

**CRITIQUE OF THE PROXY BETAS FOR  
DALRYMPLE BAY COAL TERMINAL**

**A Report for Prime Infrastructure**

**Prepared by NERA**

**December 2004  
Sydney**

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## EXECUTIVE SUMMARY

### Objective

On 15 October 2004, the Queensland Competition Authority (QCA) released its *Draft Decision*, on DBCT Management's draft access undertaking for the Dalrymple Bay Coal Terminal (DBCT). The *Draft Decision* concluded that the draft undertaking should not be approved, based in part on the QCA's view that 8.2% would be an appropriate WACC for the company.

NERA has been asked to provide an opinion on the analysis the QCA relied upon to form the view that the appropriate asset beta for DBCT is 0.35. This analysis was undertaken by Allen Consulting Group (ACG) and contains a number of components:

- a first principles analysis that leads ACG to the conclusion that DBCT has low systemic risk;
- the use of historic proxy betas and departure from regulatory precedent;
- the consideration of betas for companies in unrelated industries, which ACG nevertheless considered to be reasonable comparators to DBCT; and
- ACG's evaluation of a feasible range for beta from its analysis.

### The First Principles Analysis

ACG undertook a first principles assessment of DBCT's systemic risk, concluding that the terminal has low systemic risk for the following reasons:

- its diversified customer base reduces the company's risk exposure;
- its exporter focus implies that it has little exposure to fluctuations in domestic activity; and
- its low level of operating leverage, which largely results from its arrangement with DBCTPL.

In our view, ACG's first principles analysis is flawed and presents a misleading view of DBCT's systemic risk.

In concluding that a diversified customer base reduced systemic risk, ACG confuses diversifiable and non-diversifiable risk. The systemic risk of a company is unrelated to the concentration of its customer base, since this is a risk that shareholders can mitigate by holding shares in a variety of companies. A diversified customer base does not imply a low beta.

In surmising that an exporter has little exposure to the domestic economy and therefore a low beta, ACG has made two fundamental errors in the application of CAPM theory:

- ACG has not taken account of the limitations of the domestic CAPM theory, which should be seen as a limited approximation to real-world capital market behaviour – many companies with predominantly off-shore earnings have relatively high betas and common sense should have alerted ACG to the fact that their conclusion is not consistent with market evidence; and
- ACG has confused “correlation with GDP” with “correlation with market returns”, ignoring the fact that many Australian companies have an export focus and therefore, even if one were to accept the domestic CAPM framework, DBCT’s returns will not be uncorrelated to market returns.

ACG’s operating leverage analysis, which is used not only to conclude that DBCT has low systemic risk but also that a property trust would be a suitable comparator, also contains a number of fundamental errors:

- ACG fails to acknowledge that operating leverage is not a good indicator of beta and that the sign of the relationship between operating leverage and beta within a given industry is open to question;
- the concept of operating leverage is the extent to which costs are fixed versus variable and the extent to which revenues are fixed versus variable, ACG has not taken this into account in its analysis. When this is taken into account ACG’s conclusions are reversed – with DBCT’s low operating costs increasing systemic risk; and
- in determining that the contract with DBCTPL reduces DBCT’s systemic risk, ACG has failed to account for the fact that the terminal’s revenues are largely invariant to changes in throughput. This fact means that, in the absence of a contract with DBCTPL, an increase in throughput would actually reduce profits because of the variable costs associated with higher volumes (i.e. a higher volume does not provide higher revenue but does result in higher variable costs). Conversely a reduction in volume would, in the absence of the contract with DBCTPL, actually increase profit (i.e. revenue would be unchanged but variable costs would fall). Thus the contract with DBCTPL actually increases the correlation between throughput and profits and increases the terminal’s systemic risk.

In addition, ACG has focussed on only a limited number of the factors identified by Dr Lally as indicative of beta. A more comprehensive consideration leads us to conclude that there is no rationale for assuming that DBCT has lower systemic risk than the average of other regulated businesses. Of relevance to this finding is:

- the coal transported through DBCT is largely used in the steel manufacturing industry, which is likely to be highly correlated with international and Australian markets;
- DBCT sells to the private sector rather than public sector;
- the presence of discrete and significant real growth options at the terminal suggests that it has higher systemic risk than industries with no significant growth opportunities; and
- the regulatory framework suggests that DBCT shares many risk characteristics with other regulated businesses.

### The Use of Historic Proxy Betas

In our view, by advocating a beta based solely on a comparators analysis ACG has not taken proper account of the limitations of historical beta analysis and the approaches regulators have typically taken to minimise the negative consequences of setting the beta at a level that is too low.

Historic proxy betas need to be used cautiously in regulatory settings:

- the historical covariance of a stock with the market provides an indication of actual returns, which may differ from the expectations that investors had over the period of analysis;
- even if an historical beta is consistent with investors' past expectations, the extent to which this provides information about *future* expectations will depend on whether or not there have been any material changes in the firm or the industry it operates in; and
- information limitations, resulting for example from thin trading or few comparables, limit the extent to which confidence can be placed on any estimates.

Regulators have developed a number of strategies for dealing with the unreliability of historical proxy analysis, which we believe the QCA should consider for DBCT:

- the use of the Bloomberg adjustment, which would result in a higher beta estimate for DBCT;
- adoption of asset betas towards the upper end of a feasible range, recognising that the consequences of setting returns too low are more significant than those associated with setting returns that are slightly higher than warranted; and
- reliance on regulatory precedent, for example, the ACCC has consistently set equity betas equal to the market average of 1 – note that the higher debt leverage of infrastructure companies means that the implied asset beta is lower than that of the

market, whereas the market average asset beta is around 0.84, that for regulated entities is around 0.5; and

- Dr Lally has suggested the use of market asset betas, around 0.84, or the use of estimated asset betas for companies with low systemic risk (such as U.S. utilities).

### ACG's Comparator Analysis

We disagree that the comparators ACG has selected provide a useful indication of DBCT's beta:

- neither MOT nor MIG are within the same industry as DBCT, although some similarities can be drawn between these companies such similarities are grossly outweighed by their substantial differences and they provide no information as to DBCT's likely beta; and
- the rationale for selecting Port of Tauranga and ignoring all other port comparators appears weak and it is extremely problematic to draw conclusions from a single comparator within the same industry.

In our view, and to the extent that historical proxy betas are relied on, ports are the preferred comparator group. This conclusion is consistent with the regulatory principles laid out by US authorities and with the methods adopted by other Australian regulators.

Historical average proxy asset betas for New Zealand ports are between 0.48 and 0.70, suggesting that:

- port companies on average may have lower systemic risk than the market average, but not to the extent assumed by ACG;
- given the variation within the sample group there is no compelling case to set a beta for DBCT lower than the typically assumed equity beta of one; and
- to the extent that NZ ports are comparators, the QCA decision to adopt an asset beta of 0.35 contains a very high risk of being lower than DBCT's true asset beta.

If the QCA is not satisfied that historical market data provides a true estimate of DBCT systemic risk, then it should place significant weight on regulatory precedent. The only regulatory port decision was by the ESC, which set an asset beta of between 0.5 and 0.6, while recent energy infrastructure decisions contain equity betas in the range of 0.71 to 1.0, which imply asset betas of between 0.37 and 0.5. The operating environment for DBCT exhibits higher systemic risk characteristics than similarly regulated energy utilities and, in our opinion, an asset beta at the top of this range is consistent with regulatory practice and the observed market data.

## ACG's Assessment of a Feasible Range for Beta

Even if one were to accept ACG's comparables and reliance on this analysis, its recommendations as to the appropriate range for the beta and the use of the midpoint of this range is not supported by its own analysis.

Standard statistical techniques show a feasible range much wider than that declared by the ACG, we have estimated a 95 per cent confidence interval for DBCT's asset beta to be between 0.01 and 0.51.

ACG has recommended that the QCA adopt an asset or equity beta that is at the midpoint of its estimate of the feasible range. Such a recommendation is at odds with regulatory practice in Australia and overseas, which suggest that in order to avoid the potentially very high costs associated with under investment, a WACC should be set towards the upper end of a feasible range. ACG's recommendation is also at odds with previous advice it has provided to the ACCC.

One response to the large standard errors associated with observed raw equity betas is to adopt the Bloomberg adjustment. This is the approach adopted by the QCA in its decisions for Queensland Rail (2000),<sup>1</sup> gas distributors (2001)<sup>2</sup> and electricity distributors (2001)<sup>3</sup>. The effect of using the adjusted equity betas is to inflate those observed raw equity betas that are lower than one.

The Bloomberg adjustment is as follows:

$$\text{Adjusted equity beta} = 0.33 + \text{raw equity beta} * 0.67$$

Given that the ACG's feasible range of raw equity betas is 0.56 to 0.78, adopting the Bloomberg approach, the adjusted equity beta range for DBCT would be 0.71 to 0.85. This corresponds to an adjusted asset betas of between 0.37 and 0.43. Therefore, even if one accepts the ACG's methodology of selecting comparators and determining the feasible range, an allowance for the measurement errors increases the feasible range to 0.37 to 0.43, rather than ACG's range of 0.30 to 0.40.

The QCA also previously adopted an asset beta at the upper end of its feasible range.<sup>4</sup> Other regulators have also addressed the imbalance of risks by setting the beta towards the top of an estimated range.

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<sup>1</sup> QCA, Final Decision on QR's 1999 Draft Undertaking, Volume 2, page 394.

<sup>2</sup> QCA, Proposed Access Arrangements for Gas Distribution Networks: Allgas Energy Limited and Envestra, October 2001, page 227.

<sup>3</sup> QCA, Regulation of Electricity Distribution, May 2001, page 190.

<sup>4</sup> QCA, Final Decision on QR's 1999 Draft Undertaking, Volume 2, page 395.

## Conclusion

We believe that the QCA would be in error if it relied on the ACG analysis to materially depart from regulatory precedent. That is, we believe that the QCA should set an equity beta of 1.0. This conclusion is based on the following:

- the ACG first principles analysis focused on only a limited number of factors identified by Dr Lally as indicative of beta, being the nature of DBCT's customer base and its low level of operating leverage – neither provide a sound basis for concluding DBCT has low systemic risk;
- the flaws in ACG's first principles analysis lead us to reject the conclusion that DBCT has lower systemic risk than similarly regulated businesses and we find that the opposite is more likely true;
- the ACG analysis has no statistical validity and their own data does not support their assessment of an appropriate range for asset beta;
- we disagree that the comparators ACG has selected provide a useful indication of DBCT's asset beta and to the extent that historical proxy betas are relied on, ports are the preferred comparator group – an assessment of the asset betas of port companies suggests a range for the historical proxy beta for DBCT of between 0.48 and 0.70;
- regulatory precedent suggests an alternative range of for asset beta of between 0.37 and 0.5 (with the vast majority of regulatory decisions being in the upper end of this range); and
- ACG's proposed asset beta of 0.35 falls below the bottom of both ranges and is not supported by its own analysis.

Based on the above, NERA believes the Authority should set an equity beta of 1.0 (which is materially lower than the expected equity return on a widely diversified market portfolio given the leverage assumptions applied to DBCT).

## 1 INTRODUCTION

On 15 October 2004, the Queensland Competition Authority (QCA) released its *Draft Decision* on DBCT Management's draft access undertaking for the Dalrymple Bay Coal Terminal (DBCT). At this stage, the QCA is of the view that the access undertaking should not be approved. A principal input into this view is the opinion that the appropriate weighted average cost of capital (WACC) for determining the regulated revenue of DBCT is 8.2%. In support of its draft position, the QCA released four papers that had been prepared on its behalf by Allen Consulting Group (ACG).

NERA Economic Consulting (NERA) has been engaged by Prime Infrastructure to undertake a critique of ACG's paper on the assessment of the appropriate beta. Specifically, NERA has been asked to provide a report that:

- critiques the methodology ACG used to conclude that DBCT has low systemic risk;
- provides an overview of the regulatory use of market data;
- conducts a statistical analysis of ACG's feasible range in drawing beta's from its comparator group;
- evaluates the appropriateness of ACG's set of comparator companies;
- identifies a more suitable set of comparators, if appropriate; and
- estimates an appropriate beta using the preferred set of comparators.

Section 2 of this report outlines NERA's critique of the first principles analysis ACG used to determine DBCT has low systemic risk. Section 3 outlines the use of market data by regulatory authorities in Australia and overseas. Section 4 provides some statistical analysis of the comparator group of companies chosen by ACG. Section 5 evaluates the credibility of ACG's comparator companies to provide an objective estimate of the systemic risks of DBCT. Section 6 estimates DBCT's asset beta using an appropriate group of comparable companies. Section 7 provides concluding comments.

## 2 FACTORS INFLUENCING DBCT'S BETA

### 2.1 Overview

#### 2.1.1 A primer on the CAPM

The CAPM assumes that investors dislike variability in the expected return on their portfolio of investments (the CAPM treats variability in returns as equivalent to 'risk'). The variability in expected returns on any single investment can be broken into diversifiable and non-diversifiable variability. Diversifiable variability relates to variations in returns that do not tend to be correlated with the returns on other assets. An individual investor can eliminate this variability in these returns by holding a widely diversified portfolio. This is because if returns are uncorrelated within a portfolio the investor can reasonably expect that the negative variation in one investment will tend to be offset by a positive variation in another investment.<sup>5</sup> As a consequence, the CAPM predicts that investors will not require any compensation above the risk free rate for diversifiable variability/risk.

By contrast, if an asset's return is correlated with the return on the average of other assets within a given market an investor cannot eliminate this variability by holding a diversified portfolio. This is because, unlike diversifiable variations in returns, systemic variations in returns will not tend to 'cancel out'.

Perhaps the best way to think of diversifiable risk is to imagine a toss of a coin. A gambler could bet \$100 on heads for a single toss, expecting to receive either \$0 or \$200 (with an actuarially expected return (ie, the average of all possible outcomes) of 0% - ie, an *ex ante* expectation of getting back the original \$100). Alternatively, the gambler could bet \$1 on heads for 100 tosses in a row. In this case the investment is the same (\$100) and the expected return is still 0% but the variation (risk) in likely returns is much lower. In the case of a single throw there is 50% probability of receiving \$0 back and 50% probability of receiving \$200. In the case of 100 throws it is very unlikely that the final return will fall outside a range of \$90 to \$110.

By holding a 'large portfolio' of bets the gambler has reduced the variation (risk) in the portfolio - although the risk associated with each throw is the same. However, this is only possible because the return on each throw is assumed to be uncorrelated with all other throws. If the coin were not completely uniform such that it was more likely to land one-way than the other (but the gambler didn't know which way before placing the 100 bets) then the gambler would be unable to fully diversify risk no matter how many bets were made.

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<sup>5</sup> As the size of the portfolio held by the investor increases the variance of the portfolio will, in the limit, fall to zero if the returns on all individual assets have zero correlation with each other.

The CAPM states that investors need only be compensated for the systemic risks of an investment as you need not compensate an investor for variability/risk that can be avoided by diversification.

However, it should always be remembered that the CAPM is only one theoretical model and there is considerable theoretical<sup>6</sup> and conceptual uncertainty as to how well it explains real world behaviour. Ross, Westerfield and Jaffe (1999) note in their graduate text that :

*“..one must never forget that, as with any other model, the CAPM is not revealed truth but, rather, a construct to be empirically tested. The first empirical tests of the CAPM occurred over 20 years ago and were quite supportive. ...While a large body of work developed over the following decades, often with varying results, the CAPM was not seriously called into question until recently. Two papers by Fama and French (...) present evidence inconsistent with the model. Their work has received a great deal of attention, both in academic circles and in the popular press, with newspaper articles displaying headlines such as “Beta Is Dead”. These papers make two related points. First they conclude that the relationship between average return and beta is weak over the period from 1941 to 1990 and virtually non-existent from 1963 to 1990.”<sup>7</sup>*

If estimates of the required WACC are to be derived within a CAPM framework then, when adopting a final cost of capital, it is appropriate to take account of uncertainty surrounding both: the explanatory power of the CAPM; and the value of individual CAPM parameters.

### 2.1.2 Overview of our critique

In our view, there are significant failings in the approach the ACG has used to conclude that DBCT has low systemic risk. In particular, the three major reasons put forward by ACG as to why DBCT is low risk can be shown to be factually and theoretically in error:

- ACG incorrectly confuses diversifiable and non-diversifiable risk – arguing DBCT's asset beta is low because it has low diversifiable (rather than non-diversifiable) risk;
- ACG commits serious errors of theory and fact in its application of a 'domestic CAPM' to argue that DBCT has low systemic risk; and

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<sup>6</sup> That is not to say that we can suggest a better conceptual framework to work within when estimating the required WACC – no such agreed framework exists in the literature on finance theory. However, it should be recognised that the framework that we do have is not perfect for understanding investor behaviour. For example, the CAPM does not recognize that the return required from an asset will depend in part on the covariance between that asset's return and future investment opportunities in the economy. The CAPM is a one-period model in which the only risk is that of covariance between the asset's return and the contemporaneous return on other assets—there are no future investment opportunities.

<sup>7</sup> Ross, Westerfield and Jaffe (1999), Fifth edition, *Corporate Finance*, McGraw-Hill, pp 269-270.

- ACG fundamentally misunderstands the concept of operating leverage (ACG argues that DBCT's effective pass through of DBCTPL's operating costs reduces systemic risk when a correct understanding of the CAPM suggests the opposite).

Our examination of the ten factors identified by Dr Lally as influencing systemic risk does not find any rationale for assuming that DBCT has lower risk than the average of other regulated businesses. In fact, we believe that the treatment of DBCT's operating costs and expansion costs are likely to mean that it has higher systemic risks than other regulated businesses. Of relevance to these findings are:

- the coal exporting industry is an input into the production of energy and steel manufacturing (the majority of DBCT's throughput goes to steel manufacturing) and its health is likely to be highly correlated with international and Australian markets;
- as DBCT sells to the private sector it would be expected to have higher systemic risk than companies selling exclusively to the Government sector;
- the presence of discrete and significant real growth options at DBCT suggests that it has higher systemic risk than industries with no significant growth options; and
- the regulatory framework suggests that DBCT has many similar risk characteristics as other regulated business.

It should be stressed that a first principles assessment is by its very nature a subjective exercise, which can result in a wide disparity of views about the systemic risks of a business or industry. Consequently, regulators have tended to adopt a conservative (ie, not punitive) approach, mindful of the risks of under compensating investors, which can potentially jeopardise future investment decisions.

## 2.2 The Principal Errors in ACG's Analysis

In our view there are three primary weaknesses in ACG's analysis:

- it fails to distinguish between diversifiable and non-diversifiable risks;
- it relies on the use of the domestic CAPM theory without taking proper account of the limitations of this theory; and
- it draws insupportable conclusions from its assessment of operating cost ratios.

### 2.2.1 Failure to distinguish between diversifiable and non-diversifiable risks

The ACG observes on a number of occasions that the main reason it believes that DBCT has a low asset beta is that it has a diversified final customer base. Some relevant quotes are provided below:

***“The most important determining factor of the asset beta of DBCT is the internationally diversified ultimate customer base for its coal export services. On average, there is virtually no correlation between underlying demand for DBCT services and the state of the domestic Australian economy. Over time this diversification effect has been increasing, with a consequent fall in the ultimate customer HHI. Hence, the revenue beta of DBCT is expected to be low.”*** (Page 32, emphasis added.)

***“The nature of the customer is important since different customer groups may be expected to have varying sensitivity to domestic GDP shocks. If the ultimate customers are dispersed in a number of foreign countries their demand will be less correlated with Australia’s GDP growth since at any point in time, countries will be at different stages of their economic cycles.”*** (Page 24)

***However, from the viewpoint of systematic risk, this earnings smoothing effect is overshadowed by the final customer diversification effect discussed above in section 4.2. The important point is that due to this diversification, the revenue outcome for DBCT in any year is unlikely to be correlated with economic conditions or the state of the stock market in Australia. Thus, independently of the nature of the pricing structure, the revenue outcome will not vary systematically with the state of the Australian economy.*** (Page 26)

All of these statements show a fundamental misunderstanding of the CAPM by ACG. The diversity of a customer base makes no difference to the systemic risks faced by a business. This is the starting point for any undergraduate analysis of the CAPM as noted in Brealey and Myers standard text:

***“If investors can diversify on their own account, they will not pay any extra for firms that diversify. And if they have a sufficiently wide choice of securities, they will not pay any less because they are unable to invest separately in each factory.”***<sup>8</sup>

ACG argues that having a diversified customer base means that when one customer has high demand others may not have high demand and consequently the total variation in demand over time is smoothed. This is correct but it says nothing about systemic risk. If rather than there being a single port exporting to many countries there were many ports exporting to a single country each there would be no change in systemic risk. The basic point of the CAPM is that, from an investor’s perspective, there is no advantage in a single firm diversifying its customer base or outputs because the diversity benefits can be achieved by holding stocks in different businesses. For example, diversification can be achieved by holding equity in many ports just as well as it can be achieved by a single port diversifying its customer base.

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<sup>8</sup> Brealey and Myers (1996), *Principles of Corporate Finance: 5<sup>th</sup> edition*, McGraw-Hill Companies, page 165.

The fact that the ACG report nonetheless makes the statement that:

***The most important determining factor of the asset beta of DBCT is the internationally diversified ultimate customer base for its coal export services.***  
(Emphasis added.)

suggests a fundamental misunderstanding of the CAPM.

### 2.2.2 The Use of a Domestic CAPM

The ACG's emphasis on the exposure of DBCT to events in Australia's domestic economy fundamentally misinterprets and misapplies CAPM theory. The ACG's analysis misunderstands the following aspects of CAPM theory:

- the domestic CAPM is a convenient simplification of complex international financial markets; and
- even if one were to accept that the appropriate CAPM is domestic, the beta is defined as the covariance of a stock's returns and the *return on the market portfolio* and the latter is likely to be imperfectly correlated with domestic GDP.

It is critical to understand that the domestic CAPM is a convenient simplification of a more complex international model. No credible analysts seriously believe that the true CAPM is 'domestic'; Australian companies can seek financing from international markets and domestic investors have the option of investing in offshore companies. The proposition that the Australian equity market is isolated is not supported by the fact that foreign holdings in Australian equities were \$415bn and domestic resident holdings of foreign equities were \$302bn as at March 2004.<sup>9</sup> In other words, investors' equity portfolios are international and ACG's assumption of a domestic capital market is clearly contradicted by the facts.

When analysts discuss a 'domestic CAPM' they are talking about using historical domestic data to estimate CAPM parameters (ie, MRP and equity beta) as a proxy for the true international CAPM WACC.<sup>10</sup> Analysts working within a domestic CAPM framework are not assuming that the Australian economy or market is completely divorced from the rest of the world. This latter interpretation of the domestic CAPM is clearly inconsistent with the facts and will lead to ridiculous outcomes if adopted. Nonetheless, ACG adopts the factually erroneous interpretation of what a 'domestic CAPM' means and concludes that because DBCT is an 'exporter' it will have low systemic risk.

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<sup>9</sup> Australian Bureau of Statistics, Balance of Payments and International Investment Position, Charts3a and 3b.

<sup>10</sup> It can be shown that using domestic data to estimate the WACC will result in an *ex ante* unbiased estimate of the true international CAPM WACC. See, for example, NERA, Value of Gamma for Regulatory Purposes, a report for ActewAGL, August 2004.

Domestic data is used as an approximation to the true CAPM, which does involve international diversification. A joint regulatory cost of capital study in the UK concluded that:<sup>11</sup>

***“Both on a priori grounds, and on the basis of evidence, our strong view is that estimates of both the equity return and the risk free rate should be formed on the basis of international evidence, not just UK experience.”***

It is clear that the QCA, in common with all other Australian regulators, does not believe that the domestic market is segregated from the world market. This is demonstrated by the fact that all regulators set a value of gamma (the cost of corporate tax) equal to 0.5. If the QCA seriously believed that the ACG's analysis was valid then it would set the value of gamma equal to one (ie, assuming that all domestic stock is owned by domestic residents, any company tax paid would create imputation credits that are valued in a similar manner to dividends).

In many cases, the use of domestic data has little consequence, however, it is clearly important to be cognisant of its shortcomings in the current context. Using the unrealistic but simplifying assumptions of the 'domestic CAPM' to justify an assumed *real* lower systemic risk for exporters seriously oversteps the purpose of those simplifications.

A simple illustration of the fact that exporters do not *a priori* have a lower asset beta is provided by ACG itself. ACG provides beta information for a sample of coal companies over the period 2001 to 2003. In this sample, all the coal companies sell exclusively to the export market except Centennial Coal, which sells 77% of its coal to domestic power generators. However, Centennial Coal's asset beta is below average for that period.

An even more compelling example of exporters having high systemic risk is Australia's two largest businesses on the Australian stock exchange, News Corporation and BHP Billiton, which have equity betas of 2.0 and 1.0 respectively. Both News Corporation and BHP Billiton earn the majority of their revenues and profits in offshore ventures (ie, they are not so much exporters as foreign companies listed on the Australian stock exchange). If the ACG's reasoning in relation to DBCT were also applied to News Corporation then ACG would conclude that News Corporation has low systemic risk.

The implication of this is not that DBCT has high risk but rather that ACG simply should not have used DBCT's exposure to international markets as an indication of low systemic risk.

Finally, it should be noted that beta is defined as the expected covariance between a stock's returns and the *returns on the market portfolio* as a proportion of the variance in the *market*

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<sup>11</sup> Wright S., Mason R. and Miles D., *A Study into Certain Aspects of the Cost of Capital for Regulated Entities in the UK*, Commissioned by the U.K. economic regulators and the Office of Fair Trading, February 2003, page 4.

**portfolio's returns.** Companies that rely on internationally sourced income dominate the Australian market as is illustrated in the following table:

**Australian Companies with Significant  
Foreign Source Income**

Rank <sup>a</sup>	Company	Percentage of All Ords <sup>b</sup>	Equity beta <sup>b</sup>
1	News Corporation	2.73%	2.00
2	BHP Billiton	5.88%	1.00
3	National Australia Bank	4.82%	1.44
5	ANZ Bank	4.07%	1.08
9	Westfield Group	2.91%	0.73
10	Rio Tinto	2.09%	1.19
13	Woodside	1.40%	0.72
17	Singapore Telecom	0.66%	0.69
11	Placer Dome	N/A	0.86
19	Telecom NZ	0.58%	0.50
20	QBE Insurance	1.04%	0.62

<sup>a</sup> Rank of the Top 150 Companies as published by the Weekend Australian October 30-31.

<sup>b</sup> Source www.comsec.com.au, Thursday 11 November 2004.

This demonstrates that even if the Australian economy were completely insulated from the rest of the world (as ACG implicitly assumes), the Australian equity market is not.

### Main Conclusions

In summary, the ACG has incorrectly interpreted the 'domestic CAPM' as implying that exporters should *a priori* be assumed to have low systemic risk. This is an incorrect characterisation of the standard meaning attached to the 'domestic CAPM' framework. Moreover, if applied more widely than to DBCT it gives clearly implausible results. Certainly, the analysis provided by ACG is not sufficient to sustain a position that DBCT's status as an exporter with a diversified customer base materially lowers its systemic risk relative to similarly regulated businesses.

### 2.2.3 The Ratio of Operating Costs

The second most important factor the ACG appears to rely on to support its 'first principles' conclusion that DBCT has low systemic risk relates to operating leverage. ACG summarises its position as:

*“The Operating Cost Ratio is also expected to have a major impact on asset beta. If the level of cash operating costs is low relative to revenue, a percentage change in output will have a low percentage impact on EBIT. Since DBCTPL absorbs most of the operating costs of DBCT, the level of cash operating costs faced by DBCT is*

***relatively low and for a given change in output (or revenue) the percentage change in EBIT will be relatively low compared with other Australian utilities (and even many Australian property trusts).***” (Page 32)

According to ACG, DBCT has low operating leverage because “***DBCTPL absorbs most of the operating costs of DBCT***” and this tends to lower DBCT’s risks “***compared with other Australian utilities (and even many Australian property trusts).***” This statement shows that ACG either does not understand what operating leverage is intended to capture in a CAPM model or how it should be measured (or potentially both). Properly analysed, DBCT’s arrangement for an effective pass through of ***DBCTPL’s*** costs will almost certainly increase DBCT’s systemic risks relative to other similarly regulated Australian utilities – it certainly will not reduce DBCT’s systemic risks.

In order to apply the concept of operating leverage correctly an analyst must distinguish between fixed and variable operating costs and must determine the extent to which the existence of fixed operating costs must be recovered through variable (per unit) prices. The ACG’s analysis addresses neither of these factors. When this is done one must reach diametrically opposite conclusions to those of ACG. We explain this in detail below, however, in summary:

- Under a revenue cap, responsibility for operating costs unambiguously reduces systemic risk so long as operating costs tend to increase with the level of economic activity (ie, move pro cyclically). This is because with revenues constant pro-cyclical movements in costs tend to cause profits to move counter cyclically (ie, reduce systemic risk).
- The QCA proposes that DBCT be regulated under a revenue cap (which largely mirrors the effect of DBCT’s take-or-pay contracts). In this context, passing responsibility for operating costs to DBCTPL unambiguously increases DBCT’s systemic risk – unless DBCTPL’s costs move counter cyclically.

Operating costs tend to move pro cyclically for a number of reasons.<sup>12</sup> First, operating costs tend to increase/decrease with output which itself tends to move pro cyclically. Second, non-output related costs (eg, unskilled labour costs, skilled labour costs, materials costs etc) are likely to rise/fall when the Australian economy is performing strongly/poorly.

If revenues are fixed, then pro cyclical movements in costs cause profits to move counter cyclically (eg, when the economy booms and costs go up then profits tend to fall if revenues are fixed). In other words, the pro cyclical costs tend to make profits counter cyclical and tend to reduce systemic risk. A firm with fixed revenues that has zero pass through of

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<sup>12</sup> See for example Brealey, Cooper and Habib, Oxford Review of Economic Policy, Vol 13 No. 4 for empirical estimates of the systematic risk associated with operating costs.

variations in operating costs during the regulatory period has less systemic risk than a firm with 100% pass through of variations in costs.

The ACG's conclusion that the arrangement with DBCTPL reduces DBCT's systemic risk relative to other regulated businesses is based on the incorrect assumption that regulated businesses recover all fixed costs through variable charges. Under this assumption the more fixed costs that a regulated business is responsible for the greater will be the gap between marginal prices and marginal costs – which will tend to increase the variability of profits to output.<sup>13</sup> However, this assumption is factually incorrect for DBCT and almost every other regulated Australian business<sup>14</sup> - which unambiguously reverses ACG's conclusion. This is not to say that that DBCT's arrangement with DBCTPL necessarily causes DBCTPL to have much higher risk than other regulated businesses. However, we can say that ACG's conclusion that it causes DBCT to have much lower risk than other regulated businesses is demonstrably wrong.

Moreover, even if ACG's assumption were true it would not be sufficient for ACG to reach its conclusion. This is because, as already noted, operating costs tend to move pro cyclically due to changes in wage and other input prices. Responsibility for such costs tends to reduce systemic risk irrespective of whether it increases the gap between marginal prices and marginal cost. It is impossible to tell which affect will dominate the other without engaging in detailed analysis.

The context specific relationship between operating costs and systemic risk is recognised in the finance literature where it is noted that any relationship is only valid between two similar businesses and even then it is open to question what the sign of that relationship is.<sup>15</sup> Dr Lally similarly notes that any relationship is only valid between two similar businesses and even then it is open to question what the sign of that relationship is. Dr Lally makes clear that comparisons across industries are fraught with difficulty:<sup>16</sup>

***“...conclusions are at best valid for the majority of firms included in the data set, i.e. some industries may exhibit the opposite pattern but are outweighed in the data.***

<sup>13</sup> The theoretical concept of 'operating leverage' involves an attempt to measure the gap between the marginal price charged for an additional unit of output above the expected level and the marginal cost of producing that output. The larger this gap the larger is systemic volume risk (assuming output is positively correlated with the market). That is, the theoretical construct suggests that high *fixed* operating costs (eg, overheads) and low *marginal* operating costs will tend, other things equal, to imply higher systemic risk. ACG's discussion of operating leverage is singularly unconvincing in that not once does it attempt to identify whether the operating costs it is discussing are fixed or variable – ie, it never once attempts to answer the question that an analysis of operating leverage is supposed to answer.

<sup>14</sup> Many Australian businesses are regulated under revenue caps (eg, all TNSPs and Queensland DNSPs). For almost every other regulated Australian business, revenues increase less than proportionally with output due to the use of fixed charges to recover fixed costs.

<sup>15</sup> See Booth L. (1991, "The Influence of Production Technology on Risk and the Cost of Capital", *Journal of Financial and Quantitative Analysis*, vol. 26, pp 109-27), which found that higher operating leverages resulted in a lower beta.

<sup>16</sup> Dr Lally, *The Cost of Capital for Regulated Entities*, 14 October 2004, page 96.

***Such lack of generality in these results is consistent with the theoretical literature just surveyed.”***

This should be contrasted against ACG's decision to use operating leverage as its main rationale for ruling out the use of other ports as comparables and ruling in the use of MOT as a comparable (not withstanding the fact that MOT exists in a completely different industry to DBCT).

It should also be noted that the ACG's definition of operating cost is an extremely poor proxy for the textbook concept of 'operating leverage' as it makes no distinction between fixed and variable operating costs or accounts for the firm's pricing structure – which is the heart of an analysis of operating leverage.<sup>17</sup> It is therefore of little surprise that the ACG's proxy for operating leverage has statistically insignificant explanatory power within its own data set.<sup>18</sup>

Other regulators, when faced with the difficulties (both empirical and theoretical) in accounting for operating leverage, have universally decided not to attempt any analysis of this issue, let alone rely almost exclusively on it to select comparator companies from completely different industries and exclude those from the same industry. If the QCA relies on the ACG report, which relies heavily on operating cost ratios, it will be setting an important, and dangerous, precedent.

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<sup>17</sup> If a company sets marginal prices equal to marginal cost and has entirely fixed costs, fluctuations in output will have a much more significant impact on its profits (EBIT) than if that company's costs were entirely variable. As a very simple illustration, imagine a company selling 20 'whatsits' for \$5 each (earning \$100 in revenue) with total costs of \$80 (and therefore profit of \$20). If demand for 'whatsits' increased to 30 (and revenue increased to \$150):

- if all costs were fixed in nature, profit would increase by \$70 – a percentage increase of 350%; whereas
- if all operating costs were variable in proportion to output, costs would increase by \$40 and profit would increase by only \$30 – a percentage increase of only 150%.

This illustrates the fact that even though these two companies have identical operating cost ratios as defined by ACG the company with greater variable operating costs has significantly less fluctuations in profits compared with a company with higher fixed costs. The ACG's analysis makes no distinction between the fixed and variable operating costs of the surveyed firms.

<sup>18</sup> The ACG's operating cost ratio is statistically insignificant (even at a 85% confidence level) in explaining the variation in ACG's ports' asset betas. In fact, apart from property trusts, you cannot reject the possibility that there is zero relationship between operating cost ratio and 2001-2003 asset betas of each industry group considered by the ACG with more than a 95% confidence interval. It is also worth noting that Figure 4.1 on page 31 of the ACG report is misleading. It appears to show a strong relationship between operating leverage (as defined by the ACG) and asset betas. This figure is misleading on two counts. First, it inappropriately groups together two industries that should not be shown on the same graph. Second, what may appear to the eye to be a significant relationship (between the ACG's proxy for operating leverage and asset beta) is affected by the chosen scale of the graph. When proper statistical analysis is undertaken no such statistical relationship can be discerned with any reasonable level of confidence.

### Main Conclusions

ACG's analysis departs from accepted theory in relation to operating leverage. ACG reach a demonstrably incorrect conclusion on the effect of the arrangement with DBCTPL on DBCT's systemic risk relative to other regulated businesses. It should not be relied upon to determine where DBCT's beta lies in relation to a group of comparable companies, let alone as the basis for selecting 'comparators' from completely unrelated industries and rejecting those from the same industry.

## 2.3 An Analysis of other 'First Principle' Criteria for Assessing Systemic Risk

The primary basis of the ACG's conclusions relates to the (incorrect) analysis of DBCT's status as an exporter and its operating costs. However, there is no reason to focus exclusively on those two factors in a first principles assessment of DBCT's systemic risk and no basis for concluding they are the most definitive factors for identifying systemic risk. In the following sections we evaluate the other factors identified by Dr Lally and ACG as indicative of a company's beta.<sup>19</sup> Our conclusion is that a first principles analysis does not suggest DBCT has lower systemic risk than the average of other regulated businesses.

### 2.3.1 Industry

The ACG's analysis concludes that the services provided by DBCT relate to coal exports. We agree with this conclusion and note coal is an input into global energy and steel manufacturing (the majority of DBCT's throughput is inputted into the steel industry) both of which are likely to be highly correlated with the international and Australian markets. Dr Lally states that:<sup>20</sup>

***“Firms producing products with low income elasticity of demand (necessities) should have lower sensitivity to real GNP shocks than firms producing products with high income elasticity of demand (luxuries)”***

Energy generation is an input into all goods produced in a modern economy – luxuries and necessities and steel is an input into many goods. Other things being equal, you would expect that providers of services to the coal industry would tend to be exposed to average levels of systemic risk. The industry DBCT operates in is not obviously lower risk than that of electricity or gas transport.

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<sup>19</sup> Dr Lally, *The Cost of Capital for Regulated Entities*, 14 October 2004, pages 92 – 97.

<sup>20</sup> Dr Lally, *The Cost of Capital for Regulated Entities*, 14 October 2004, page 92.

### 2.3.2 Nature of the Customer

The ACG's analysis focuses exclusively on the composition of the residency mix of customers (ie, are they foreign or domestic). This assumption has already been discussed in detail in section 2.2.2.

Another aspect of the nature of the final customers is the extent to which a firm sells to either the private or public sectors. Firms that sell exclusively to the public sector should have less systemic risk than companies that supply a similar product to the private sector other things equal. This is because demand for government output tends to be less cyclical than private sector output.<sup>21</sup>

To our knowledge, DBCT and the coal companies reliant on DBCT sell exclusively to the private sector. This is a distinguishing feature between DBCT and Macquarie Office Trust that ACG has failed to acknowledge.

### 2.3.3 Pricing Structure

Our understanding is that DBCT's existing pricing structure allows both coal companies and DBCT to share the risks associated with demand fluctuations. Should a revenue cap be introduced then DBCT's revenues would be wholly recovered within each regulatory period by an effective fixed charge. Other things being equal, this would suggest a lower beta than a similar company whose pricing structure was comprised exclusively of a variable component. However, many other industries, such as telecommunications and energy utilities, also employ a combination of fixed and variable charges, to minimise revenue variation associated with any changes in demand. Transmission network service providers are also regulated under a revenue cap as were electricity distributors in NSW until recently. Moreover, those businesses tend to have higher covariance of costs with output than DBCT (due to the arrangement with DBCTPL as already discussed). As a consequence, it is unclear whether DBCT's pricing structure exposes it to more or less systemic risk than other regulated businesses.

### 2.3.4 Duration of Contracts

The ACG concludes that:<sup>22</sup>

***“the five year Access Arrangement situation, together with longer (5 to 19 years) volume contracting with users creates a situation that would suggest a lower asset beta.”***

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<sup>21</sup> Dr Lally, *The Cost of Capital for Regulated Entities*, 14 October 2004, page 93.

<sup>22</sup> ACG, Dalrymple Bay Coal Terminal: Analysis of Proxy Betas, September 2004, page 27 and 3.

***“In the past, DBCT has not expanded the facility unless much of the incremental output has been underwritten by contracts from users. This has reduced DBCT's risks, including stranding risk.”***

However, our understanding is that while volume contracts may last up to 19 years, DBCT has guaranteed volumes for only five years and coal companies can at any time notify their intention to lower volumes which comes into effect in five years. Furthermore, as the current proposal is to regulate DBCT under a revenue cap, prices are adjusted annually to ensure that target revenues are achieved. This is similar to the annual pricing adjustments made by New Zealand ports (who operate under the threat of regulation) and other businesses regulated via revenue caps.

The ACG suggests that long volume contracts mitigate stranding risk for DBCT, but this is true only to a limited extent:

- port assets have a long life ( up to 70 years), well beyond the period covered by these contracts;
- existing volume commitments tail off due to the staggered timing of contracts. This means that within a relatively short period of time committed utilisation may fall dramatically;
- DBCT still faces counterparty risk irrespective of the duration of contracts they have entered into; and
- coal demand is currently high, but industry developments, such as the introduction of the Kyoto treaty or a downturn in China's demand, over the next 10 or even 20 years could significantly alter the utilisation of the coal terminal.

Stranding risk has both systemic and diversifiable aspects, which must both be compensated for in regulated revenues (in the same way that the debt margin is comprised of both diversifiable default risk and non-diversifiable default risk). We understand that the QCA has provided zero compensation for the possibility of future stranding in its draft decision. In effect this means that the QCA has taken the position that debt and equity investors in DBCT believe, on average, that there is zero probability that the value of their investment will ever fall below the value of the regulatory asset base. This appears to be inconsistent with the ACG report which only talks about a 'reduced' stranding risks not 'eliminated' stranding risks.

This is an aggressive assumption on the part of the QCA given the up to 70 year life of DBCT's assets and the potential for technological and policy changes over this time to affect the viability of coal exports. It is all the more striking given that the QCA's draft decision recognises that DBCT's cost of debt is above the risk free rate, suggesting that lenders place a materially positive probability on DBCT defaulting.

Denying any compensation for stranding risk may be reasonable if there is as much potential 'upside' for DBCT as there is 'downside'. However, under regulation (and especially revenue cap regulation) the potential for 'upside' is truncated while the potential for 'downside' (ie, coal exporters being unwilling to pay an amount that finances DBCT's regulatory asset base) is not. The failure of the QCA to provide any explicit compensation (either systemic or diversifiable) for stranding risk is an important reason for the QCA to choose its value from the top of the feasible range for DBCT's equity beta.

### 2.3.5 Regulatory Framework

The ACG states, and we agree, that the nature of a regulatory framework will impact the systemic risk of a business. It is important to note that while DBCT is to be regulated under a revenue cap, a number of other businesses are also regulated under similar arrangements. This includes electricity transmission network service providers (TNSPs) in Queensland, NSW, Victoria, South Australia and Tasmania. The QCA has also imposed revenue caps on electricity distribution network service providers (DNSPs) and, in the past, Queensland Rail.<sup>23</sup> Table 1 below illustrates the level of compensation for systemic risk provided in recent regulated decisions.

**Table 1**  
**Recent Regulatory Decisions**

Decision	Equity Beta	Asset beta*
TransGrid NSW (2000)	1.02	0.50
Powerlink Qld (2001)	1.00	0.50
ElectraNet SA (2002)	1.00	0.50
SPI PowerNet Vic (2002)	1.00	0.50
Transend Tas (2003)	1.00	0.50
QCA Gas distributors	1.12 <sup>24</sup>	0.55
QCA DNSPs (2001)	0.90 <sup>18</sup>	0.45
QCA Rail** (1999)	0.76	0.42

\* Assuming a debt beta of 0.1. \*\* The assumed gearing level is 55%

<sup>23</sup> Note that Queensland Rail, does not have a pure revenue cap, with actual volumes allowed to vary within a band before prices need to be reset.

<sup>24</sup> QCA decisions allowed an equity beta of 0.97 and 0.71 for gas and electricity distributors respectively. We have previously criticised these decisions as they set inappropriately high debt betas. The debt betas in these determinations are unsound as they implicitly assume that the entire observed debt margin is due to the systemic risk associated with default risk (ie, the covariance of default risk with the market) and that none of the debt margin was due to default risk. This outcome is impossible and in the QCA's draft decision has not been continued. The equity betas in table 1 are derived from the decision asset betas and assuming a debt beta of 0.10.

### 2.3.6 Degree of Monopoly Power

The ACG has pointed out that the influence of monopoly power on asset beta is open to question. Given that DBCT are declared and subject to regulation by QCA the degree of monopoly power is unlikely to significantly influence DBCT's asset beta.

### 2.3.7 Real Options

The ACG's analysis of real growth options is also tainted by its incorrect interpretation of the domestic CAPM framework, which guides them to conclude that growth options are unlikely to have *much systemic variation with respect to the domestic economy*.

The real growth option in the case of DBCT is the decision to expand the size of the port's capacity. Current indicators are that expansion will be required to increase capacity at DBCT to at least 70 million tonnes per annum and potentially up to 90 million. This would require an investment at DBCT of between \$300 and \$600 million, or around 35 to 60 percent of DBCT's regulatory asset value. If this expansion would be profitable for DBCT and the probability/timing of it proceeding is dependent on the state of the world economy, then this adds to DBCT's systemic risk.

### 2.3.8 Market weight

Market weight is unlikely to be a factor given the relatively small size of Prime Infrastructure and any of the proxy companies.

## 2.4 Conclusions

The ACG's first principles analysis is simply incorrect in relation to the two factors it identifies as being most important to DBCT's systemic risk (ie, a diversified customer base and low operating costs).

Other factors likely to affect DBCT systemic risk suggest that:

- as the coal exporting industry is an input into the production of energy and steel manufacturing it is reasonable to assume a material correlation between demand and the international and Australian markets;
- as DBCT's sells to the private sector it would be expected to have higher systemic risk than companies that sell exclusively to the Government sector;
- the presence of significant real growth options at DBCT suggests that it should have higher systemic growth than industries with no significant growth options; and
- the regulatory framework suggest that DBCT has similar risk characteristics to other businesses operating under revenue cap frameworks.

It should be stressed that a first principles assessment is by its very nature a subjective exercise, which can result in a wide disparity of views about the systemic risks of a business or industry. Dr Lally reiterated this in his advice to the QCA, however, ACG's conclusion that DBCT has low systemic risk is based on analysis that is fundamentally flawed. In our view, a first principles analysis is inconclusive as to whether a coal terminal has either 'high' or 'low' systemic risk.

However, what can be concluded is that to the extent that companies in the proxy port group rely on a greater degree of trade in 'luxury items' and to the extent that DBCT's pricing structure smooths demand fluctuations the port proxy group may have a higher average beta than DBCT.

Furthermore, a proxy group containing regulated utilities would be similar to the extent that both industries are monopoly service providers that are regulated under a revenue cap and generally structure their prices with a combination of fixed and variable tariffs. However, the much lower stranding risks associated with necessities such as water, gas and electricity distribution to final customers, suggests that these industries should have a lower beta than a coal terminal.

### 3 MARKET DATA AND REGULATORY PRECEDENT

#### 3.1 Historical Betas as Proxies for Forward-Looking Betas

It is possible to estimate the historical covariance of a stock with the market and to calculate an historical *proxy* beta for that stock and that period. However, this should not be confused with estimating the actual historical beta, as that value is a function of what investors expected to happen rather than what actually did happen. For example, while historical proxy betas over the period of the dot-com crash were very low, this is not what investors in infrastructure companies would have expected to happen over that period.

In addition, even if historical proxy betas were an accurate reflection of investors' prior expectations for a company's performance, the extent to which an historical proxy beta is a good guide to today's forward-looking beta will depend on whether or not investors' expectations have remained stable or changed. For example, the ACG notes:<sup>25</sup>

*“if it is believed that the effect of the technology boom and bust were an unusual occurrence, then the associated effect on betas – in particular, the substantial depression in measured betas – would create a bias in the estimate of the future beta (in this case, a downward bias). We have accepted that such a bias in recent estimates is likely, and as a result we have placed much greater weight on betas observed prior to the year 2000.”*

Where there is sufficient information, it is possible to estimate forward-looking proxy betas, on the basis of share prices and investor expectations of future cash flows from the company in question (a 'discounted cash flow' (DCF) approach). This is the approach generally taken by US regulators, where market information is much deeper than is the case for Australia. The difference between an historical and a forward-looking beta estimate can be pronounced. For example, in 2002, the ESC reported historic proxy equity betas for US energy firms of between 0.2 and 0.3 and the ACG submitted similar findings to the ACCC.<sup>26</sup> However, US state energy regulators have made over 70 determinations since the end of 2000 using forward-looking estimates with an average implied equity beta over that period of 1.09.<sup>27</sup>

The US precedent illustrates two things. First, where sufficient data is available to implement a forward-looking DCF estimate of equity beta there can be extremely large

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<sup>25</sup> ACG, Dalrymple Bay Coal Terminal: Analysis of Proxy Betas, September 2004, page 36.

<sup>26</sup> ESC, Review of Gas Access Arrangements, October 2002, page 350, and ACG, Empirical Evidence on Proxy Beta Values for Regulated Gas Transmission Activities: Final Report, July 2002, pages 39-43.

<sup>27</sup> Attachment A summaries the results of the last 70 decisions by US state regulators for electricity distributions businesses. The implied equity beta has been calculated on the basis of an assumed MRP of 6% and an observed risk-free rate. In order to bring the implied equity beta below 1.0 it would be necessary to assume a market risk premium of greater than 6.5%.

divergences between this value and an estimate based on historical proxy betas. Second, US regulators consistently adopt the (higher) forward-looking equity beta and pay little, if any, attention to historical proxy betas.

A further problem limiting the usefulness of estimated historical betas in the current context relates to the quality of the available information. Many potentially comparable Australian regulated companies have either been listed for a limited period or are characterised by thin trading. As a result, estimates of historical proxy betas can be subject to significant standard errors. The ACG has recognised this limitation:<sup>28</sup>

***“The reason for cautioning against exclusive reliance on that evidence flowed from a concern about the statistical precision of those beta...”***

In its 2002 review of gas access arrangements, the ESC cited problems of thin trading and limited market data as reasons for adopting an equity beta of 1, even though market data indicated the historical proxy beta was averaging around 0.5.<sup>29</sup> Similarly, in its 2004 draft decision on the statement of regulatory principles, although the ACCC estimated that the historical proxy beta of a comparator group had an average equity beta value of 0.3 it concluded that:<sup>30</sup>

*“...the time period of the market data is not long enough to satisfy the ACCC that market derived equity betas would not systematically under compensate the TNSPs.”*

As a result, the ACCC’s draft decision was to continue to apply an equity beta of 1.0 while continuing to monitor market evidence.

### 3.2 The Incomparability of Comparables

No two companies are ever identical and comparables analysis can only ever be used as a guide. The more limited the pool of similar companies, the greater the reliance a regulator must have on its judgment. The lack of comparable firms has been a common difficulty throughout Australian regulatory decisions. This was recognised by IPART:<sup>31</sup>

***“There is a limited number of utility companies traded on the Australian Stock Exchange. Those that are traded are not always directly comparable to the asset bases [of the companies] IPART is regulating.”***

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<sup>28</sup> Letter by ACG to the ACCC, Recommendations in the Allen Consulting Group Report on Proxy Betas, dated 16 January 2003.

<sup>29</sup> ESC, Review of Gas Access Arrangements, October 2002, page 356.

<sup>30</sup> ACCC, *Draft decision: Statement of Regulatory Principles for the Regulation of Electricity Transmission Revenues – Background Paper*, 18 August 2004, page 156.

<sup>31</sup> IPART, *NSW Electricity Distribution Pricing 2004/05 to 2008/09: Draft Report*, January 2004, page 245.

In recent regulatory decisions for energy infrastructure businesses, Australian regulators have signalled their intention to place greater reliance on empirical evidence from the market. The possibility of using market data has only arisen now that six regulated energy infrastructure businesses are listed on the Australian stock exchange.

In contrast, there are no Australian listed comparator businesses for DBCT, ie, with the exception of Prime Infrastructure (the owner of DBCT) the Australian stock exchange contains no regulated port operators or ports. Without a group of companies that are directly comparable, a regulator is forced to consider companies that are less than ideal. This requires a greater reliance on regulatory judgement to adjust for perceived differences in underlying systemic risks.

### 3.3 Reliance on Regulatory Judgment and Precedent

Regulators have generally dealt with the problems associated with relying on market information by taking a conservative approach, recognising that the risks associated with under compensating investors and potentially jeopardizing future investment decisions are of greater concern than the risks associated with setting the regulated price at a level that is marginally higher than necessary. The Essential Services Commission of Victoria (ESC) has stated that:<sup>32</sup>

*“the Commission considers that the derivation of the proxy is one of the matters upon which a conservative exercise of judgment is justified.”* (Emphasis added.)

One response to the large standard errors associated with observed raw equity betas is to adopt the Bloomberg adjustment. This is the approach adopted by the QCA in its decisions for Queensland Rail (2000),<sup>33</sup> gas distributors (2001)<sup>34</sup> and electricity distributors (2001)<sup>35</sup>. The effect of using the adjusted equity betas is to inflate those observed raw equity betas that are lower than one.

The Bloomberg adjustment is as follows:

$$\text{Adjusted equity beta} = 0.33 + \text{raw equity beta} * 0.67$$

Given that the ACG’s feasible range of raw equity betas is 0.56 to 0.78, adopting the Bloomberg approach, the adjusted equity beta range for DBCT would be 0.71 to 0.85. This corresponds to an adjusted asset betas of between 0.37 and 0.43. Therefore, even if one

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<sup>32</sup> ESC, Review of Gas Access Arrangements, October 2002, page 356.

<sup>33</sup> QCA, Final Decision on QR’s 1999 Draft Undertaking, Volume 2, page 394.

<sup>34</sup> QCA, Proposed Access Arrangements for Gas Distribution Networks: Allgas Energy Limited and Envestra, October 2001, page 227.

<sup>35</sup> QCA, Regulation of Electricity Distribution, May 2001, page 190.

accepts the ACG's methodology of selecting comparators and determining the feasible range, an allowance for the measurement errors increases the feasible range to 0.37 to 0.43, rather than ACG's range of 0.30 to 0.40.

The QCA also previously adopted an asset beta at the upper end of its feasible range.<sup>36</sup> Other regulators have also addressed the imbalance of risks by setting the beta towards the top of an estimated range. This is illustrated in the ACCC's 2003 review of the *Draft Statement of Regulatory Principles*, in which it reviewed the available market data.<sup>37</sup> The ACCC had intended to place greater reliance on observable market data and initially proposed to estimate the equity beta by reference to historical proxy betas of comparable companies. However, given the limited number of comparable companies (five core and four supplementary companies), the ACCC proposed to take a conservative approach, setting the equity beta by reference to an upper confidence interval of either 95 or 99 per cent.<sup>38</sup>

Alternatively, some regulators have made only passing reference to historical proxy betas with the primary basis for the decision being regulatory consistency with other regulators and past decisions. For example, the Office of the Tasmanian Energy Regulator<sup>39</sup> and the Independent Competition and Regulatory Commission<sup>40</sup> both relied solely on regulatory precedent to estimate betas. The Independent Pricing and Regulatory Tribunal of NSW (IPART) recently took a similar approach, stating that:<sup>41</sup>

*“while it recognizes 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.”*

Another example is the ACCC's 2003 statement that:<sup>42</sup>

*“To the extent that sample market data indicate a substantial reduction from the typically assumed  $b_e$  of one, the Commission is conscious that a transitional/cautious approach may be required such that the Commission take a conservative view to adopting a market based proxy  $b_e$ .”*

It should be stressed that that although the ACCC defaulted to an *equity* beta equal to the average of the market, it does not follow that it believes that energy infrastructure

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<sup>36</sup> QCA, Final Decision on QR's 1999 Draft Undertaking, Volume 2, page 395.

<sup>37</sup> ACCC, *Discussion Paper Review of the Draft Statement of Principles for the Regulation of Transmission Revenues*, 2003.

<sup>38</sup> ACCC, *Review of the Draft Statement of Regulatory Principles Discussion Paper*, 2003, page 78.

<sup>39</sup> Office of the Tasmanian Energy Regulator, *Investigation of Prices for Electricity Distribution Services and Retail Tariffs on Mainland Tasmania: Final Report and Proposed Maximum Prices*, September 2003, page 67.

<sup>40</sup> ICRC, *Investigation into prices for electricity distribution services in the ACT: Final Report*, March 2004, page 64.

<sup>41</sup> IPART, *NSW Electricity Distribution Pricing 2004/05 to 2008/09: Final Report*, June 2004, page 230.

<sup>42</sup> ACCC, *Review of the Draft Statement of Regulatory Principles Discussion Paper*, 2003, page 78.

businesses have the same systemic risk as an average company. The higher assumed debt leverage leads to significantly lower asset betas for regulated energy infrastructure businesses compared with the average company. With the Australian market leverage of approximately 20 per cent,<sup>43</sup> this implies an average asset beta of 0.84.<sup>44</sup> On the other hand, it is common to assume that regulated entities have a debt leverage of 60 per cent, which implies an asset beta of around 0.50.

Dr Lally has suggested other potential responses to unreliable market data in his report for the QCA.<sup>45</sup> Dr Lally identified two potential default positions; the first assumes that the regulated company has a similar systemic risk as an average company, which infers an asset beta of 0.84. The other default position is to estimate the asset beta for very low risk firms, with good proxies being US water or electricity utilities. As discussed in section 3.1, US state energy regulators rely extensively on market data and in over 70 determinations since the end of 2000 the implied average equity beta over that period has been 1.09. Assuming 60 per cent debt leverage this corresponds to an asset beta of 0.54.

Either of these responses to data limitations put forward by Dr Lally will result in an equity beta for DBCT of above 1.0.

### 3.4 Conclusions

There are five problems with the use of historical market data, which is likely to limit the extent that investors will rely on historical proxy betas to form their expectations of future systemic risk of DBCT:

- the lack of an ideal set of comparators companies for DBCT;
- historical beta outcomes do not measure actual historical beta (which is a function of what investors expected to happen rather than what actually occurred);
- the difference between historical betas and forward-looking betas can be significant (as illustrated by US market data and regulatory precedent);
- the reliability of historical proxy betas are tainted by the effects of one-off events such as the 'dot com bubble' that bias down measured historical betas; and
- all market betas relied on by ACG exhibit large statistical errors.

In response to these concerns, regulators have adopted conservative approaches to the use of market data. When confronted with market information suggesting a substantial reduction

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<sup>43</sup> Ernst and Young, 2000, *Country Leverage and its Relevance to the valuation of New Zealand Companies*.

<sup>44</sup> De-levering based on the Conine formula and an assumed debt beta of 0.1.

<sup>45</sup> Dr Lally, *The Cost of Capital for Regulated Entities*, 14 October 2004, page 107.

in beta Australian regulators have cited the unreliability of the data as a reason for not reducing the beta below one.

In past regulatory decisions, the QCA has dealt with these concerns by adopting adjusted betas rather than raw betas and selecting parameter values at the top of feasible ranges. Such an approach has not been followed in the case of DBCT.

The need for a conservative approach is acutely necessary in this case where DBCT does not have ideal comparators and the historical data is known to be biased downwards.

In the following sections, we highlight the fact that the market data for DBCT is limited, inconclusive and unreliable. The available market data provides the QCA with no justification for treating DBCT differently to other regulated businesses – in particular, discarding its use of a Bloomberg adjustment or exercising caution by selecting a beta at the top of its feasible range. There is no justification for determining one of the lowest levels of compensation for systemic risk of any regulatory decision in Australia.

## 4 STATISTICAL REVIEW OF THE ACG'S ANALYSIS

### 4.1 Overview

For the purposes of this section we take the ACG's methodology in choosing its comparator group as given and ask the question whether the ACG's proposed feasible range for DBCT is supported by its own data. Our finding is that the ACG's feasible range is not supported by its own data or analysis. We apply standard statistical techniques to the ACG's data to develop a confidence interval around the asset beta based solely on that data. This shows a feasible range that is much wider than the feasible range declared by the ACG. In our opinion the ACG does not provide any justification for how its feasible range estimate has been derived from its own data.

It should be noted that the purpose of this section is not to question the ACG's choice of comparators. The intention is simply to ask whether the ACG's conclusions are supported by its own empirical data.

### 4.2 Analysis

#### 4.2.1 ACG's estimate of feasible range

The ACG conclude that the 'most likely feasible range' for DBCT's asset beta is between 0.30 and 0.40, assuming a debt beta of 0.10.<sup>46</sup> In setting this range the ACG has attempted to account for the expected future (post bubble) increase in measured asset betas, however it has made no allowance for the statistical errors of measured asset betas. The ACG acknowledges that measured equity and asset betas have relatively large standard errors.<sup>47</sup> In the case of the proxy companies selected by ACG the statistical errors of the betas make any conclusions drawn from the data completely unreliable.

Consider the Bloomberg five-year raw equity beta on the Port of Tauranga, the point estimated equity beta for 2003 is 0.33, however the standard error of this estimate is 0.18. That is, if one applies the standard 95% confidence interval you could not statistically reject that the true equity beta for the Port of Tauranga is between -0.03 and 0.69. This corresponds to an asset beta range of between 0.01 and 0.52. Furthermore, ACG's use of an average of asset beta over three years, ie, 2001-2003 does not improve the reliability of the *five-year* raw equity betas as there is significant overlap in data used between each year.

A similar analysis on the 2003 data on Macquarie Infrastructure Group one could not statistically reject that its true asset beta is between -0.51 and 0.62. While the data on the Macquarie Office Trust gives an asset beta range of between 0.00 and 0.36.

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<sup>46</sup> ACG, Dalrymple Bay Coal Terminal: Analysis of Proxy Betas, September 2004, page 50.

<sup>47</sup> ACG, Dalrymple Bay Coal Terminal: Analysis of Proxy Betas, September 2004, footnote 42.

The empirical data on which the ACG states that it has based its conclusion is set out in Table 6.1 of the ACG report which is reproduced below.

Company/Sector/Decision	Debt Beta = 0.10		Debt Beta = 0.20
	1997-99	2001-03	1997-99
<b>Port sector:</b>			
NZ and UK ports	0.63	0.45	
<b>Port regulatory decisions:</b>			
Melbourne Ports Corporation (ORG June 2000)			0.60
Victorian Channels Authority (ORG June 2000)			0.50
<b>Comparator group:</b>			
Macquarie Infrastructure Group		0.24	
Macquarie Office Trust		0.18	
Port of Tauranga	0.34	0.28	
<b>Market evidence:</b>			
Prime Infrastructure		0.18	

However, the ACG does not explain what statistical or other techniques it has used to derive this 'feasible range' other than to say it is based on 'taking into account of the factors, benchmarks, and comparables set out above'.<sup>48</sup> The ACG goes on to state that:<sup>49</sup>

*“This range may appear to be high given the current range of estimated betas for the comparator group (simple average for 2001-3 is 0.23). However, the range of 0.30 to 0.40 has been chosen after taking into account an expected future (post bubble) increase in measured asset beta...”*

In our opinion the ACG's historical proxy data does not support its estimate of a feasible range. In order to estimate a 'feasible range' it is first necessary to define 'feasible'. The concept of a feasible range is related to the probability that an observation will fall within this range. There are standard statistical techniques that can be used to determine the probability that an unknown observation (eg, DBCT's true asset beta) will fall within a range based on evidence from a sample of unbiased proxies for that unknown observation. Dr Lally in his recent advice to the QCA stated that if market data is to be used, market estimates should be reasonably reliable in a statistical sense. The standard statistical method

<sup>48</sup> Op. Cit.

<sup>49</sup> Op. Cit., page 51. The ACG goes on to make the further statement that “ *the specific characteristics of the comparators suggest that their longer term average measured asset beta may settle at a level higher than DBCT's. For example, we expect the Port of Tauranga's long-term asset beta will rise due to a progressive shift away from raw material exports.*” It is unclear why the ACG considers changes to the *future* risk of the Port of Tauranga to be relevant to interpreting its *historical* proxy beta.

for ensuring this is the case is to compute whether there is a 95% probability that the unknown observation will fall within that range (ie, a 95% confidence interval).<sup>50</sup>

In setting a 95% confidence interval we are interested in establishing the value of the statistic where there is only a 5% probability that the true value lies outside that confidence interval. Applying the standard statistical assumption that the population of equity betas is normally distributed around the population mean, the upper bound of a one-tailed confidence interval is given by:

$$\alpha\% \text{ confidence bound } \beta = \text{Sample mean } \beta \pm t_{(\alpha)} * \text{Standard deviation of statistic} \quad (1)$$

where  $\alpha$  is the probability attached to the confidence interval and  $t_{(\alpha)}$  is the t-statistic attached to that probability (which is itself a decreasing function of the sample size). The standard deviation of equity betas around the mean is given by:

$$\text{Standard deviation for the difference between an individual firm's } \beta \text{ and the sample } \beta = S \sqrt{1 + \frac{1}{n}}$$

where  $\sigma$  is the cross sectional standard deviation of beta values in the population and  $n$  is the size of the sample used to calculate the sample mean.

Substituting these values into equation 1 and replacing  $\sigma$  by its sample estimate  $S$  gives:

$$\alpha\% \text{ confidence bound } \beta \text{ for an individual firm's } \beta = \text{Sample mean } \beta \pm t_{(\alpha)} * S \sqrt{\frac{n+1}{n}} \quad (2)$$

where  $S$  is equal to the square root of the sample variance divided by  $n-1$ ; that is

$$S = \sqrt{\frac{\sum_{i=1}^n (b_i - \text{mean}b)^2}{(n-1)}}.$$

The sample size ("n") of ACG's sample is three. The sample mean asset beta is 0.26 for the four observations listed under ACG's 'comparator group' in their table 6.1. The sample standard deviation is 0.07. The t-statistic for a sample size of four is 3.18. When these values are combined with equation 2 we derive a 95% confidence interval of between 0.01 and 0.51 for DBCT's asset beta. (In fact, this is an underestimate of the true 95% confidence interval because we have not accounted for the fact that the 'observations' of asset betas within the

<sup>50</sup> Dr Lally, *The Cost of Capital for Regulated Entities*, 14 October 2004, page 107.

proxy group are themselves estimates with uncertainty attached to them.) This is a materially greater range than the ACG has determined 'feasible'. The only justification for the ACG choosing such a narrow feasible range is if it is relying on some prior information unrelated to its historical proxy betas to narrow the feasible range. However, the ACG report does not provide any details on why it has estimated a 'feasible range' that is inconsistent with its own estimates of comparable historical proxy betas.

Our estimated range is a reflection of both the mean of the relevant samples and the variance within that sample. The ACG should have looked at both of these variables when drawing conclusions on the confidence it can place in a particular estimate of the equity beta. On the basis of the above we conclude that ACG did not reach its conclusions on a feasible range for DBCT's asset beta based on its own empirical data (putting aside the problems with ACG's choice of comparables).

#### 4.2.2 Choice of a beta from within the range

The ACG recommends that the QCA set the regulatory WACC by choosing an asset/equity beta that is equal to the midpoint of its estimate of the feasible range.<sup>51</sup>

***“In conclusion, ACG recommends that in determining a regulatory WACC for DBCT based on the current arrangements, the QCA adopt an equity beta in the range of 0.56 to 0.78, with a mid-point estimate of 0.67. ACG believes that the best estimate is the mid-point estimate of 0.67.”***

As already described in the previous section this recommendation is at odds with regulatory practice both in Australia and overseas which suggests that it is appropriate to set WACC parameters conservatively (ie, above the mid-point estimate) in order to avoid the potentially very high costs associated with under investment in essential infrastructure. However, ACG's recommendation is even more surprising given its public position and counsel to other regulators that it is inappropriate to rely solely on the midpoint of ranges based on historical proxy betas.<sup>52</sup>

***“Accordingly, while it inevitably is a matter for the Commission to decide how it exercises its discretion, it is recommended that, in the near term, it adopt a conservative approach, and not assume a proxy equity beta that is too far from the range of previous, relevant regulatory decisions. As noted above, these decisions typically have assumed a proxy beta (for the regulatory standard gearing assumption) of around 1.”***

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<sup>51</sup> Op. Cit., page 6.

<sup>52</sup> Allen Report to the ACCC “Empirical Evidence on Proxy Beta Values for Regulated Gas and Transmission Activities” pp.42-43. Substantially similar comments were made in the report overview (p.6). These statements by ACG were publicly repeated in a letter to the ACCC (Attached to this report) the purpose of which was to emphasize the need for caution when relying on historical proxy betas.

ACG does not explain in its report for the QCA why it is advising a different course of action than it advised the ACCC. If anything, one would expect ACG to be advising even greater caution to the QCA given that it has identified a much smaller, and therefore less statistically significant, group of comparables (three comparables for the QCA report versus 4 Australian proxies and over 30 international proxies for the ACCC).

For the following reasons, we believe that ACG's recommendation that the QCA select the midpoint of its beta range is likely to result in an inappropriately low return to DBCT:

- ACG uses raw rather than adjusted equity betas;
- a 95% confidence interval based on the ACG data gives a maximum asset beta of (at least) 0.51;
- that regulatory precedent and ACG's own previous counsel is to choose conservatively within the feasible range; and
- that ACG's own analysis suggests that its data is biased downward (ie, the true 95% confidence interval would give an asset beta in excess of 0.51).

We also note that ACG has stated that its historical proxy betas are likely to be biased down due to the effects of the 'dot-com bubble'.

### 4.3 Conclusion

We do not believe that the ACG has justified its recommendation to choose the midpoint of its feasible range (ie, an asset beta of 0.35).

Even accepting the ACG's methodology in choosing its comparator group, one should reject the ACG's recommendation to choose a midpoint asset beta of 0.35:

- no allowance is provided for the statistical errors of the observed raw betas. The QCA in all its recent regulatory decisions has accepted the use of adjusted betas rather than raw betas due to the standard errors of observed equity betas;
- no reasons have been given for determining such a narrow feasible range, even accepting the use of raw betas, a standard statistical technique derives a feasible range of between 0.01 and 0.51 at a 95% confidence level; and
- the ACG has not explained why its recommendation to QCA differs from the advice provided to the ACCC, ie, that a conservative approach to market information be adopted.

In our opinion adopting an equity beta of one would not be inconsistent with the market data on ACG's 'comparables'.

## 5 FLAWS IN THE ACG'S CHOICE OF COMPARABLES

### 5.1 Overview

The primary requirement for a set of comparable companies is that these companies should be similar in nature to the one under consideration, hence the term 'comparables'. The objective of the exercise is to gain an understanding of the company of interest by considering companies operating a similar business. The exercise provides no information if preconceptions regarding the nature of risk and level of beta are used as the basis for identifying comparator companies.

ACG has proposed three comparator companies, only one of which operates in the same industry:

- Port of Tauranga;
- Macquarie Infrastructure Group (MIG); and
- Macquarie Office Trust (MOT).

The basis for this choice was not that these firms had comparable operations to DBCT but that they were 'comparable' in the sense that they were low risk. Such an approach assumes at the outset what the analysis is supposed to identify.

A selection of comparators that favours companies outside the relevant industry is entirely inconsistent with previous regulatory decisions in Australia. Common sense should have alerted ACG to the fact that a property trust that leases to AAA rated entities on a long-term basis has little in common with a coal port terminal. Although some similarities between the businesses can be identified, these are grossly outweighed by the disparities. Similarly, its choice of MIG is based on fact that a large share of MIG's revenues are sourced from overseas – which ACG believes makes MIG comparable to DBCT due to DBCT's role in supplying inputs to coal exporters. However, this logic would make News Corporation a comparator for DBCT as News Corporation also sources most of its revenues from the United States and Europe. However, News Corporation's historical proxy beta is around 2.0 compared with MIG's 0.2. It is difficult not to draw the conclusion that MIG was chosen because of its low historical proxy beta not because it of its foreign earnings.

In our opinion, there are no ideal comparators to DBCT. The fact that there are no listed coal (or even bulk) ports on the Australian stock exchange means that the QCA will be required to exercise considerable regulatory judgement to adjust for differences in the underlying characteristics of the businesses. Without credible comparable companies it has been suggested that regulators resort to a default option which suggest an equity beta of at least 1.0, this was discussed in more detail in section 3.3.

In the following sections we scrutinise the ACG's reasons for including or excluding comparable companies.

## 5.2 Ports as Comparable Companies

The first place to look for comparable companies is within the same industry, ie, port terminals or ports. However, the ACG dismissed all but one port, the Port of Tauranga, on the basis that other ports either relied to a greater extent on imports, and hence the state of the domestic economy, or they had a higher ratio of operating costs than did DBCT. We have already described why both of these arguments are wrong in theory and fact.

## 5.3 The ACG's Selection of MIG and MOT

The ACG has used its assessment of DBCT's exposure to domestic GDP and low operating leverage to select comparable companies from outside the port sector. This is fundamentally at odds with regulatory precedent. The ACCC stated that to determine electricity transmission revenues:<sup>53</sup>

*"[I]t is typical to use comparable firms in a similar line of business so that the systemic risk of the underlying assets could be regarded as similar."*

The ESC has expressed the view that:<sup>54</sup>

*"... the pool of comparable entities should be restricted to those for whom the provision of regulated energy infrastructure accounts for a large share of their overall activities."*

It is also at odds with approaches in other countries. For example, the United States' Federal Energy Regulatory Commission (FERC) has expressly rejected any comparator company that does not provide a similar product or service. For example, in the *SolCal Edison* decision the FERC rejected the use of gas pipelines companies as a proxy for the electric utility industry as they believed that significant differences existed between the industries.<sup>55</sup>

The key question to ask oneself in assessing the relevance of comparable companies is whether or not an investor thinking of purchasing shares would be roughly neutral between investing in DBCT and the comparables if they were expected to yield the same future return. It seems highly unlikely that investors would compare DBCT with either MIG or MOT as proposed by the ACG.

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<sup>53</sup> ACCC, Draft decision: Statement of Regulatory Principles for the Regulation of Electricity Transmission Revenues – Background Paper, 18 August 2004, page 155.

<sup>54</sup> ESC, Review of Gas Access Arrangements, October 2002, page 340.

<sup>55</sup> 92 FERC ¶61,070 (2000)

In the case of MIG, the fund mainly invests in toll roads for which the price is generally fixed under agreement with the relevant authority but total revenues are able to increase in accordance with volume growth. The ACG selected MIG on the basis that it is similarly unexposed to the domestic economy and instead exposed to a group of international customers. However, as discussed above, such a basis for selection is inappropriate because the exposure to the domestic economy, on its own, provides little information regarding a company's beta. It is extremely difficult to assess whether or not toll roads are likely to have more or less systemic risk than a coal terminal. For one thing, the risks associated with an investment in MIG will be a function of MIG's derivative trading to hedge (or increase) exposure to the impact of exchange rate fluctuations on \$A earnings. ACG did not even consider this issue in deciding that MIG is a comparator for DBCT.

MOT was largely chosen on the basis of having a similar operating cost leverage as DBCT with a revenue stream likely to have a low correlation to with the Australian economy (ie, a company with low systemic risk). As discussed above, the QCA's own advisor, Dr Lally, states that operating cost leverage provides little information regarding relative betas *even within a group of comparable companies*. It is an entirely inappropriate basis for selecting comparable companies from different industries. It is even more inappropriate to select a comparable on the basis that it has low systemic risk, and therefore a beta, that is similar to what one presupposes for the company of interest. The point of comparables analysis is to yield information regarding the systemic risk; it yields absolutely no information if the comparables are picked on the basis of their systemic risk.

#### 5.4 Conclusion

The ACG's selection of comparators, which favours companies outside the relevant industry, is out of step with regulatory decisions of other Australian and international regulators. While there may be no ideal comparators to DBCT, the closest comparator companies are those within the same industry, ie port terminals and ports.

The selection of MIG as a comparator on the basis that it is similarly unexposed to the domestic economy is inappropriate, on its own. Whether a toll road operator whose revenues are able to increase in accordance with volume growth has more or less systemic risk than a coal terminal is virtually impossible to assess on the basis of the type of analysis provided by ACG.

The selection of MOT is invalid as the basis of selection is that it holds long-term contracts with Government tenants and therefore is expected to show *virtually no systemic variation with the state of the domestic economy*. To choose a comparator simply because it has low systemic risk does not provide an objective estimate of DBCT's systemic risks, as such MOT as a comparator should be rejected.

## 6 ALTERNATIVE COMPARATORS AND BETA ANALYSIS

### 6.1 Overview

The previous section raised considerable concerns around the group of comparator companies adopted by ACG, in particular the reliance on companies with very different business profiles. In our opinion the primary comparator companies are those companies within the same industry. Adopting other ports as the comparator to DBCT is consistent with the regulatory principles laid out by US authorities and with the methods adopted by other Australian regulators. Observations of historical market data gives a range of asset betas of between 0.41 and 0.70 for New Zealand ports and suggest that ports on average have a higher equity beta than other regulated businesses, such as energy distribution and transmission.

We do not disagree with ACG's opinion that DBCT's contractual/regulatory framework means that it is exposed to lower systemic risk than the average of New Zealand ports. New Zealand ports are only subject to the threat of regulation under the 1998 Commerce Act rather than actually being regulated. Consequently, it may be reasonable to assume that New Zealand ports face greater contribution to systemic risk through fluctuations in volumes than does DBCT. However, we are extremely wary of placing a magnitude on this especially given that competing factors (such as DBCT's pass through of operating costs) means that DBCT is likely to face higher systemic risk.

Given the variation within the sample group, the approach adopted by the ACCC would lead to a rejection of the observed market data as a reason to substantially lower the typically assumed equity beta of one. Furthermore, the ports data suggests that the QCA decision to adopt an asset beta of 0.35 contains a very high risk of being lower than DBCT's true asset beta.

### 6.2 Comparable Companies

The purpose of a proxy group is to select companies with analogous risks to the company under consideration. Ideally, the group of comparator companies would be comprised of Australian listed regulated firms involved in the supply of port infrastructure necessary for coal exporting. Unfortunately there are no ideal comparators to DBCT, which increases the reliance a regulator must have on its judgment.

For the reasons outlined above in section 5.2 those companies in a similar line of business are most likely to have comparable risks, for DBCT this would be other port terminals and ports. This is consistent with the approach taken by Australian and international regulators.

For the purpose of our beta analysis we primarily considered ports in New Zealand.<sup>56</sup>

### 6.3 Beta Analysis

Regulators have stressed that the risks of setting regulated returns too low significantly outweighs the risks of setting revenues slightly too high. Given this, and the uncertainty as to a company's true cost of capital, regulators have been hesitant to lower the established betas without clear evidence that this is justified.

In table 2, the ACG's data on New Zealand ports has been reproduced the conclusions do not change substantially if UK ports are included.

**Table 2**  
**Asset Beta of NZ Ports**

Company	1997-1999	2001-2003
Lyttelton Port	0.98	0.63
Northland Port	0.86	0.78
Port of Tauranga	0.34	0.28
Port of Auckland	0.70	0.49
South Port New Zealand	0.64	0.47
Mean of NZ ports	0.70	0.53
Standard variation of group	0.24	0.19
95% confidence $\beta_a$	1.28	0.98
Probability that a port asset beta exceeds 0.35	87%	78%

*Source: ACG table 5.1, Bloomberg, NERA analysis. Note: Beta estimates have not been adjusted for market composition or leverage differences.*

Table 2 illustrates that historical proxy betas of New Zealand ports provide no compelling reason to substantially discount DBCT's asset beta compared with past Australian regulatory decisions. Importantly, the asset betas determined by the ESC for the Melbourne Ports Corporation and the Victorian Channels Authority, falls within the range of means asset betas in table 2.

Furthermore, the average equity beta derived from the proxy group is 1.47 and 1.08 for the 1997-99 and 2001-2003 periods respectively. This suggests that ports on average have a higher equity beta than other regulated businesses such as energy distribution and transmission.

<sup>56</sup> Note that these results do not substantially change with the inclusion of UK ports.

Concentrating on the 2001-03 data there are a number of reasons to believe that an asset beta of 0.53 and a corresponding equity beta of 1.08 may be conservative (i.e. low). Primary reasons are:

- the 2001-03 data is tainted by the events of the ‘dot-com bubble’ which creates a downward bias in all the post-2000 observations;
- that since the implementation of the *Port Companies Act 1988*, New Zealand ports have been unregulated. Charges at NZ ports are reviewed annually, with almost all contracts for periods less than two years. Compared to a fixed revenue stream, annual adjustments to prices allows NZ ports to mitigate the effects of cost shocks; and
- the need to adjust for differences between the New Zealand and Australian financial market. The analysis conducted by the ACG, in section 6.2 of its report, suggests that New Zealand asset betas should be adjusted upwards to account for differences in the market risk premium, company tax rate and market leverage. Adopting the ACG methodology, an asset beta of 0.53 in New Zealand would be comparable to a 0.57 asset beta in Australia.<sup>57</sup>

That is not to say that other differences, such as the reliance on container traffic, at New Zealand ports and the fact that there may be greater reliance on per unit pricing do not suggest that DBCT has relatively lower systemic risk, however, the extent to which these differences cancel out is unclear.

When the ACCC considered the use of market data it adopted the following approach:<sup>58</sup>

*“To the extent that sample market data indicate a substantial reduction from the typically assumed  $b_e$  of one, the Commission is conscious that a transitional/cautious approach may be required such that the Commission take a conservative view to adopting a market based proxy  $b_e$ .*

*One approach is to construct a statistical upper confidence interval based on the sample data. Table 5.2 provides an example of calculating a t-student distribution for upper 95% and 99 % confidence betas.”*

Adopting the same approach suggests an asset beta of between 0.93 and 1.28. This results in a significantly higher equity beta than typically assumed for regulated businesses.<sup>59</sup> Even rejecting the smaller New Zealand ports of Lyttelton and Northland the 95% upper bound

<sup>57</sup> Note that adjusting for all the differences between countries is extremely complicated and the ACG analysis is unlikely to explain all the differences between the Australian and New Zealand markets.

<sup>58</sup> ACCC, *Review of the Draft Statement of Regulatory Principles Discussion Paper*, 2003, page 78.

<sup>59</sup> See NERA, *Evaluation of the ACCC’s Proposed Approach to Statistical Estimation of Equity Betas for TNSPs: A Report for TransGrid*, November 2003.

asset beta for 2001-03 is above 0.80, which again leads to a rejection of market data as a reason for lowering the typically assumed equity beta of one.

Based on the historical proxy betas of New Zealand ports, the QCA's asset beta of 0.35 has an extremely high probability of being lower than DBCT's true asset beta. Based on a t-student distribution the probability that DBCT's asset beta is above 0.35 is between 78% and 87% (see table 2 above).

## 6.4 Conclusions

In our view, those companies in a similar line of business are most likely to have comparable risks, for DBCT this would be other port terminals and ports. Selecting only companies in the same industry is consistent with the approach taken by Australian and international regulators.

Observations of historical market data gives a range of asset betas of between 0.41 and 0.70 for NZ ports and suggest that ports on average have a higher equity beta than other regulated businesses, such as energy distribution and transmission. Were the QCA to rely solely on historical proxy betas then we believe DBCT's asset beta should be set within this range.

## 7 CONCLUDING COMMENTS

The QCA's *Draft Decision* incorporated an asset beta of 0.35 based largely on advice from ACG. In our view, ACG's analysis is not sufficiently credible to warrant such a determination and a more prudent proxy asset beta would be selected in line with the dominant regulatory precedent of setting the equity beta equal to 1.0. Were the QCA to rely solely on historical proxy betas we believe it should be choosing an asset beta from within the range 0.4 to 0.7 (which encompasses the asset beta associated with an equity beta of 1.0).

We are sceptical of the sole reliance on historical proxy betas. A statistical regression cannot provide an exact answer to an investor's forward-looking expectations of risk. Therefore, even with an ideal comparator group, regulators have adopted conservative approaches to the use of empirical market information to ensure that they do not under compensate investors and jeopardise essential future investment.

Even without correcting errors in ACG's choice of comparators, applying standard statistical techniques to the ACG's data presents a feasible asset betas range of 0.01 to 0.51 for DBCT. Given the small sample of comparators and the fact that the data is likely to be biased downward, the adoption of an asset beta of 0.35 is inconsistent with the conservative approaches taken by other regulators. On the other hand, adopting an asset beta at the top of the feasible range is consistent with the ACG's public position and counsel to other regulators to not assume a proxy equity beta that is too far from the range of previous, relevant regulatory decisions.

The ACG's first principles conclusion that DBCT has low systemic risk contains fundamental errors. Of particular concern is ACG's misunderstanding of the theoretical underpinnings of the CAPM. ACG confuses diversifiable and non-diversifiable risk when it concludes that because DBCT has a diversified customer base it also has low systemic risk. ACG also misinterprets the use of the 'domestic CAPM' to imply that the systemic risk for exporters is low. This results in demonstrably incorrect conclusions and is inconsistent with the proper interpretation of what the domestic CAPM framework is intended to achieve. Finally, ACG makes a further demonstrable error in assuming that DBCT's arrangements with DBCTPL reduces its systemic risk relative to other regulated businesses when the opposite is true.

These errors were the central reasons for the ACG rejecting ports as a comparator group and proposing just three comparator companies, of which only one operates in the same industry as DBCT.

While no companies are ideally comparable with DBCT, historical proxy betas of port operators and ports are most likely to have analogous risk to DBCT. A proxy group of port operators and ports suggest an asset beta significantly higher than the 0.35 midpoint recommended by the ACG, with the average asset beta ranging between 0.41 and 0.70. Market data clearly undermines the proposition that ports operate in a very low systemic

risk environment associated with ACG's asset beta of 0.35. We also note that the market data is consistent with the ESC's decision for the Port of Melbourne and the Victorian Channels Authority.

If QCA is not satisfied that historical market data provides a true estimate of DBCT systemic risk, then it should place significant weight on regulatory precedent. The only regulatory decision on ports was by the ESC that set an asset beta of 0.5 and 0.6, while recent energy infrastructure decisions include an equity beta range of between 0.71 and 1.0, which implies an asset beta of between 0.37 and 0.5.

Finally, a first principles analysis suggests that, contrary to ACG's conclusions, DBCT almost certainly has higher systemic risk than other businesses regulated under a revenue cap. The QCA has not been presented with, nor has it developed, any evidence to reliably suggest that DBCT has lower risk than other businesses regulated by itself or other regulators.

## ATTACHMENT A – US REGULATORY PRECEDENT

Period		Authorised equity returns (average)	Number of decisions	Average 10y Treasury Security yield <sup>‡</sup>	Implied equity beta (assuming an MRP of 6%)
2001	1 <sup>st</sup> Quarter	11.38	2	5.05	1.06
	2 <sup>nd</sup> Quarter	10.88	2	5.27	0.94
	3 <sup>rd</sup> Quarter	10.78	8	4.98	0.97
	4 <sup>th</sup> Quarter	11.50	6	4.77	1.12
2001	Full Year	11.09	18	5.02	1.01
2002	1 <sup>st</sup> Quarter	10.87	5	5.08	0.97
	2 <sup>nd</sup> Quarter	11.41	6	5.10	1.05
	3 <sup>rd</sup> Quarter	11.06	4	4.26	1.13
	4 <sup>th</sup> Quarter	11.20	7	4.01	1.20
2002	Full Year	11.16	22	4.61	1.09
2003	1 <sup>st</sup> Quarter	11.47	7	3.92	1.26
	2 <sup>nd</sup> Quarter	11.16	4	3.62	1.26
	3 <sup>rd</sup> Quarter	9.95	5	4.23	0.95
	4 <sup>th</sup> Quarter	11.09	6	4.29	1.13
2003	Full Year	10.97	22	4.02	1.16
2004	1 <sup>st</sup> Quarter	11.00	3	4.02	1.16
	2 <sup>nd</sup> Quarter	10.40	5	4.60	0.97
2004	Year-to-date	10.63	8	4.31	1.05
Average <sup>60</sup>		11.00	70	4.51	1.09

<sup>†</sup> The data is an extension of those contained in the, 22 January 2004 Regulatory Research Associates, Inc. entitled *Major Rate Case Decisions – January 2002 – December 2003 Supplemental Study*.

<sup>‡</sup> The Federal Reserve Board, *Statistics: Releases and Historical Data* G13 monthly data.

<sup>60</sup> Weighted by the number of decisions in each period.

16 January 2003

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Dear Mr Phillips

## **RECOMMENDATIONS IN THE ALLEN CONSULTING GROUP REPORT ON PROXY BETAS**

I refer to my conversations with Messrs Griffin and Walsh and note my earlier advice on this matter. You have asked for clarification of the advice to the Commission on the selection of a proxy beta value for regulated Australian gas transmission activities that was included in the report I co-authored entitled Empirical Evidence on Proxy Beta Values for Gas Transmission Activities (July 2002, the Allen Report). Clarification in particular is sought on the observations that were made in the Allen Report about the quality of the empirical evidence available on the proxy beta for regulated Australian gas transmission activities at that point in time and the consequent observations made about the extent of reliance that should be placed upon that evidence compared to other information on beta values, such as the assumptions employed by regulators in relevant recent decisions.

A caveat to this clarification is that the purpose of the report referred to above was to provide the Commission with empirical evidence that it could draw upon when deriving a proxy beta for the pipelines that it regulates across Australia.<sup>1</sup> Consistent with this, the particular circumstances of individual pipelines were not examined, and specific recommendations for individual pipelines were not provided.

Regarding the quality of the empirical evidence that was available at the time of the preparation of the report, the Allen Report did caution against the Commission placing *exclusive* reliance (or weight) on the empirical evidence on betas that it had compiled. The reasons for cautioning against exclusive reliance on that evidence flowed from a concern about the statistical precision of those beta estimates and a concern about a possible bias in the betas derived for foreign firms, coupled with a concern about the substantial reduction in the estimate of the cost of capital for regulated gas transmission entities that the use of this empirical information would imply. The relevant text from the body of the Allen Report is reproduced below (footnotes omitted).<sup>2</sup>

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<sup>1</sup> The Allen Consulting Group, Empirical Evidence on Proxy Beta Values for Gas Transmission Activities, Report to the Australian Competition and Consumer Commission (the Allen Report), July 2002, p.1.

<sup>2</sup> Allen Report, p.42. Substantially similar comments were made in the report overview (pp.5-6).

Exclusive reliance on the latest Australian market evidence would imply adopting a proxy equity beta (re-levered for the regulatory-standard gearing level) of 0.7 (rounded-up). Moreover, regard to evidence from North American or UK firms as a secondary source of information does not provide any rationale for believing that such a proxy beta would understate the beta risk of the regulated activities. Rather, the latest evidence from these markets would be more supportive of a view that the Australian estimates overstate the true betas for these activities.

That said, however, we would caution against exclusive reliance upon the latest market evidence at this point in time.

To date, most Australian energy regulators have used a proxy equity beta in the range of 1 (for the regulatory-standard gearing level of 60 per cent debt-to-assets) when assessing or setting regulated charges, and a substantially higher assumption has been adopted in a number of decisions (including those of the Commission). The use of a proxy beta of 0.7 would represent a substantial reduction in the estimates of the costs of capital compared to the assumptions previously adopted. While such a revision would be warranted in the face of reliable, objective evidence, it cannot be concluded definitively that this quality of evidence exists at this time.

First, the primary source of evidence – which derives from the listed Australian entities – consists of a group of only four firms. Moreover, only two of the firms have been in existence for long enough to permit the AGSM's-preferred four years of observations to be used, with the beta estimate of one of these – the Australian Pipeline Trust – being based upon only 21 observations (just above the cut-off that the AGSM Risk Management Service applies for providing beta estimates).

Secondly, we are concerned about the magnitude of the beta estimates derived for firms operating in other countries. The re-levered equity betas for the US firms, in particular, are substantially lower than the estimates that have been obtained from past time 'sampling windows'. It could be hypothesised that the recent events on US share markets – such as the large surge in the values of high-technology stocks and then their subsequent fall – may have affected the beta estimates, and which may have biased the estimate of the forward-looking beta risk of these firms if those events were not considered by investors to be normal events. However, it is impossible to prove or disprove such a conjecture.

In light of these concerns with the available empirical information and the significance of the assumption adopted for the proxy beta for a regulated entity, the Allen Report recommended that the Commission apply a degree of 'inertia' to the judgement it reaches on the proxy beta for the regulated activities of Australian gas transmission entities. The relevant text from the Allen Report is reproduced below.<sup>3</sup>

Accordingly, while it inevitably is a matter for the Commission to decide how it exercises its discretion, it is recommended that, in the near term, it adopt a conservative approach, and not assume a proxy equity beta that is too far from the range of previous, relevant regulatory decisions. As noted above, these decisions typically have assumed a proxy beta (for the regulatory standard gearing assumption) of around 1. That said, this report has demonstrated that no implication can be drawn from current market evidence that the proxy betas that Australian regulators have adopted are likely to understate the 'true' beta – rather, as noted above, the current evidence suggests regulators systematically have erred in the favour of the regulated entities.

It would be consistent with the advice in the Allen Report for the Commission to select a proxy beta value that was a weighted average of that implied by current Australian market evidence (0.7) and the proxy betas adopted in other decisions by Australian energy regulators (including the Commission's previous decisions), with the weights a matter for the Commission's judgement. It would be incorrect to interpret the Allen Report as advising the Commission not to place any weight on the empirical evidence on the proxy beta for regulated Australian gas transmission activities that was presented in that report.

The Allen Report also noted that the quality of the market evidence available for the proxy beta for regulated Australian gas transmission activities was likely to increase in the future and that, as a result, it should be possible to place greater reliance (weight) on empirical evidence on beta values over time. The relevant text from the Allen Report is reproduced below (footnotes omitted).<sup>4</sup>

In the future, however, it should be possible for greater reliance to be placed upon market evidence when deriving a proxy beta for regulated Australian gas transmission activities. There are currently six firms listed on the Australian Stock Exchange that could be used as comparable entities when deriving a proxy beta – AlintaGas, AGL, the Australian Pipeline Trust, Envestra, GasNet and United Energy. Beta estimates are already available from the AGSM Risk Management Service for four of these entities, and estimates will be available for all six within a couple of years. Moreover, should any of the currently-mooted stock market listings of energy utilities proceed, then the information available from Australian capital markets will expand even further.

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<sup>3</sup> Allen Report, pp.42-43. Substantially similar comments were made in the report overview (p.6).

<sup>4</sup> Allen Report, pp.42-43. Substantially similar comments were made in the report overview (p.6).

Assuming the Commission continued to update the empirical information presented in the Allen Report to take account of this additional information, it would be consistent with the advice in the Allen Report for the Commission to place greater weight on that updated information over time.

Yours sincerely

[Signed]  
Jeff Balchin  
**Director**