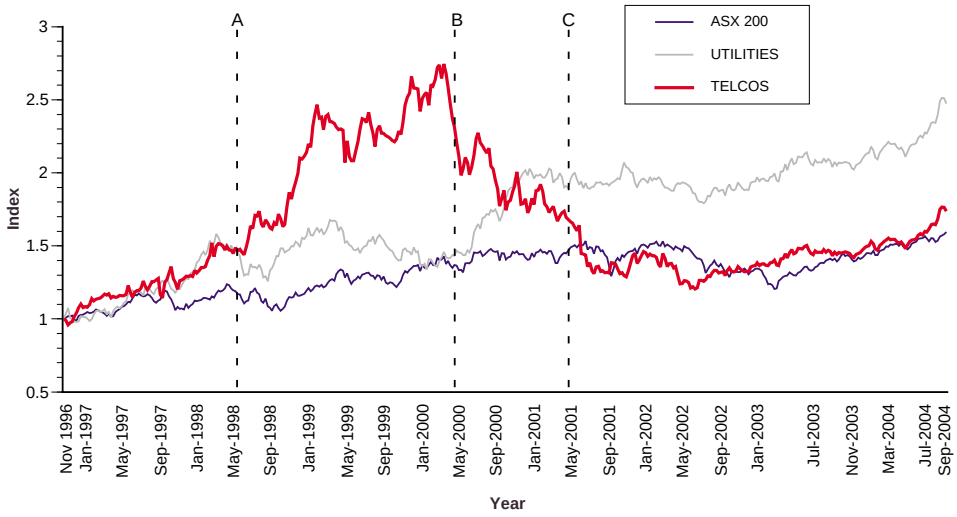
Unlike many of the other share markets – and particularly the US – the Australian share market did not experience a substantial rise overall during this period, and equally did not experience a substantial later correction, but rather experienced a sustained period of side-ways movement. However, while the share market as a whole appeared largely unaffected by the dot-com 'bubble' that affected many other share markets, there were sizeable impacts on specific sectors of the market.

[29] Annema A. and M. Goedhart, 2003, 'Current Research – A Better Beta', *McKinsey Quarterly*, No.1, p.8. The authors classified the abnormal period for the US market as between January 1998 and December 2001.

Figure 6.1 shows the ASX 200 share market index over the period since 1 January 1996 to the present, along with the relevant indices for telecommunications stocks and infrastructure stocks, all re-based to unity at the start of the period.[30]

Figure 6.1

AUSTRALIA: EFFECTS OF THE DOT-COM 'BUBBLE '



Source: Bloomberg

While the behaviour of the Australian market as a whole over the period was largely unexceptional, there were substantial differences in the relative performance of some of the sectors. In particular, the telecommunications sector (the proxy for the 'new economy') experienced substantial growth over the period beginning in mid 1998 (indicated by line A), and then an equally substantial decline from the peak experienced in March 2000 (indicated by line B). In contrast, the utilities sector moved largely counter to the telecommunications sector and counter to the market as a whole – particularly during the subsequent decline in the telecommunications sector from March 2000 until the end of 2001 (in the period indicated by lines B and C), when the utilities experienced substantial growth and the price index for the market as a whole barely changed.

Current beta estimates for Australian and US utility firms over a 4-5 year period include observations from the unusual market periods discussed above. In particular, the current 60-month beta estimates include the period after November 2000, and so include much of the period of the dot-com 'bubble'. Given the discussion above, we consider there to be a sound basis for questioning whether the estimates of betas that include data between the period commencing in about mid 1998 and the end of 2001 would deliver an unbiased estimate of the expected (future) beta for these stocks.

Accordingly, in this report, we have used two approaches to attempt to remove the potential bias in the forward-looking beta estimates, discussed above.

[30] The relevant sectoral indices were the telecommunications and infrastructure and utilities indices until 5 July 2002, and then telecommunications services and utilities indices thereafter (the original indices were not published after this date). The new indices were 'spliced' to the old to create a continuous series.

First, we have presented beta estimates for entities using the reasonably standard 5-years of monthly observations over a period that predates the commencement of the dot-com bubble, that is, for the period prior to about mid-1998. Secondly, we have also presented beta estimates using a shorter estimation period (60 weeks) and higher frequency data (weekly observations). The 60 -week beta estimates will be free of the effects of the utility boom after about February 2003.[31] It is noted that there *may* be some risk that the latter set of results provide downward biased beta estimates if the stocks in question are traded more thinly than the market.[32] However, it is also noted that higher frequency data are often frequently applied by financial analysts, and has been recommended in a recent independent review of cost of capital matters for the UK regulators.[33]

6.5 Australian electricity and gas transmission and distribution

Figure 6.2 shows 'rolling' equity beta estimates for both 60 monthly and 60 weekly observations since the early 1990s for a proxy group of companies that includes AGL, Alinta, Australian Pipeline Trust, Envestra, GasNet and United Energy (which has subsequently de-listed). This figure shows that the weekly beta estimates tend to lead to monthly estimates, which have lower volatility, reflecting the fact that the weekly estimates are more quickly affected by more recent developments. The weekly estimates – after hovering between about 0.6 and 1.4 since the end of 1994, started to fall quickly from early 1998. The trend in weekly estimates was subsequently followed by the monthly estimates. However, the weekly estimates rose sharply from early 2003, and sharply from the end of 2003, coinciding with the 'bubble' observations dropping out of the sample set. If this trend is followed by future monthly estimates, it follows that the current monthly estimates would materially understate the expected (future) equity beta for a regulated Australian energy utility.

[31] That is, estimates of betas using 60 weeks of weekly observations in February 2003 would have used observations back to about January 2002, which would have excluded the 'bubble' observations.

[32] A cursory perusal of trading data suggests that thin trading was not a significantly biasing issue for the Australian utility stocks examined.

[33] A recent report to the UK energy and water regulators, OFWAT and OFGEM, concluded that there was no necessary reason to use monthly sampling intervals for all firms, and suggested that weekly – or even daily – observations may have substantial advantages, subject to the thin trading and other problems of more frequent sampling either not being substantial or being dealt with through econometric techniques See, Wright, S., R. Mason and D. Miles, (February, 2003), *A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K.*, Study for the Joint Regulators, pp.103-104.

Figure 6.2

AUSTRALIAN ENERGY: AVERAGE BETA ACROSS THE PROXY GROUP

Source Bloomberg; ACG analysis

Table 6.1 shows that the average of current (at 11 November, 2004) data indicates an average equity beta of 0.73 based on 60 weekly observations, which is similar to the average level of equity betas observed (for AGL and Envestra only) in June 1999 using 60 monthly observations. Recent 60 week estimates have been in the order of 0.75 to 0.85. Whilst such evidence is not conclusive on the question of where observed 60 month equity betas for Australian energy utilities will settle at over the next 5 years, there is strong evidence that they will be considerably higher than present levels.

Table 6.1

AUSTRALIAN PROXY GROUP: EQUITY BETA RE-LEVERED TO 60%

Re-levered (to 60%) equity beta:	At June 1999 (monthly)	At Oct. 2004 (monthly)	At 11 Nov. 2004 (weekly)
AGL	0.80	-0.30	0.66
Alinta		0.69	1.73
Australian Pipeline Trust		0.67	0.65
Envestra	0.60	0.09	0.58
GasNet Australia		-0.10	0.62
Average	**0.70**	**0.21**	**0.73**

Source: Bloomberg

6.6 US Electricity Transmission and Distribution

Figure 6.3 shows estimates of rolling re-levered betas (at 60% gearing) for listed US comparable entities in the electricity sector for both the 60 weeks of weekly observations and 60 months of monthly observations. Of interest in this figure is the reasonably constant average of the monthly betas for the proxy group between about 0.60 and 0.75 before the start of 1998, and then a substantial decline in the weekly estimates followed by the monthly estimates. This is the same temporal pattern that we observed for the Australian proxy group.

Figure 6.3

US ELECTRICITY: AVERAGE BETA ACROSS THE PROXY GROUP

Source: Bloomberg; ACG analysis

In the US electricity sector the weekly beta estimates have since risen to levels that are more consistent with the pre-1998 period, while the monthly estimates are rising more slowly. Thus, the future levels of US electricity betas are also likely to be significantly understated by current estimates. Table 6.9 below shows that the current weekly beta estimate of 0.69 is higher than the monthly average of 0.64 at July 1998.[34] This contrasts with the currently observed monthly beta estimate of 0.23, which includes observations from the dot-com 'bubble' period.

Table 6.2

US ELECTRICITY: RE-LEVERED EQUITY BETA (TO 60%)

Re-levered equity beta:	At July 1998 (monthly)	At Oct. 2004 (monthly)	At 11 Nov. 2004 (weekly)
Centerpoint Energy	0.71	0.64	0.62
Clesco Corp	0.56	0.88	1.14
DTE Energy Corp	0.81	0.05	0.37
Empire District Electric Co	0.25	0.02	0.79
El Paso Electric Co	0.49	-0.00	0.99
Entergy Corp	0.97	-0.08	0.64
Exelon Corp	0.67	0.04	0.45
First Energy Corp		0.03	0.44
FPL Group	0.53	0.23	0.41
MGE Energy	0.23	0.20	1.26
Progress Energy	1.06	0.19	0.54
Westar Energy	0.71	0.61	0.59
Average	**0.64**	**0.23**	**0.69**

Source: Bloomberg

[34] It should be noted that none of the US proxy group is a pure-play DNSP.

Another way of analysing the effects of the dot-com 'bubble' is to remove the monthly observations that were affected by it. The impact of removing observations between July 1999 and July 2002 is shown in Figure 6.4. As in Figure 6.3, the geared equity beta for US electricity hovers around an average level of 0.60 until July 1999, but rises to a relatively stable average of 0.80 after July 2002. Thus, a maximum of half the 60 monthly observations for beta estimates beyond July 2002 are derived from the post 'bubble' period.

Figure 6.4

US ELECTRICITY INDUSTRY: EQUITY BETA EXCLUDING 'BUBBLE' PERIOD (GEARED TO 60%)

Source: Bloomberg, based on 60 monthly observations

6.7 US gas distribution and transmission

We also estimated rolling weekly and monthly re-levered (to 60%) equity betas for US listed gas transmission and distribution companies. The results are displayed in Table 6.4, and show essentially the same picture of monthly asset betas fluctuating between 0.30 and 0.90. Whilst the current monthly equity beta estimate is barely positive, as shown in Table 6.3, the weekly estimate is now 1.37.

Figure 6.5

US GAS: AVERAGE BETA ACROSS THE PROXY GROUP

Source: Bloomberg; ACG analysis

Table 6.3

US GAS DISTRIBUTION AND TRANSMISSION: RE-LEVERED EQUITY BETA (TO 60%)

Re-levered equity beta:	At July 1998 (monthly)	At Oct. 2004 (monthly)	At 11 Nov. 2004 (weekly)
Atmos Energy Corp	0.24	-0.17	1.39
Cascade Natural Gas	0.57	0.03	1.72
Delta Natural Gas Co	-0.14	-0.10	0.24
Energy South	0.11	0.24	2.20
The Laclede Group	0.65	0.14	1.43
Northwest Natural Gas	0.96	-0.30	1.56
Southern Union Co	1.04	0.61	0.96
WGL Holdings	2.03	0.25	1.49
Average	**0.68**	**0.09**	**1.37**

Source: Bloomberg,

6.8 Australian regulatory decisions in the Energy Sector

Table 6.4 displays a number of recent Australian regulatory decisions in the electricity sector. The average equity beta for these decisions is 0.95. In general, decisions made since the year 2000 rapid decline in monthly beta estimates have not resulted in a downward shift in regulatory equity beta applied. Regulators have taken a cautious approach in light of the relatively poor quality of current data. As an example, IPART provided a chart of rolling equity betas (calculated on 48 monthly observations by AGSM Risk Management Services) for AGL and Envestra at quarterly intervals over the period from June 2000 to March 2004. The chart showed a general decline over the period for AGL from 0.80 to negative levels, and a movement in Envestra's equity beta between 0.30 and 0.60. IPART concluded that:[35]

> Given the above evidence of decreasing betas of comparable Australian companies, the Tribunal considers that there is not sufficient evidence to increase the range of asset beta values to those submitted by the DNSPs and NSW Treasury. In addition, while it recognises that due to the lack of market data, the DNSPs face some degree of regulatory uncertainty in relation to the choice of the equity beta, it believes that the evidence for lower equity betas is not compelling enough to warrant it using a lower equity beta in the final decision.

Table 6.4

AUSTRALIA: RECENT REGULATORY DECISIONS IN THE ENERGY SECTOR

Regulator	Year	Decision	Debt beta	Asset beta	Equity beta
ESCOSA**	2004	SA electricity	0.00	0.32	0.80
ICRC	2004	ACT electricity	0.06	0.4	0.90
IPART	2004	NSW electricity	0.06 – 0	0.35 – 0.45	0.78 – 1.11
ACCC	2003	Transend	0.00	0.4	1.00
ACCC*	2002	SPI Powernet; ElectraNet	0.00	0.4	1.00
QCA	2001	QLD electricity	0.28	0.45	0.71
OffGAR	2003	WA gas	0.20	0.6	1.20
ACCC	2002	GasNet	0.18	0.5	0.97
ESC	2002	VIC gas	0 – 0.23	0.4 – 0.54	1.00
QCA	2001	QLD gas	0.26	0.55	0.97
		Range	***0 – 0.28***	***0.35 – 0.6***	***0.71 – 1.20***
		Average	***.11***	***.45***	***.95***

Source: published regulatory decisions

6.9 Assessment of the Queensland DNSPs' equity beta

Direct Australian evidence on equity betas of energy companies is deficient in that it generally spans a relatively short period of time that largely coincides with the period in which the dot-com 'bubble' affected the returns of Australian companies. In addition, most of the data are for gas distribution companies rather than for electricity distribution.

[35] IPART, (June, 2004), *NSW Electricity Distribution Pricing 2004/05 to 2008/09: Final Report*, p. 230.

The monthly data for Australian energy indicates a current geared (to 60%) equity beta of 0.21, whilst the weekly estimates indicate 0.73. In the US, data for the electricity industry follow a similar pattern, with the current monthly beta estimate of 0.23 and 0.69 respectively. If monthly observations during the years of the bubble are removed, the current US electricity equity beta is found to be around 0.80. Similar results are found for the US gas industry. We should expect that, other things being equal, companies regulated under CPI-X regulation would tend to have a higher level of systematic risk than companies regulated under rate of return regulation. It is difficult to say what this difference should be, since there is no definitive empirical study that estimates it with any degree of accuracy.

It must be recalled that, by definition, the average firm listed on the market has an equity beta of 1.00. However, the average firm is geared to 30%, rather than the 60% assumed for the DNSPs. If the average firm in the market were geared to 60% it would have an equity beta of 1.60, which is the beta that can be legitimately compared with the beta that is estimated for the DNSPs. We believe that the equity beta of the average Australian DNSP is 1.00 assuming 60% gearing.

It is important in the context of regulation that there be a consistency of beta decisions across time, and that appropriate beta relativities are maintained. However, we consider that on balance there are several factors unique to Queensland, which distinguish the Queensland DNSPs from their southern counterparts. Given the specific circumstances of the Queensland electricity DNSPs, and the empirical evidence that has been reviewed, we consider that an equity beta of 0.90 (geared to 60%) is appropriate. These circumstances include the following issues:

- The Queensland electricity DNSPs have significantly lower risk than the market as a whole, and should therefore exhibit an asset beta significantly less than 0.76 (the asset beta of the market as a whole).
- The Australian and US evidence relating to electricity and gas proxy companies has been affected by the dot-com 'bubble' but is supportive of the fact that the geared equity beta of the Queensland DNSPs is likely to be above the range of 0.60 to 0.80.
- Whilst the relatively higher Operating Cost ratio of the Queensland DNSPs might suggest a higher equity beta than in the southern states, these risks are mitigated by arrangements under which the QCA may review cost changes and adjust revenues when costs have changed unexpectedly.
- The Queensland DNSPs are regulated under a revenue cap form of regulation, under which revenue deviations from the forecast levels are adjusted in the revenue cap over successive years. This will reduce the level of systematic risk relative to the electricity DNSPs in the southern states.

An equity beta of 0.90 implies an asset beta of 0.45 when applying the Conine formula with a debt beta assumption of 0.10.

6.10 Comparison with other regulatory determinations

With reference to Table 6.4, it will be seen that the recommendation of a 0.90 equity beta for the Queensland DNSPs is slightly below the overall average of 0.95, which would indicate that a combination of the revenue cap regulatory approach and ex-post cost adjustment arrangements undertaken by the QCA provide a lower than average level of overall risk despite the DNSPs' relatively higher Operating Cost risk. It is, however, somewhat higher than the 0.71 equity beta determined by the QCA in 2001 at the height of the dot-com 'bubble', which had artificially depressed observed equity betas for proxy companies.

We have also undertaken a comparative beta analysis of the Queensland DNSPs against the Dalrymple Bay Coal Terminal (DBCT), which we have assessed as having an equity beta of 0.67 under 60% gearing.[36] We applied the Brealey and Myers formula to calculate an asset beta for DBCT based on an assumed similar revenue beta but a significantly lower ratio of the present value of fixed costs to asset value when compared with the DNSPs. We found the relatively higher operating cost risks incurred by the Queensland DNSPs would appear to justify the order of magnitude of the equity beta differential between the DNSPs and DBCT.

6.11 Summary and Conclusions

This chapter has examined the effects of the dot-com 'bubble', which in May 2000 led to a short period in which utilities were demanded and their measured betas based on 60 monthly observations fell to low or negative values. Our analysis has shown that the effects of the 'bubble' on equity betas were temporary, and that current 60-week beta estimates are generally rising to levels similar to or higher than those experienced prior to the 'bubble'. Over the next 4 years we would expect monthly equity beta estimates to revert to levels that are more in line with current (and pre-bubble) weekly beta estimates. Applying another approach involving the exclusion of monthly observations during the 'bubble' period, we found that the monthly average equity beta of US electricity companies is currently at 0.80.

The Allen Consulting Group considers that the empirical evidence, together with the desirability of maintaining stability in regulatory decisions across time and consistency in regulatory decisions across companies justifies the use of an equity beta of 1.00 (for a gearing level of 60%) for the average regulated electricity distributor. However, we are of the view that there are a number of unique factors to the Queensland regulatory regime that would suggest that the systematic risk of the Queensland electricity distributors is less than their interstate counterparts. As such, we consider an equity beta of 0.90 for a gearing level of 60% when deriving the revenue caps for the Queensland DNSPs can be justified.

Our conclusion on the empirical evidence about equity betas has taken account of the current market evidence, but taking account of measurement difficulties created by the dot-com 'bubble'.

Our conclusion about the systematic risk associated with electricity distribution in Queensland compared to their interstate counterparts has been arrived at by taking account of:

[36] ACG (September 2004), *Dalrymple Bay Coal Terminal: Analysis of Proxy Betas*, Report to Queensland Competition Authority.

- The revenue cap regulation applied to the DNSPs by the QCA, which would reduce systematic risk relative to distributors regulated under price caps (which apply to most of the interstate distributors);
- The fact that changes in distribution prices are not passed through to final customers for much of the market (but rather are borne by the Government through its CSO arrangements) and so some of the risk is effectively passed on to the Government;
- Advice from the QCA that it intends to put in place pass-through arrangements to mitigate the downside risk that the distributors may face if the growth in peak energy demand and customers exceeds the forecasts for the next regulatory period; but
- Mitigated by the relatively high operating leverage of the DNSPs relative to some other proxy companies in the energy sector, which would tend to raise systematic risk relative to some Australian DNSPs.

The equity beta of 0.90 is consistent with an asset beta of 0.45, a debt beta of 0.10 and the use of the Conine de-levering approach. The asset beta of 0.45 compares with an asset beta of approximately 0.76 for the average company in the market (geared at 30%), reflecting the lower risk nature of the DNSPs' operations. Our analysis has also demonstrated that, compared with DBCT's estimated equity beta of 0.67, the equity beta of 0.90 estimated for the DNSPs would be justified by the much higher operating leverage of the latter even if in all other respects the assets were equivalent. However, we recognise the shortcomings of analyses of operating leverage and note that it is only one of the factors to which we have had regard. The recommended equity beta of 0.90 is slightly below the average beta used by regulators when regulating energy sector assets. We believe that this differential is justified by the systematic risk reduction implicit in the revenue cap and other specific regulatory arrangements outlined above.

Appendix A

Company Descriptions

A.1 Australian energy company descriptions

Australian Gas Light

Australian Gas Light Company Limited sells and distributes gas and electricity through various networks along with the operation of natural gas transmission pipelines. The company also extracts and sells LPG, provides power generation and energy infrastructure, invests in energy and telecommunications businesses and is involved in property rentals.

Alinta

AlintaAlinta Limited is a natural gas distribution and gas retail company in Western Australia. The company delivers natural gas to approximately 450,000 Western Australian households through its network of pipelines. Alinta also has an interest in National Power Services (Western Australia) Pty Ltd a construction and maintenance company.

Australian Pipeline Trust

Australian Pipeline Trust has interests in a portfolio of high-pressure gas transmission pipelines in Australia covering four states and two territories which transport natural gas. Some of the Trust's pipeline systems include the Moomba to Sydney and Roma to Brisbane.

Envestra

Envestra Limited operates natural gas distribution networks in South Australia, Queensland and the Northern Territory. The Company's networks distribute gas to households and businesses in Adelaide, Brisbane (north of the Brisbane River), Alice Springs and various regional centres in South Australia and Queensland.

GasNet Australia Group

GasNet Australia Group, through its subsidiary, owns and maintains gas transmission pipelines in Victoria and New South Wales. The Group also owns and operates a liquefied natural gas storage and vaporization facility, compressor stations and metering, odourant, injection, monitoring, control and communication systems.

A.2 US electricity company descriptions

Centrepoint Energy

CenterPoint Energy, Inc. provides energy services to customers in Arkansas, Illinois, Iowa, Kansas, Louisiana, Minnesota, Mississippi, Missouri, Oklahoma, Texas, and Wisconsin. The Company conducts activities in electricity transmission and distribution, natural gas distribution and sales, interstate pipeline and gathering operations, and power generation in Texas.

Cleco Corporation

Cleco Corporation generates, transmits, distributes, and sells electric energy to customers in Louisiana. The Company, through a subsidiary, also markets energy and energy management services. In addition, the Company is involved in energy asset development opportunities in the southeast region of the United States.

DTE Energy Company

DTE Energy Company, a diversified energy company, develops and manages energy-related businesses and services nationwide. The Company, through the Detroit Edison Company, generates, purchases, transmits, distributes, and sells electric energy in southeast Michigan.

Empire District Electric Company

The Empire District Electric Company generates, purchases, transmits, distributes, and sells electricity. The Company supplies electricity to parts of Missouri, Kansas, Oklahoma, and Arkansas. Empire also provides water service to several towns in Missouri.

El Paso Electric Company

El Paso Electric Company generates, distributes, and transmits electricity in west Texas and southern New Mexico. The Company also serves wholesale customers in Texas, New Mexico, California, and Mexico. El Paso Electric owns or has partial ownership interests in electrical generating facilities.

Entergy Corporation

Entergy Corporation is an energy company that is primarily focused on electric power production, marketing and trading services, and distribution operations. The Company is headquartered in the United States and has energy and investment operations in Latin America, North America, Europe, and Australia.

Elexon Corporation

Exelon Corporation distributes electricity and gas to customers in Illinois and Pennsylvania. The Company also has holdings in infrastructure services, energy services, and telecommunications businesses.

FirstEnergy Corporation

FirstEnergy Corp. is a public utility holding company headquartered in Akron, Ohio. FirstEnergy subsidiaries and affiliates are involved in the generation, transmission and distribution of electricity, exploration and production of oil and natural gas, transmission and marketing of natural gas, and energy management and other energy-related services.

Florida Power and Light Group

FPL Group, Inc. is a public utility holding company. The Company, through its subsidiary, generates, transmits, distributes, and sells electric energy. FPL's customers are located throughout the east and lower west coasts of Florida.

MGE Energy

MGE Energy, Inc. is a public utility holding company. The Company's principal subsidiary generates and distributes electricity to customers in Dane County, Wisconsin. MGE also purchases, transports, and distributes natural gas in several Wisconsin counties.

Progress Energy

Progress Energy, Inc. provides energy and energy-related products and services in the Southeast United States. The Company serves electric and gas customers in the Carolinas and in Florida. Progress Energy also owns and operates a broadband transport and network access business, as well as several energy-related service companies.

Westar Energy

Westar Energy, Inc. is an electric utility company, servicing customers in Kansas. The company provides electric generation, transmission and distribution services.

A.3 US gas company descriptions

Atmos Energy Corporation

Atmos Energy Corporation distributes natural gas to customers in several states. The Company's non-utility operations include Woodward Marketing, Atmos Power Systems, underground storage, and the sale of retail products and services. Atmos also holds an indirect interest in Heritage Propane Partners.

Cascade Natural Gas Corporation

Cascade Natural Gas Corporation distributes natural gas to customers in the states of Washington and Oregon. The Company services residential, commercial, and industrial customers, as well as non-core customers.

Delta Natural Gas Company

Delta Natural Gas Company, Inc. distributes, stores, transports, gathers, and produces natural gas. The Company, through its subsidiaries, buys and sells gas, as well as operates underground storage and production properties.

EnergySouth

EnergySouth, Inc. through its wholly-owned subsidiary, Mobile Gas, distributes natural gas to residential, commercial, and industrial customers in Southeast Alabama. Through other subsidiaries, the Company operates in the pipeline, transportation, storage, and marketing segments of the energy industry.

The Laclede Group

The Laclede Group, Inc. is the parent company for Laclede Gas Company, a public utility involved in the retail distribution of natural gas. The Company serves an area in eastern Missouri, including the city of St. Louis, St. Louis County, and parts of several other counties. Laclede also operates underground natural gas storage fields and transports and stores liquid propane.

Northwest Natural Gas Company

Northwest Natural Gas Company distributes natural gas to customers in western Oregon, as well as portions of Washington. The Company services residential, commercial, and industrial customers. Northwest Natural supplies many of its non-core customers through gas transportation service, delivering gas purchased by these customers directly from suppliers.

Southern Union Company

Southern Union Company is an international energy distribution company serving customers in Texas, Missouri, Pennsylvania, Rhode Island, Florida, and Mexico. The Company distributes natural gas and electricity, operates propane distribution and natural gas pipeline systems, and markets propane gas.

WGL Holdings

WGL Holdings Inc., through its Washington Gas Light Company subsidiary, sells and delivers natural gas and other energy-related products and services. The Company serves residential, commercial, and industrial customers throughout metropolitan Washington, D.C. and the surrounding region.

Appendix B

S&P Ratings: Definitions

B.1 Ratios

Interest coverage

Interest coverage ratios are a direct measure of the proportion of earnings or cash to the forecast interest payments; the ability of a company to meet its debt obligations. A higher ratio implies a greater safety margin. Three measures for interest cover are used in the report, which are:

- $Pretax\ (EBIT)\ interest\ Cover = \frac{EBIT}{Interest}$
- $EBITDA\ interest\ Cover = \frac{EBITDA}{Interest}$
- $FFO\ interest\ Cover = \frac{FFO + Interest}{Interest}$

The first two measures use different measures of accounting earnings to test the safety margin over interest payments, the difference being whether earnings are measured before or after depreciation and amortisation. A concern over both measures is that accounting earnings may misstate the cash generated by the entity – either including non-cash items as revenue (such as the fair-value of gifted assets) or under or overstating cash expenses – and so misstate its ability to service debt.[37] Both measures also focus on earnings before tax, and so do not take account of this cash expenditure item.

The third interest cover measure – funds from operations interest cover – focuses on the cash generated by an entity in respect of a year – and so avoids the potential distortions arising from accounting policies. Funds from operations (or net cash flow from operations) reflect the difference between revenue and operating expenditure, including taxation and interest payments.

Cash Flow

- Cash flow ratios measure the ability of the company to generate cash from its operations to service outstanding debt principle and other obligations. As considered above, cash flow measures tend to overcome distortions accounting measures of profit can generate. The primary cash flow measure used in this report is:

- $FFO\ to\ total\ debt = \frac{FFO}{Total\ debt}$

[37] Cash expenses would be overstated (all else constant) where provision is made for expenditure in respect of a period that will be required in the future. Cash expenses would be understated (all else constant) where the expenditure is made on an item for which a provision was made in a previous period.

Capital structure

Capital structure ratios indicate the degrees to which a company is funded by debt and equity. The conceptually correct measure of gearing for an entity is the ratio of the market value of debt liabilities to the market value of the entity as a whole (that is, the sum of the market values of debt and equity). However, while an estimate of the market value of the equity portion of finance is easy to obtain for listed entities at least, the market value of debt finance cannot be observed. Accordingly, the book value of the debt is taken as a proxy for its market value – which is generally a reasonable close proxy.[38] This provides the following formula:

$$Gearing\ (Market\ Value) = \frac{Total\,Debt(BV)}{Total\,Debt(BV) + Equity(MV)}$$

where BV and MV refer to book and market values, respectively.

For THE DNSPS, the market value of equity cannot be observed. A proxy based upon accounting values is required.[39] The measure of 'book' gearing that is used primarily in this report is debt as a proportion of the book values of debt and equity (often referred to as 'debt to total capital'), that is:

- $Gearing\ (Total\ Capitalisation) = \frac{Total\,Debt(BV)}{Total\,Debt(BV) + Equity(BV)}$

'Book gearing' is a measure of gearing based on the accounting records of a company. It is analogous to the regulatory gearing ratio applied to the regulated asset base (RAB) when calculating the regulatory WACC, except that the regulatory gearing ratio is based on market value. Accounting measures of gearing have an advantage in providing comparative ratios for both listed and unlisted companies. On the other hand, accounting values will differ from market values for numerous reasons. For example, whilst the book value of shareholders' equity will depend on capital contributions and historical retained earnings, the market value of equity will reflect future earnings potential. While book gearing may indicate relative risks of default, the EBITDA/Interest Cover ratio is a much more direct indicator of such risks.

[38] Australian accounting standards now require firms to provide an estimate of the 'marked to market' value of outstanding debt liabilities. For most entities (including utilities), the difference between the market and book values of debt is relatively minor.

[39] It is also more common for firms to set target gearing levels on the basis of accounting values given that gearing levels based upon market values can vary widely over time.