Capital Research

Dalrymple Bay Coal Terminal

Response to QCA Draft Determination

Prime Infrastructure

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   - It assumes that the short term stability in EBIT automatically leads to low cost of capital.
   - It uses a comparator company in a small foreign economy and asserts it has investment characteristics applicable to DBCT.

[1] Notwithstanding the reduction in average cost from construction of Stages 5 and 6 of the Terminal development, the reduction in tariff is very significant.

- DBCT, it is asserted, has characteristics of a LPT and it is incorrectly claimed that LPTs have a low cost of capital.
- The Draft Decision makes comparisons (and assertions) about betas changing over time based on inadequate sample data.
- Throughout the Draft decision document the inherent uncertainty in estimating company betas is ignored. The Draft Decision does not examine or even refer to the standard errors of their estimates and the degree of confidence they might reasonably expect to hold with respect to such estimates.

6. We can see no compelling reason why DBCT would not be awarded an average equity beta = 1 outcome. There is certainly no convincing statistical or other "hard" evidence in the Draft Decision and the supporting consultant's paper to justify moving away from that null hypothesis or starting point for all companies when adopting the CAPM approach.

1. Overview

We have been asked to comment on the Queensland Competition Authority (QCA) Draft Determination for the arrangements for access between coal producers and the Dalrymple Bay Coal Terminal (DBCT)

The principal for intervention by the Queensland Competition Authority (QCA) in the arrangements for access between coal producers and the Dalrymple Bay Coal Terminal (DBCT) is set out under the essential facilities doctrine of the National Competition Policy. The logic underlying the intervention is that a monopolistic supplier of an "essential facility" should be constrained by the rulings of an independent regulator from exerting their monopoly power.

The dangers of unconstrained market power held by an essential facility are obvious. The risks that can be imposed by the regulator on such an essential facility are less obvious and have received less attention. The problems created by the regulator of a regulated entity have been referred to in the recent Productivity Commission's Draft Paper on National Competition Policy. The Commission on a number of occasions in the Draft Paper referred to the "widespread concerns about current regulatory practices" (Chapter 9, pages 236-7 of the Draft Paper). The Productivity Commission list a number of what they refer to as generic concerns about current regulatory practice, including:

1. The intrusiveness of regulatory price setting and oversighting arrangements and their associated costs.
2. Inconsistencies in the approaches adopted by the plethora of regulators.
3. An undue emphasis on encouraging the efficient usage of existing services and as a consequence losing sight of the need for incentives for new investment and asset maintenance in these services.
4. Too much emphasis on what they refer to "as building block" approaches to price setting. This approach fails to give sufficient attention to linking regulated price changes to what is happening to prices for comparable sectors in a competitive environment or what is happening to prices in the economy at large.

The Draft Decision in the DBCT access hearing gives clear illustration of a number of these problems. The clearest expression of these is an effective price reduction of 26%[2] and a corresponding reduction in the DBCT's income at a time that companies in the rest of the economy are experiencing increasing incomes. Moreover, based on research carried out on behalf of

[2] Notwithstanding the reduction in average cost from construction of Stages 5 and 6 of the Terminal development, the reduction in tariff is very significant.

Prime Infrastructure, the existing price structure appears to be amongst the lowest cost structures for comparable ports in the world (see Appendix 1).

The Draft Decision of the QCA cannot be explained by changing economic conditions or a change in circumstances specifically related to DBCT. This suggests that previous regulatory decisions were wrong, or, alternatively, the current decision is wrong. In the current matter, the Draft Decision has chosen values for asset betas much lower than comparable asset betas used by other regulators for infrastructure facilities and, although it could be argued that the port facility is unlike other infrastructure assets, there is no compelling evidence to suggest this. Moreover, the data and empirical evidence brought to bear on the estimation of the asset beta relevant to the DBCT does not reflect previous approaches to estimating asset betas for infrastructure where, typically, a large group of infrastructure assets have been examined and there has been little or no weight placed on the individual company betas. The result is that the empirical evidence supporting the asset beta in the Draft Decision is, at best, questionable and at worst, spurious.

The Draft Decision relies too heavily on logical arguments about risk characteristics and on empirical estimates of beta that totally neglect the inherent uncertainty in those estimates. The CAPM is weak when applied to individual stocks. Relying on an individual stock estimate for beta requires that one has excellent confidence in the estimates. No such evidence is supplied, and indeed we consider the uncertainty in some of the estimates to be so great as to render them meaningless. The risk for regulators is that they will create another overlay of risk in the form of regulatory uncertainty, the cost of which will ultimately have to be borne by producers and consumers.

The Draft Decision assumes that attributes of the Terminal are unique to DBCT and they use this to justify unconventionally low CAPM parameter estimates. We can see little or no evidence to verify that these attributes are indeed unique. We believe that many of these so-called unique attributes are common to infrastructure assets. Hence the argument for a lower cost of systematic risk is flawed.

One of the major weaknesses of the Draft Decision is that it totally ignores the required investment return for small capitalisation assets that is applicable for DBCT. Instead, it applies the CAPM as if the decision was being applied to a large capitalisation asset. This contradicts much evidence from around the world that investors in small capitalisation assets require a premium above the CAPM. It would be rare indeed to see the CAPM used to value small capitalisation assets. This is because it totally ignores their important risk attributes. The beta of a stock that rarely trades is zero but no one would reasonably suggest that such a stock is zero risk. Regulators should not be wedded to a model such as the CAPM that is clearly inadequate in the market they are examining.

The Draft Decision via its consultants places a heavy emphasis a theory about operating leverage and cost of capital that is most certainly not universally accepted. It is a theory that is not easily verified and so remains an arcane aspect of cost of capital. It is quite inappropriate to award a low cost of capital with this argument as a central plank.

The Draft Decision also assumes the argument that a stable short term EBIT automatically implies a low cost of capital. This is incorrect. There are many realistic examples where the risk is short term stable and then concentrated at a point of re-negotiation. Real estate rental contracts are an obvious example.

The Draft Decision relies too much on apparently similar operating characteristics when determining a cost of capital when *investment* characteristics such as the nature of the investors, the index classification of the asset, and the market capitalisation of the asset are just as important for determining a cost of capital.

As part of its consultants report, ACG asserts that listed property trusts have low risk and that this should be attributed to DBCT. There is an implicit sequence of assumptions made in this logic in that DBCT has some real-estate like characteristics, that these characteristics are captured in LPTs and that the CAPM captures the systematic LPT risk. These are heroic assumptions. If one accepted that DBCT had real-estate like characteristics one would at least suggest that the closest comparator is direct investment, not LPTs. Many companies, for example BHP Billiton (a large resource company), own real estate as part of their business activities. As far as we can ascertain, no one is claiming that BHP has characteristics of LPTs. In any event, the logical chain breaks down at the CAPM assumption. The classical CAPM does not work for LPTs.

There are also some minor errors in the ACG report in that they incorrectly suggests the PIF beta is negative when it is indeed positive. No weight is given to this point because it is readily accepted that PIF has been listed for such a short time. However, in contradiction to this sensible approach, we are asked next to accept comparisons of betas calculated over consecutive 36 month intervals. This is an inconsistent approach to accepting inherent uncertainty within beta estimates.

There is so much inherent uncertainty in beta calculations that one should be very cautious about making comparisons based on small sample sizes. Indeed, there is so much noise in estimating the beta for an individual stock that it is almost impossible to distinguish the stock beta from the sector beta. In which case, the sector beta is probably a more reliable estimator for beta risk.

In a forlorn attempt to overcome the lack of monthly data for beta estimates, the consultant's report tries weekly data intervals for beta estimates. But more data does not equate to more information. Beta is meant to measure

the systematic risk of a stock as it unfolds through future economic events. Measuring returns in weeks instead of months does not reveal any further insights into future prospects compared to measuring in months. All it does is introduce more noise into the beta estimates and make them more unreliable. It is a fruitless exercise that obfuscates the issues being addressed.

1 Summary:

The Draft Decision exemplifies some of the problems of regulation outlined by the recent Productivity Commission paper on National Competition Policy. Specifically, it exhibits the problem of placing too much emphasis on the "building block" approaches to price setting. This approach fails to give sufficient attention to linking regulated price changes to what is happening to prices for comparable sectors in a competitive environment or what is happening to prices in the economy at large. This is exemplified by the QCA totally ignoring that the terminal asset is held within a small capitalisation stock and would accordingly warrant a small cap cost of capital premium. There are many issues of attributing risk characteristics to the terminal which we find highly questionable. Unrealistic certainty has been awarded to low cost of capital estimates that we find are quite unjustified. Many arguments justifying this low cost of capital are more accurately classed as assertions rather than objective evidence. We consider that there have been no compelling arguments put forth why the Terminal should not be awarded a sector cost of capital, as awarded by prior regulators.

2. Regulation Issues and DBCT

2.1 The Capital Asset Pricing Model (CAPM)

One of the criticisms made by the Productivity Commission of price regulation was that the regulatory authorities tended to use a building-block approach where that approach, because of inadequacies in the blocks or more accurately estimations of the parameters used in the building-blocks, led to a decision, or decisions, at odds with observations from comparable markets in the economy. Implicitly, they were arguing that regulatory authorities should step back and take a holistic approach before reaching a decision based on the building-blocks.

The CAPM has been the mainstay of the building-block approach to regulation of pricing in Australia. The CAPM is one of those classic models in economics/finance which gives rise to the adage that is particularly relevant to the social sciences such as economics that "models are to be used but never to be believed". The world of the social scientist is far removed from the degree of determinism of the physical scientist and therefore statistical tools and methods adopted from the physical sciences must be treated with a great deal of caution when applied to social sciences. One can rarely draw inferences with the same degree of confidence about outcomes in the social sciences as one can often do in the physical sciences.

The CAPM was developed over 40 years ago by academics under a set of very restrictive and unworldly assumptions such as frictionless markets and symmetry in information or knowledge amongst investors. The popularity of the model was not based on its normative characteristics, instead it was the positive or empirical usefulness of the CAPM that has led to its popularity. There has been no other model for pricing risk that has proved to be as robust as the CAPM. However, this does not mean that the CAPM is without problems. There are prominent examples extant in the market today where the CAPM fails to adequately explain asset prices.

The strength of the relationships on which the CAPM is based is only supported in listed markets amongst highly traded and therefore large companies. In fact, most of the empirical work testing and support for the CAPM has been on the basis of the large portfolios of companies listed on major stock exchanges. The relationships between returns and covariance risks as described by CAPM are very weak when one strays from those markets and uses individual stocks instead of portfolios on which the empirical validity of the CAPM has been based.

The consequence is that estimates of parameters of the CAPM should be treated with a great deal of caution. In particular, regulatory bodies before making changes in parameter values relative to previous decisions should be very confident of the validity of the change, otherwise all they are achieving

is creating another overlay of risk in the form of regulatory uncertainty, the cost of which will ultimately have to be borne by producers and consumers.

The Draft Decision also contains some faulty reasoning but because this does not affect the outcome or the approach that the Draft Decision eventually adopts, it is addressed in Appendix 2 to this commentary.

In general, the estimates of the various parameters of the CAPM and the approach adopted in obtaining these estimates follows fairly conventional and generally acceptable and defensible lines. The exception is in the estimate of the equity beta and by implication the asset beta.

2.1 Summary:
The CAPM is weak when applied to individual stocks. Hence regulators need to be very confident of the validity of the beta estimate proposed when it is different to previous estimates applied otherwise all they are achieving is creating another overlay of risk in the form of regulatory uncertainty, the cost of which will ultimately have to be borne by producers and consumers.

2.2 Equity and Asset Betas

The draft decision has relied heavily on a consultant's report by Allen Consulting Group (ACG) for the selection of equity and asset betas. Therefore this criticism is largely directed at the Allen's report on betas. The Draft Decision reflects the ACG approach.

"In summary, due to its unique characteristics, there are likely to be only a few appropriate comparators providing proxy betas for DBCT. Applying the asset beta of an entire industry is clearly inappropriate. The key characteristics of the comparator companies are: a revenue stream that is relatively insensitive to the domestic economy; and a low cost structure that makes EBIT relatively invariant with changes in output." (page 4 of the ACG report on betas).

The above statement and Appendix 3 clearly illustrates the very subjective nature of the ACG ultimate conclusion of DBCT's equity and asset ß's. Insofar, as they believe an entire industry such as infrastructure is inappropriate because of DBCT's "unique" characteristics they turn to individual companies for support such as the main shareholding company, Prime, and the Port of Tauranga (POT). They correctly conclude that the evidence of Prime's ß is too unreliable to place any weight on it but the same logic is even more applicable to the POT, this company is very thinly traded in another country with an entirely different product mix to DBCT.

In short, a close examination of the decision indicates the ad hoc[3] nature of the asset ß estimate for DBCT. Moreover, if one was to adopt the standard null hypothesis then the equity ß of DBCT would be unity (ß=1.0), and we do not believe that one could not reject the null hypothesis, although the ACG do not test their estimates for significance or show the standard errors of their estimates. It is worth recalling that equity betas cannot be *observed* or *measured with precision*—they must be *estimated*.

The standard method for estimating equity betas is an ordinary least squares (OLS) regression of stock returns on market returns. Most commercial data sources use four or five years of monthly stock returns and monthly returns on a broad stock market index portfolio. The slope coefficient from a standard OLS regression of stock returns on market returns is then used as an estimate of the equity beta.

As with any regression, the estimated coefficient is not a precise calculation, but simply an estimate. The standard statistical (and legitimate) interpretation of the estimated coefficient from any regression is that the true value of this parameter comes from a normal distribution with mean equal to the parameter estimate and standard deviation equal to the standard error of the estimate. That is, the regression approach does not compute the true beta, it merely narrows it down to within some probabilistic range.

The width and range of this depends on how precisely the coefficient can be estimated. It is the standard error of the regression estimate that measures the precision with which it has been estimated. Typically equity beta estimates, computed by regressing stock returns on market returns, have large standard errors. This means that they are imprecisely estimated and cannot be relied upon with any great confidence.

The imprecision of equity beta estimates has also long been recognized in the academic literature as in practice. For example, the Centre for Research in Finance (CRIF) at the Australian Graduate School of Management computes OLS betas as well as Scholes-Williams betas. The Scholes-Williams procedure provides a statistical correction for non-trading. This correction is designed to correct for the fact that a particular stock may trade more or less frequently than the average stock in the index. The AGSM-CRIF Explanatory Notes explain that, "OLS can only be used when the data used satisfies the assumptions which underlie the regression analysis. One assumption, which is of potential importance in the Australian environment, is that the company and index rates of return should be measured

[3] For example, the clearest description of how they assemble the various estimates into an asset ß estimate for DBCT is described on page 50:
"Taking account of the factors, benchmarks and comparables set out above, The Allen Consulting Group concludes that the most likely feasible range for DBCT's asset beta is as follows:

- Assuming a debt beta of 0.10, an asset beta range of 0.30 to 0.40, with a mid-point estimate of 0.35."

contemporaneously; that is, over exactly the same time intervals. Since we are using monthly data, this is equivalent to assuming that all stocks have a trade (establishing the current price) right at the end of each month. While this might be the state of affairs for BHP Billiton, it is not so for many of the companies listed by the ASX. In fact, some listed companies exhibit infrequent trading to the point where they do not trade even at regular monthly intervals.

In fact, the problem is even worse than this. Many of the stocks that are included in the index also trade infrequently. Therefore, even if we are trying to estimate the beta of a stock that is large and liquid and trades continuously, there is still a mis-match with the trading frequency of the index. The index likely contains stock prices from its smaller constituents. The CRIF Explanatory Notes also recognizes this:

"This thin trading phenomenon may introduce biases into the OLS estimates. A number of statistical methods exist for estimating beta in the presence of the thin trading phenomena. The CRIF betas are computed using a version of the method first suggested by Scholes and Williams (1977), this technique adjusts for thin trading inherent in both the stock and the market index".

However, we cannot simply rely on these Scholes-Williams betas for at least three reasons:

1. They tend to be estimated with even less precision than standard OLS betas (i.e., they are designed to correct for non-trading bias, not statistical imprecision);

2. The Scholes-Williams technique is only one of many statistical adjustments to OLS betas that have been proposed (see below); and

3. The Scholes-Williams technique often produces extreme results, at lest relative to standard OLS betas, but there is no consistent relationship between the two. For example, in the most recent CRIF report (March, 2004), the Scholes-Williams beta is no different from the OLS beta for Envestra, 30% higher for Alinta, and 8 times as large for AGL!

Another reputable data source, Bloomberg, provides a different statistical adjustment. The QCA had regard to this Bloomberg Adjustment in its most recent Electricity Distribution Determination (2001, pp. 95-96). "The Authority adjusted betas in accordance with the approach applied by Bloomberg as follows: *Adjusted beta = 0.33 + raw beta * 0.67*". The QCA then recognized that no statistical adjustment will provide a reliable and robust estimate given the nature of the data that are involved. The QCA concluded (p. 96) that:

"The difficulties outlined above merely serve to highlight that the calculation of WACC using CAPM to estimate the return on equity involves some degree of imprecision. However, the Authority considers that in applying CAPM in a regulatory setting, regard must be had to the risks of allowing too low a rate of return. Consequently, the Authority has considered adjusted (as well as raw) betas in the assessment of the rate of return for the electricity distribution businesses".

There are many variations in the way that betas are estimated in the Australian context e.g. ACG's report for the ACCC (2002), the NERA (2002) response to this report and the research monograph by Brailsford, Faff and Oliver (1997). These sources document more than 20 alternative statistical approaches that have been proposed to estimate equity betas.

Clearly, there is no single consensus approach for estimating equity betas. The very existence of so many alternative approaches is evidence that none are satisfactory, accurate, or robust.

In addition, the ACCC has recently addressed this issue in its Victorian Transmission Revenue decision. After consideration of the presently low values of the estimates of betas for comparable firms, the ACCC noted the statistical unreliability of these estimates and the range of statistical approaches that might be used to estimate equity betas and assessed that an appropriate estimate of the equity beta for electricity transmission is one.

In our view, there is no "convincing market data" that leads to the conclusion that an appropriate estimate of the equity beta is less than the estimate of one that has been used recently by the ACCC and other Australian regulators when examining infrastructure assets.

The ACG have examined betas for electricity distributors but not in the same frame-work that they have adopted for the DBCT research. One strongly suspects if they had adopted the same approach, they would have reached the same conclusions as they have for DBCT. That is, that there is over selected periods "virtually no correlation between the underlying demand for DBCT services and the state of the domestic Australian economy" and therefore they would have reached a conclusion of a significantly lower ß for electricity distributors had they adopted the same approach as they did in the current matter.

Their conclusion that the operating cost ratio is expected to have a major impact on asset beta is flawed. The formula in Brealey and Myers referred to implies a fixed asset beta of zero which is clearly wrong for long life assets, e.g. buildings, irrespective of the duration of the regularity period. Moreover this low level of cash operating costs relative to income or revenue of DBCT one would expect that it is no different for electricity distributors and therefore the same point could have been made there. The issue of operating costs is considered further at section 3.3. The ACG

conclusion, that "Clearly DBCT has different risk characteristics from many regulated utilities in Australia", is far from proven.

The proxy company betas that ACG have chosen are questionable. Their calculations for the Port of Tauranga cannot be directly translated to Australian data even if they were accurate and they are far from that. One cannot directly translate the data or estimates from foreign countries to Australian companies and the adjustments made by ACG were inadequate for that task because such securities are not traded on Australian markets and amongst other factors they took no account of foreign exchange movements.

The Draft Decision uncritically accepts the ACG case for an asset beta of between 0.3 and 0.4 for the DBCT which is considerably below the asset betas involving infrastructure pricing decisions of other regulators and previous QCA decisions. The results of this assumption have a significant impact on the revenues of the company and while the ACG coverage is extensive of alternative proxies for DBCT's beta they all fail to make compelling economic or statistical reason for a significant change asset or equity beta.

2.2 Summary:
The Draft Decision adopts unconventional CAPM parameter estimates and does so with unconvincing reason. The parameters estimates it adopts for the asset beta are not supported by sound logic but instead are quite subjective. The Draft Decision ignores the inherent uncertainty in CAPM parameter estimates and adopts low values for parameter estimates that could not be supported by conventional statistical uncertainty tests.

3. Logical Errors in the draft determination

DBCT is not necessarily low risk

The Draft Decision purports to demonstrate that Dalrymple Bay Coal Terminal (DBCT or *The Terminal*) is a low risk asset. This is used to justify low asset betas and ultimately a low cost of capital.

The underlying assumption of the Draft Decision with respect to DBCT's asset beta is that DBCT has unique risk characteristics which:

"…provide DBCT with low systematic revenue risk and low cost risk, making the overall net revenue stream relative invariant to shocks in the domestic economy." (see page 2 of the Executive Summary of the Allen Consulting Group (ACG) report on betas)

The "unique characteristics" of DBCT are listed by ACG as:

- An internationally diversified ultimate customer base.
- Take or pay contracts.
- DBCT has very low operating cost risk.
- Expansion risk is largely mitigated by contracts.

We address these issues below.

The ACG report and the Draft Decision totally ignore the fact that PIF as the owner of the asset is a small capitalisation company and as such it should demand a risk premium in the investment market. Indeed, ignoring this and setting a too low cost of capital may damage the asset value in the market place which in turn will result in a *higher* demanded investment return – a higher cost of capital.

3.1 Customer base of DBCT is not low systemic risk

The demand for the services of DBCT is derived from the demand for coal, largely by international steel manufacturers and electricity producers (in DBCT's case the majority of the exported coal is for use in steel manufacturing) which are said to represent a well diversified international group of customers. These characteristics of the derived demand for the services of DBCT are not unique in an open economy like Australia. There are many products and services that owe their demand ultimately to international customers, for example, certain sectors of the electricity industry largely provide energy for offshore production e.g. alumina, a number of rail networks are largely transporting goods that finish up in international market places, and most ports would face the same derived demand from international consumers. DBCT is not unique in these characteristics and yet when the regulators have reviewed a number of these

facilities they have not chosen to highlight this characteristic as unique. The claim is made in the same context that the output of DBCT is not highly correlated with the Australian economy and whether this is unique or not is an assertion without evidence of the output of, for example, electricity, rail and other ports for their correlation with the Australian economy. We suspect that for many of them and over a number of different time periods there is very little correlation with GDP. In which case, there is no compelling reason to assert that the Terminal is unique in that characteristic.

3.1.1 Take or Pay Contracts.

Current contracts require coal or shipping customers to pay approximately 45% of their contracted amount even if the coal is not being shipped. We also note that the interaction of the take or pay and the throughput rebate provisions in the current contracts would also mitigate against volume risk. However, contracts of this type are not particularly unique, in fact, in the electricity industry we believe there are base load contracts that are not dissimilar. Indeed, many base load electricity generators would have much more than 45% of their revenue effectively under-written by contracts to take or pay. We need look no further than Prime Infrastructure itself which has offtake contracts in place with regard to its electricity generation investments, which were negotiated in a normal competitive commercial environment and which provide substantial revenue certainty.

3.1.2 The expansion risk is largely mitigated by contracts.

This is true of most companies in most industries. One does not usually go ahead and make major investment decisions without some form of forward contract. It does not reduce stranded asset risk as the ACG comment implies. There is effectively nothing unique about DBCT with respect to expansion risk.

3.1.3 Revenue Caps effect on Systematic Risk

A revenue cap or even a revenue guarantee does not necessarily reduce systematic risk. It is a function of the time period of the cap and whether it is nominal or in real terms. For example, a long term government bond that is only to be held for a short period can be a very risky instrument under an economy experiencing interest rate uncertainty. Similarly, a contract that is written for a much shorter period than the life of the assets of an entity, even though there are opportunities to roll the contract over, can still leave the entity with a lot of systematic risk. A typical example would be the lease contracts on property rental where the contract is renewed at regular intervals. While in place, the lease contract offers a reasonably certain income stream (apart from defaults) but when the lease contract is renewed all the risk is concentrated in the renewal period. The risk in owning real

estate cannot be contained in the long run by having contracts in place to set the nearby rentals. It only controls it over the period of the contract.

We understand that the existing DBCT contracts are essentially five year rolling contracts, while the assets are very long lived assets

Using the reducto ad absurdum argument one could set contracts on a weekly basis and even though there may be contractual certainty of the income for the week each time the contract is renewed at a new income level, the company faces a change and therefore potential systematic risk. Unless the period of the contract is coincident with the period or duration of the assets of the entity, contracts do not necessarily remove uncertainty and systematic risk. This issue, to the best of our knowledge has not been addressed in any of the papers or taken into account in the Draft Decision. The ACG's conclusion stands as an unsupported assertion.

3.1 Summary:
The Draft Decision assumes that attributes of the Terminal are unique to DBCT and they use this to justify unconventionally low CAPM parameter estimates. We can see little or no evidence to verify that these attributes are indeed unique. We believe that many of these so-called unique attributes are common to infrastructure assets. Hence the argument for a lower cost of systematic risk is flawed.

3.2 PIF is a small cap stock

The Draft Decision totally neglects the fact that the owner of the asset, PIF, is a small capitalisation stock. The opportunity cost of capital of any asset is that applicable for *investors* in the asset, in the case of DBCT this is PIF. The Draft Decision is totally silent on this point and presents all its calculations of returns as if the asset were held by a large cap investor. It must be acknowledged that the cost of capital for any investment is just the investors' expected returns. Cost of capital and investor expected returns are just two sides of the same coin.

PIF is ranked about 150 on the ASX so it is well inside the Small Capitalisation universe of the ASX, typically taken by professional investment managers to be the ex-Top 100 stocks. These investors demand a premium for investing in small cap stocks and so their assets must be valued using this premium.

Regulators must recognise that their determinations are meant to reflect the appropriate investment return on the asset. It is their role to determine what is "appropriate". This investment return is typically called the company's

cost of capital and it is usually modelled by the CAPM as if the only model of investment return ever relevant to investors was the CAPM. This is patently false. The CAPM fails in many cases. The CAPM allows for one risk only, the systematic correlation risk with the market. The undeniable logic of the CAPM is the very severe result that no beta risk equates to no risk premium. This is patently nonsense. The beta of a stock that never trades is zero so the CAPM would force us to award such an investment a risk free rate of return. No sensible investor would accept the same return as readily redeemable risk free money in the bank as for an investment that was so illiquid that it could not be redeemed without extensive efforts.

If PIF owned only regulated assets, it would be incongruous to value its set of assets as if they were owned by large cap investors. This would lead to the contradictory outcome of the assets within the company being valued at a low rate of return (a low discount rate via the CAPM) while real investors in the firm demanded a high rate of return on the bundle of assets.

If the asset is held within a small capitalisation business then the asset itself must be a small cap asset, else the market would need to be totally inefficient in valuing the possessing business. The professional investors in PIF are the small cap managers of Australia and they would demand much higher investment returns than the notional figures ensuing from the CAPM.

We thus must use the appropriate discount rate for valuing the asset that reflects the discount rate typically used for the small cap owners of the asset. This does not automatically mean the CAPM should be applied.

For example, if regulators, naively using the CAPM, were called upon to control the room rate for a small rural motel then without doubt there would be an almost zero correlation between the profit derived from the rooms and the Australian stock market. There might be a little bit of income effect so generously there might be a beta of 0.1. This would translate into an allowed return on equity of a notional 6% pa (5.4% risk free rate + 0.60% risk premium). In terms of investor multiples, this is an equity multiple of about 17. But in the market place motel room rates would trade for multiples much closer to 2-3. These multiples are equivalent to a return of above 30% per annum which is typical for small assets. Under a regulated environment which only allowed a 6% return, no further rooms would ever be replaced or new ones constructed.

There is clearly a continuum of risks that begins with CAPM-type risks at one end, applicable for large capitalisation assets, through to a high illiquidity type risk at the other end, typically small capitalisation assets, in which market multiples are the appropriate model and CAPM is totally inapplicable in practice.

There is much research around the world that indicates small cap investors demand risk premia over that of the standard CAPM. Whilst there is much debate about explaining and modelling the small cap premia, there is little

debate that it exists. From the point of view of investors and regulators, it is sufficient only to recognize its existence and allow for it in their determinations.

One of the most well-published research results on aspects of investing were those of the early 1980's that purported to discover that after adjusting for risk, small capitalisation stocks out-performed big capitalisation stocks. No one was surprised that small cap stocks made returns greater than big cap stocks as they are inherently riskier than big cap stocks. What was surprising was that this excess performance did not disappear when risk was taken into account as published by Ralph Banz in 1981.

Although definitions of what constitutes "small" cap vary, in the USA the Russell 2000 Index is the most common benchmark for small-cap funds. It includes companies with market capitalisation between US$20 million and US$1.5 billion so some of these are rather big by any standard.

For the 50-year period ended December 31, 2001, $1.00 invested in large-cap stocks would have grown to $286; the same investment in small-cap stocks would have grown to $374 (source: AXA small cap website).

Dimensional Fund Advisers (DFA) was set up in 1982 to exploit this investment attribute. As in Banz's study, the fund would invest in stocks within the smallest two deciles as measured by market capitalisation. (The name of the fund was "9-10" which derives from the bottom two deciles.) At first things went according to the research. From July 1982 to June 1983, DFA's small-cap fund returned nearly 100%. Then they suffered the flip side of the small cap effect - from 1984 to 1990 small caps had their worst period ever, making just 2.6% pa against 14.7% for the S&P 500 (a proxy for big cap stocks).

Research over longer periods demonstrates the difference in returns for small versus big cap stocks. The following Table 1 is taken from the work of Ibbotson and Sinquefield. It shows that there has been a strong premium for investing in small companies.

Table 1: Small Cap Premiums

Smaller Public Companies Have Historically Resulted in Higher Annual Returns to Investors [1]

Size Decile	Average Company Market Value (Millions)	Average Annual Total Returns 1926-1994	Average Annual Risk Premium Above Risk Free Treasury Rates, 1926 –1994
1	$14,193	11.01%	6.31%
2	$3,509	13.09%	8.39%
3	$1,826	13.83%	9.13%
4	$1,114	14.44%	9.74%
5	$730	15.50%	10.80%
6	$484	15.45%	10.75%
7	$292	15.92%	11.22%
8	$194	16.84%	12.14%
9	$104	17.83%	13.13%
10	$41	21.98%	17.28%

1. Stocks, Bonds, Bills and Inflation 1995 Yearbook™, Ibbotson Associates, Chicago (annually updated by Roger C. Ibbotson and Rex A. Sinquefield).

The market risk premium has usually been calculated as the difference between the market index and the risk free rate. The market index is usually taken as the S&P 500 in the USA and the S&P/ASX All Ordinaries index in Australia. These are market capitalisation indices so they are dominated by the large capitalisation stocks. The historical market risk premium is usually given a measure of about 6% pa which is close to the large capitalisation measure in Table 1.

An explanation for the excess performance of small cap funds, even small cap index funds, is given by William J. Bernstein in his *Frontiers* as "A small cap index fund cannot possibly own all of the thousands of stocks in its benchmark; instead it owns a "representative sample." Further, these stocks are usually thinly traded, with wide bid/ask spreads. In essence what the folks at DFA learned was that they could tell the market makers in these stocks, " we don't have to own your stock, and unless you let us inside your spread, we'll pitch our tents elsewhere. Further, we're prepared to wait until a motivated seller wishes to unload a large block." In a sense, this gives the fund the luxury of picking and choosing stocks at prices more favourable than generally available. Hence, higher long term returns.

These observations are strongly indicative of a liquidity effect. The small cap effect could just be a manifestation of this illiquidity. The beta of a stock that does not trade is zero. The classic CAPM would give a silly result that such a stock should earn the same as a government bond yield. No one would truly believe that such a stock is low or zero risk. Rather, the

risk is all liquidity risk and one would certainly want compensation for bearing that risk.

Whilst the data is not as extensive in Australia as in the USA, we still have sufficient historical data to exhibit the same phenomena in Australia. *But*, when we measure the risk via the CAPM parameters, they are *lower* for small caps funds than for large cap funds, which is again counter intuitive. The following Table 2 has these results.

Table 2: Market risk & return 1974-2004

	Top100	Ex100	AOI
Mean	11.06%	11.80%	11.85%
Volatility	21.19%	16.92%	20.16%
Correlation	0.993	0.873	
Beta	1.04	0.73	

These results seem to suggest that small company funds have *lower* volatility and lower betas than high capitalisation funds. However, they make higher returns than the big cap stocks. The problem with these data is that they use monthly returns and lack of liquidity for small stocks means that they do not react in price as quickly as do big cap stocks. Hence the apparent lack of risk. Annual return beta estimates as opposed to monthly return beta estimates give betas of about 1.2-1.3 which closer reflects the risk in small cap stocks.

We are left the clear result that the standard CAPM model does not work for public small cap stocks.

3.2 Summary:
The Draft Decision totally ignores the required investment return for small capitalisation assets that is applicable for DBCT. Instead, it applies the CAPM as if the decision was being applied to a large capitalisation asset. There is much evidence around the world that investors in small capitalisation assets require a premium above the CAPM. Indeed, the CAPM would rarely be used to value small assets as it totally ignores their important risk attributes. Regulators should not be wedded to a model that is clearly inadequate in the market they are examining.

3.3 Low operating cost ratios and short term EBIT certainty do not automatically imply a low risk asset

Electricity production falls into this category and yet the regulators have not seen fit to reduce the asset betas of electricity transmission or distribution service providers to anywhere near the level that the Draft Decision has chosen to do.

The assumptions underlying the theory on low operating cost implying low asset risk are very restrictive. It is based upon a strict view of fixed costs as invariant so that the assumed beta of "fixed costs" is zero. But many costs are the income of someone else. In the medium to long run, fixed costs will change and they will not really be fixed. They may be adjusted at one point in time (eg when a lease is re-negotiated) and all the risk is realised at that point in time. This renders the CAPM version of measuring risks in costs a very inadequate tool. Apparently the EBIT is stable in the short term but then suffers a shock at point of re-negotiation. The short term beta is close to zero but the re-negotiation event beta is quite high. This is the same problem as the lack of trades with small cap stocks giving an artificially low estimate. The CAPM assumes risks evolve in some defined statistical manner. But the CAPM is totally silent about what the measurement interval should be for calculating returns. Individual analysts impose their own criteria on the model, such as monthly or weekly or even daily return intervals. These intervals might be totally inappropriate for costs which evolve in the long run and so the analysts derive artificially low beta estimates.

In the market place, returns on assets will reflect the markets' consensus of what the totality of revenues and costs will be in the future. The consensus will capitalise all anticipated revenues and costs into the one metric of market price. It is all but impossible to decompose this into its various components of revenue and costs. The return on any asset is nearly always a mixture of different risk items. For example, the next dividend on a stock may already have been declared (equivalent almost to "money in the bank") so there is next to no risk in the dividend. *In theory*, one should value the stream of dividends as initially low (or zero) risk and the more future dividends as a higher class of risk. In practice, we cannot do this. We only observe the one capitalisation value, the current share price, which blends all these risks into one metric. Nor can we separate out the risk of revenue and costs and value them at different risk classes. If we know, for example, that we should discount the net profit flow at a 10% discount rate but the costs are low risk (eg just risk free 5%) then we must necessarily discount the revenue stream at a *higher* rate than 10% in order to get a consistent value.

Unfortunately, this is an academic exercise because nearly all the returns we observe in the market place are blends of various risks and it is, in practice, impossible to untangle them out of the one share price series.

If we knew that the market place rated the risk of different companies against each other in terms of operating leverage then we could unwind those assumed formulae. Alas, the world is not that simple and so it remains a theory that could only be observed and tested in the broad and long term and then with many caveats.

The following is a quote from Lally.

If firms have linear production functions and demand for their output is the only random variable, then firms with greater operating leverage (higher fixed to total operating costs) should have greater sensitivity to real GNP shocks because their cash flows will be more sensitive to own demand, and hence to real GNP shocks. A number of papers including Rubinstein (1973), Lev (1974) and Mandelker and Rhee (1986) have modeled this. However the assumptions noted above, which underlie this work, are very restrictive. Booth (1991), by contrast, examines a perfectly competitive firm facing price uncertainty, and reaches the opposite conclusion about the sign of the relationship between operating leverage and beta. In respect of empirical work, Lev (1974) shows that operating leverage is positively correlated with equity beta, for each of three industries. Mandelker and Rhee (1974) refine the procedure and reach the same conclusion in respect of a set of firms spanning numerous industries. However Lev's conclusions are specific to the three industries examined. Furthermore Mandelker and Rhee's 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 set. These concerns about lack of generality of the results are prompted and supported by the theoretical literature just surveyed.

(under-lining added for emphasis)

It is obvious from this quote and the leading assumption that this is a very narrow view of the world. One would be loath to make the heroic assumption that it universally applied and as a consequence awarded rates of return on the basis of this theory.

3.3 Summary:
The Draft Decision relies on a totally precious theory about operating leverage and cost of capital. It is not easily verified and so remains an arcane aspect of cost of capital. It is quite inappropriate to award a low cost of capital with this argument as a central plank. In addition the argument that short term EBIT is stable automatically implies a low cost of capital is a nonsense argument. There are many realistic examples where the risk is short term stable and then concentrated at a point of re-negotiation. Any company that has hedged its income at an uneconomic rate manifests short term EBIT certainty until the moment of truth arrives (eg Pasminco).

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4. Beta comparators are poorly chosen

4.1 Port of Tauranga is a questionable comparator

The Draft Decision via their consultant's report (ACG) have used the Port of Tauranga (POT) as a comparator for DBCT. However, it is not at all obvious that POT is a valid comparator. It is a modest sized company in a very modest sized economy. Even accepting it has similar operating characteristics, we nevertheless need similar *investment* characteristics because the comparator is meant to give a proxy for the cost of capital. We cannot take a company out of its environment and assert that its beta will be appropriate in Australia. It is the correlation of the returns of POT against that ASX market index that are appropriate for a domestic Australian cost of capital. There is no evidence supplied anywhere that the beta of POT against the NZ market index would be a valid estimate applicable in Australia. "Importing" betas is a risky approach to estimating costs of capital, especially when they are derived in a very small economy by world standards.

4.1 Summary:
The Draft Decision too readily adopts a small company (POT) in a small economy as a reasonable comparator for DBCT. The Draft Decision relies too much on apparently similar operating characteristics when determining a cost of capital when *investment* characteristics (who are the investors? what index class is the asset in? what is its capitalisation ranking?) are just as important for determining a cost of capital.

4.2 LPTs do not have low systematic risk

The Draft Decision makes the claim that the ACG report makes a compelling case that the risk of the Terminal asset is low. ACG in turn used the analogy of listed property trust (LPT) risk to partly explain the asset risk of the Terminal. In doing so they perpetuate the myth that LPTs are low risk. All the purported case for LPTs does is to demonstrate why the CAPM may often *fail* and instead of making a case for LPT being low risk, it only underscores the case that a great deal of caution is needed in accepting the CAPM without criticism.

The Australian Listed Property Trust market (LPTs) is a very actively traded and highly regarded investment market. The trading in these trust units is very liquid and it is common to see pension funds have an allocation to LPTs in the order of 5%-10% of their total assets. This represents a very

large amount of capital that is invested in securities over the underlying physical real estate. Direct or physical property investment comprises investments mainly in office blocks, hotels, industrial and commercial properties. Unlike the trust "paper" units which are very actively traded, these physical properties are very infrequently traded. Various reasons are put forward for this, including the very high transaction costs associated with the trading of property and the lack of depth in the supply of buildings. Once allocated into market strata of various types, there are not that many candidates within each stratum.

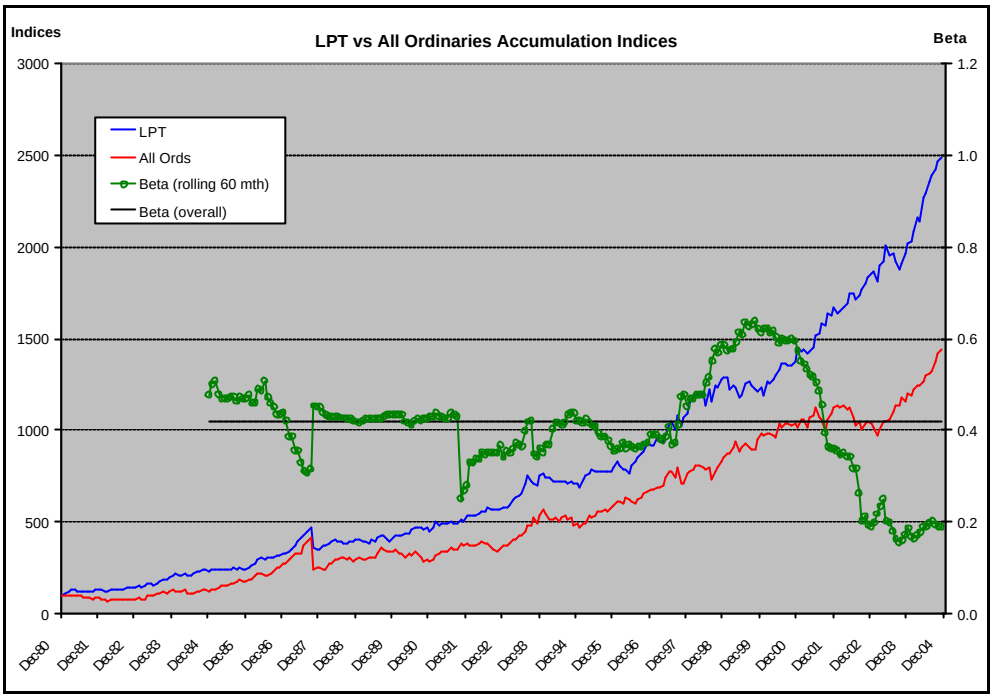
Whatever the reasons for the lack of liquidity in the physical market, one cannot claim that these apply to the trust *securities* market. These units are very well traded. So it is perplexing that we find the CAPM fails for such a well attended market. Indeed, the total returns on the LPT market are higher than returns on the broad market (AOI accumulation index) but they have lower apparent risk, either measured as annual volatility or by beta. The results are as in Table 3.

Table 3: LPT vs. AOI risk and return: 1980 – 2004

	LPT	AOI
Mean pa.	13.44%	11.16%
Volatility pa.	11.92%	18.98%
Correlation	0.67	
Relative risk	0.63	
Beta	0.42	

To see whether this is an unusual result that may have been the result of a temporary aberration, the data for the LPT and AOI accumulation series (based at 100 in January 1980) are plotted in Figure 1 along with the rolling 5 year beta as well as the full period beta.

Figure 1: LPT vs. Broad market 1980 -2004



Apart from the period in the early 1980's and the most recent two years (2002-2004), the LPT market more-or-less moved in line with the broad market. Yet the 60-month beta has remained in a band between 0.2 and 0.6. Most of the time, the beta estimate has been a steady 0.4. This is perplexing. The LPT market makes higher returns but at seemingly lower risk. A careful examination of the LPT and AOI plot in Figure 1 will reveal that the lower volatility is visible in the LPT accumulation index compared with the AOI accumulation index.

Because the underlying physical real estate does not trade very often, it is instead re-valued according to valuation principles. It is well-known that valuations are typically more stable than market prices. Proposed reasons for this are that valuations are often done relative to other recent valuations and this induces an artificial smoothness in the series of valuations. Perhaps the lack of volatility in valuation appraisals feeds through to the LPT market so that the LPT market also exhibits an artificially low volatility. Whatever the reasons, the LPT market shows behaviour inconsistent with the CAPM. For such a low beta, we would expect LPTs to make just 40% of a risk premium compared to the general market. Instead of seeing LPTs make 60% less of a premium, we actually observe they make about a 50-60% *greater* premium (assuming a market risk premium of about 6% pa.).

This is a conundrum. There is certainly no shortage of overseas property into which one could invest either directly or via REITs. There is no competitive advantage of foreigners investing into Australian LPTs so there is no reason to propose an international benchmark in place of the domestic All Ordinaries Accumulation index. We are left with the hint that investments in LPTs include an element of vicarious illiquidity induced

from direct property investment, even though the LPT units are themselves well-traded.

Whatever the reason, it is quite invalid for the Draft Decision to rely on assertions that LPTs are low risk and that the Terminal might have characteristics of these property assets.

4.2 Summary:
The Draft Decision uncritically accepts the ACG assertion that listed property trusts have low risk and that this should be attributed to DBCT. There is an implicit sequence of assumptions made that DBCT has some real-estate like characteristics, that these characteristics are captured in LPTs and that the CAPM captures the systematic LPT risk. These are heroic assumptions. If one accepted that DBCT had real-estate like characteristics one would at least suggest that the closest comparator is direct investment, not LPTs. In any event, the logical chain breaks down at the CAPM assumption. The classical CAPM does not work for LPTs.

5. Calculation Errors

The ACG Report upon which QCA base its Draft Determination makes three errors in its beta work.

1. The PIF beta estimate is wrong.

2. The data period over which they measure and compare betas is woefully short – they ignore the standard errors in beta estimates.

3. The use of too high data frequency to estimate betas – the higher the data frequency, the lower the beta estimates tend to be.

5.1 The error in the PIF equity beta calculation

This is a minor point because everyone seems to accept that the listing period of PIF is too short – about 29 months. However, the beta estimate for PIF in the ACG report is wrong. It is actually positive, not negative as claimed. See the following Table 4 for the PIF beta estimate made over the same period as the ACG report.

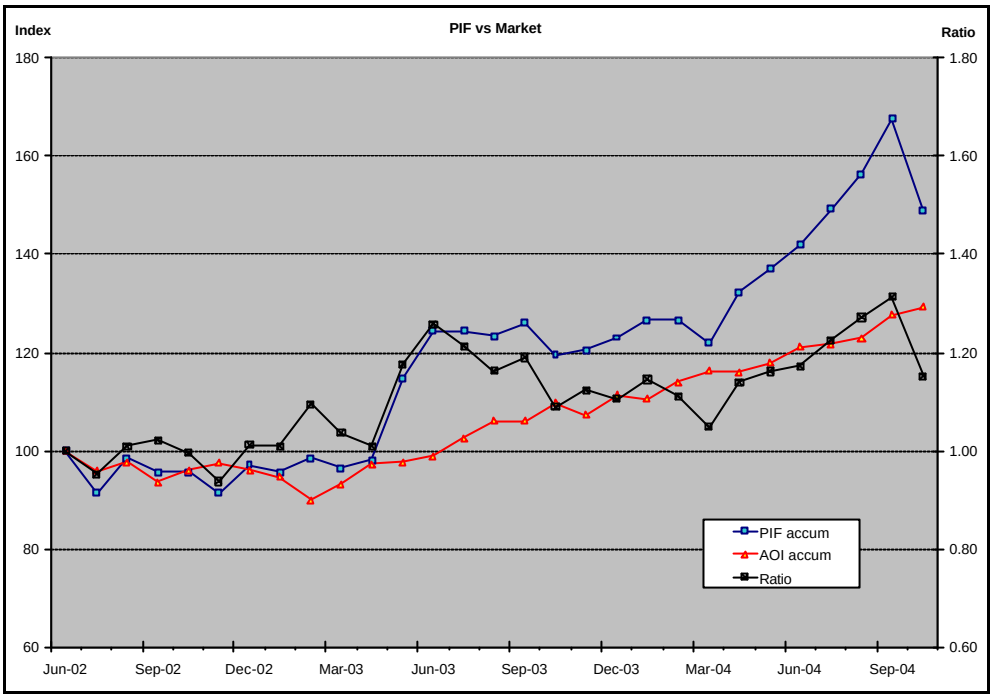
Table 4: PIF beta estimate

	Estimate	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.01	0.01	1.25	0.22	-0.01	0.04
Beta	0.10	0.44	0.23	0.82	-0.80	1.01

One can observe in the plot of PIF versus the market (see Figure 2) that they have both tended to rise over the period so the beta is *a priori* a positive value but there is too much short term noise to get any reliable estimate. Note from Table 4 that the PIF calculated beta could be anywhere from - 0.80 to 1.01 based on these data!

While it is obviously too short a period for the PIF beta estimate, curiously ACG are prepared to compare beta estimates based on 36 month intervals. These are far too short to make any meaningful comparison as we see in the next section. One cannot sensibly assume that 29 months is too short for estimating betas and then make claims of comparison in beta estimates based on two 36 month intervals. However, we are asked to accept this in the ACG Report.

Figure 2: PIF versus the Market



5.1 Summary:
The ACG report incorrectly suggests the PIF beta is negative when it is indeed positive. No weight is given to this point because it is readily accepted that PIF has been listed for such a short time. However, in contradiction to this sensible approach, we are asked next to accept comparisons of betas calculated over 36 month intervals. This is an inconsistent approach to accepting inherent uncertainty within beta estimates.

5.2 The missing uncertainty in the beta estimates.

The estimates of betas, both equity and asset betas, are based on woefully short intervals as derived in the ACG Report. ACG estimate betas in two intervals of 36 months each and attempt to indicate that betas have declined in the latter 36 month period. The amount of uncertainty in such short time intervals is so great that it renders any such comparisons meaningless.

The standard solution for estimating betas is to use ordinary least squares (OLS). The OLS approach relies on several assumptions which are notoriously difficult to establish in finance.

1. The error terms or the residuals from the CAPM model fit have constant mean and variance.

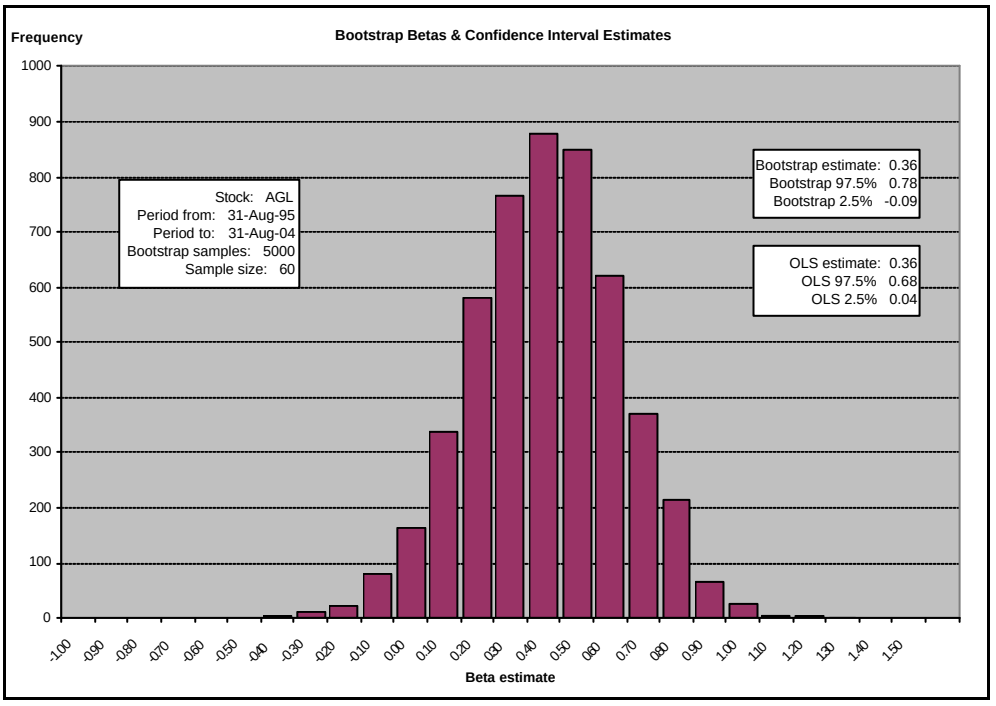
2. The residuals from the fit are independent of each other.
3. The residuals from the CAPM estimation follow a given distribution, usually assumed to be the normal distribution.

If these assumptions are at least broadly correct or reasonably consistent with real life and thus approximately satisfied, OLS provides the optimal estimates and uncertainty intervals for the fit coefficients. However, if the assumptions are not at least approximately satisfied, then the OLS estimates may no longer be optimal (and may in fact be quite wrong). Applying transformations and weighting are common approaches to fitting when the assumptions are not satisfied.

Bootstrap fitting provides an additional alternative. The bootstrap is a non-parametric method for calculating a sampling distribution for a statistic. The bootstrap calculates the statistic with *N* different sub-samples. The sub-sampling is performed with replacement. In the context of fitting, we are estimating the coefficients of the fit and providing bootstrap estimates of the uncertainty.

To demonstrate the point, we will estimate the equity beta of AGL based on a ten year window (ie 120 months) of returns, from 1995 to 2004. The overall beta estimate is 0.36 and the range of possible betas is 0.04 to 0.68 based on these 120 observations assuming that ordinary least squares is applicable. If we take repeated samples of 60 observations (5 years of returns) and estimate the betas for these many samples (5000 samples in this exercise) we observe that betas may be anywhere between -0.09 and 0.78. This gives one very little confidence in the beta estimate: see Figure 3.

Figure 3: Range of possible AGL beta estimates



There is so much error in beta estimates that one must be very careful in taking short sample data. Indeed, with too little data it is best to assume a null hypothesis of equity beta = 1 because we know that is the average of all listed companies. Lacking enough data, we cannot begin to claim that a beta is different from the average.

If we now use 36 months as a sample size, then it becomes obvious that the beta estimates are so imprecise that any comparison is meaningless.

5.2 Summary:
There is so much inherent uncertainty in beta calculations that one should be very cautious about making comparisons based on small sample sizes. Indeed, there is so much noise in estimating the beta for an individual stock that it is almost impossible to distinguish the stock beta from the sector beta. In which case, the sector beta is probably a more reliable estimator for beta risk.

5.3 Higher frequency data errors

Faced with this level of uncertainty, people are tempted to use more frequent data intervals, such as weekly or even daily return estimates. This is a foolish activity. More data does not mean more information. The beta parameters are meant to capture the systematic performance of a stock with the market as a measure of how the fortunes of an asset or a company are correlated with a broad market measure of asset values. As such, the beta estimate captures the effect of economic cycles in the value of the company and the general market. At any point in time, the market, including the company, is valuing the future prospects of all the listed companies through a number of future economic events. The beta estimate captures movements in how these assumed prospects move together as the markets' views of future outcomes are being updated. The problem is that we need to estimate the correlation of changes in the stock's prospects with changes in the general market prospects so that we can estimate how much systematic risk that investors will have to bear in future within their portfolios.

In this context, some stocks may not trade for a significant time so that we have to wait for observations of trades before we can see the revised valuations. If we foolishly tried to estimate the equity betas of such (typically small) stocks based on daily returns we would observe that often the stock price did not move while the market moved frequently (the market typically moves in the range -2% to +2% per day). We would thus observe very low or even zero correlation between the stock and the market and so we "conclude" that there is a zero beta. This is clearly nonsense as the risk in small stocks is certainly not zero – it is an artefact of our foolish research design of using high frequency data.

This issue is still pervasive in large stocks – it is not confined to illiquidity issues with small stocks. For large and medium sized stocks, there can be a lot of noise in share returns as investors come and go on a frequent basis. Hence weekly and daily betas for even large stocks can be quite misleading if applied to long term applications, such as asset valuation out many years. This is because there is much high frequency noise around the signal we want to extract – the correlation of the valuation of future prospects. Hence the beta estimates are invariably very imprecise when based on high frequency data. The confidence intervals of the beta estimates are very wide indeed. They are already wide enough when we use monthly data as seen above. Moving to high frequency weekly or daily data solves nothing for the reliability of beta estimates. It is a delusion that more data equates to more information when we move to high frequency data.

5.3 Summary:
More data does not equate to more information. Beta is meant to measure the systematic risk of a stock as it unfolds through future economic events. Measuring returns in weeks instead of months does not reveal any further insights into future prospects compared to measuring in months. All it does is introduce more noise into the beta estimates and make them more unreliable. It is a fruitless exercise that obfuscates the issues being addressed.

6. Summary

The Draft Decision exemplifies some of the problems of regulation outlined by the recent Productivity Commission paper on National Competition Policy. Specifically, it exhibits the problem of placing much emphasis on the "building block" approaches to price setting. This approach fails to give sufficient attention to linking regulated price changes to what is happening to prices for comparable sectors in a competitive environment or what is happening to prices in the economy at large. This is exemplified by the QCA Draft Decision totally ignoring that the terminal asset is held within a small capitalisation stock and would accordingly warrant a small cap cost of capital premium. There are many issues of attributing risk characteristics to the terminal which we find highly questionable. Unrealistic certainty has been awarded to low cost of capital estimates that we find are quite unjustified. Many arguments justifying this low cost of capital are more accurately classed as assertions rather than objective evidence. We consider that there have been no compelling arguments put forth why the Terminal should not be awarded a sector cost of capital, as awarded by prior regulators.

The CAPM is weak when applied to individual stocks. The inherent data errors make any estimates rather unreliable. Hence regulators need to be very confident of the validity of the beta estimate proposed when it is different to previous estimates applied by regulators otherwise all they are achieving is creating another overlay of risk in the form of regulatory uncertainty, the cost of which will ultimately have to be borne by producers and consumers.

The Draft Decision adopts unconventional CAPM parameter estimates and it does so with unconvincing reason. The parameter estimates it adopts for the asset beta are not supported by sound logic but instead are quite subjective. The Draft Decision ignores the inherent uncertainty in CAPM parameter estimates and adopts low values for parameter estimates that could not be supported by conventional statistical uncertainty tests.

There are assertions made in the Draft Determination and the ACG report that the attributes of the Terminal are unique to DBCT and this is used to justify unconventionally low CAPM parameter estimates. We can see little or no evidence to verify that these attributes are indeed unique. We are not convinced that many of these so-called unique attributes are not common to infrastructure assets. Hence the argument for an unconventionally low cost of capital is not sustained.

One of the major weaknesses of the Draft Decision is that it totally ignores the required investment return for small capitalisation assets. DBCT is such an asset. The Draft Report and the ACG report assume the CAPM can be applied to DBCT as if the decision was being applied to a large capitalisation asset. This runs counter to much evidence around the world

that investors in small capitalisation assets require a premium above the CAPM. Regulators must guard against being wedded to a model and a process that is clearly inadequate in the market they are examining.

Much import is made about the operating leverage effect on the cost of capital. This is a theory which is not widely adopted. It is quite inappropriate to award a low cost of capital with this argument as a central plank. A related assertion is that a short term EBIT being stable automatically implies a low cost of capital. We find this spurious logic. There are many market situations where the risk is short term stable and then concentrated at a point of re-negotiation. The cost of capital (the investors' required return) will capitalise the risk of these events so that they will look through short term EBIT stability. The cost of capital reflects the duration of the asset, not the short term duration of some income.

The Draft Decision too readily adopts a small company (POT) in a small economy as a reasonable comparator for DBCT. Too much emphasis appears to be placed on apparently similar operating characteristics when determining a cost of capital. This is presumably the argument for selecting POT as a proxy for DBCT. However, for investors it is the *investment* characteristics of the asset that are just as important for determining a cost of capital.

No better example of why the CAPM should not be taken literally is inadvertently presented in the ACG report. The Draft Decision uncritically accepts the ACG assertion that listed property trusts have low risk and that this should be attributed to DBCT. Even if LPTs were a reasonable proxy for any real estate characteristic of DBCT, the classical CAPM does not work for LPTs. It suggests less than half a risk premium performance of LPTs versus the market when indeed they make about 1.5x risk premiums but with just 40% of the systematic risk. Without being able to solve this conundrum, we must nevertheless recognise it is a real investor cost of capital issue and must be allowed for in cost of capital determination.

There is a minor calculation error in the ACG report where it incorrectly suggests the PIF beta is negative when it is indeed positive. This is a minor point because no credence is given to this beta estimate because it is readily accepted that PIF has been listed for such a short time. Paradoxically, we are asked next to accept comparisons of betas calculated over 36 month intervals. This is an inconsistent approach to accepting inherent uncertainty within beta estimates.

There is so much inherent uncertainty in beta calculations that one should be very cautious about making comparisons based on small sample sizes. There is so much imprecision in estimating the beta for an individual stock that it is almost impossible to distinguish the stock beta from the sector beta. Lacking sufficient confidence in the estimate of a stock beta, the sector beta is probably a more reliable estimator for beta risk.

Finally, one cannot invent information by analysing more data points due to a higher frequency data series, such as weekly instead of monthly. Beta is meant to measure the systematic risk of a stock as it unfolds through future economic events. Measuring returns in weeks instead of months does not reveal any further insights into future prospects compared to measuring in months. All it does is introduce more noise into the beta estimates and make them more unreliable.

APPENDIX 1

Dalrymple Bay Coal Terminal

Draft Access Undertaking

Accompanying Submission prepared by Prime Infrastructure (DBCT) Management Pty Limited

19TH June 2003

"DBCT Management commissioned Sandwell, a leading global ports consultant, to provide a benchmarking survey of world-wide coal loading terminals in an effort to establish a reasonable commercial range for the prices of DBCT services.

The Sandwell Report provides a benchmark comparison of the coal loading charge per tonne (converted to A$) for each of the terminals in the sample. The coal loading charge per tonne includes both capital and operating and maintenance charges and is the appropriate benchmark given the interdependency between capital costs and operations and maintenance costs (i.e. higher capital investment, if efficient, leads to lower operating and maintenance costs). A summary of the benchmark coal loading charges for Australian coal loading ports noted in the Sandwell Report is illustrated in Figure A1 below.

Figure A1: Coal loading charge per tonne ($A) vs. port capacity – AUSTRALIAN COAL LOADING PORTS

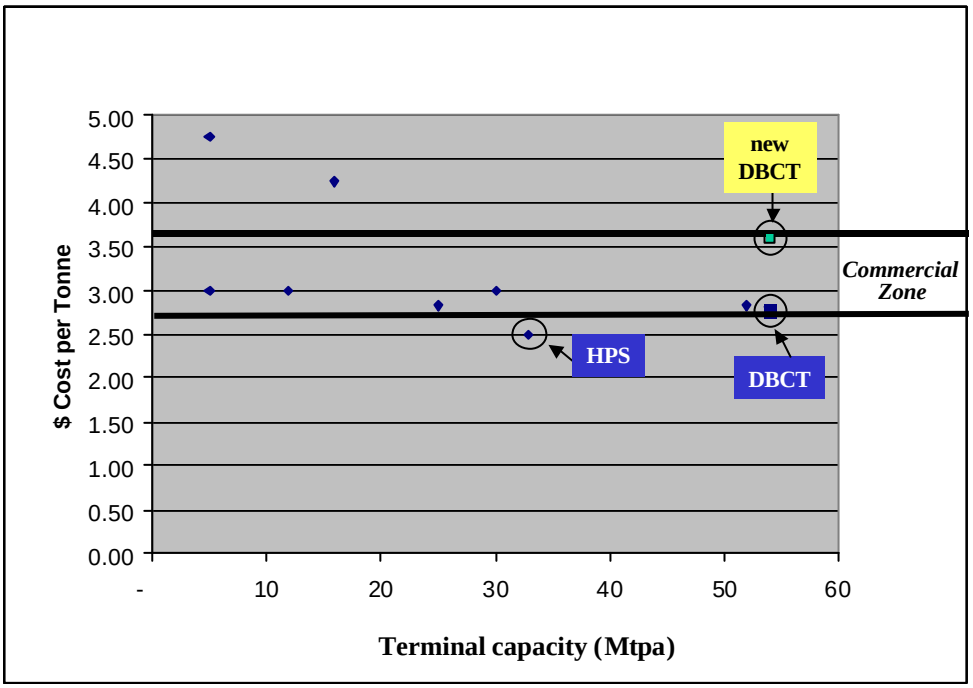
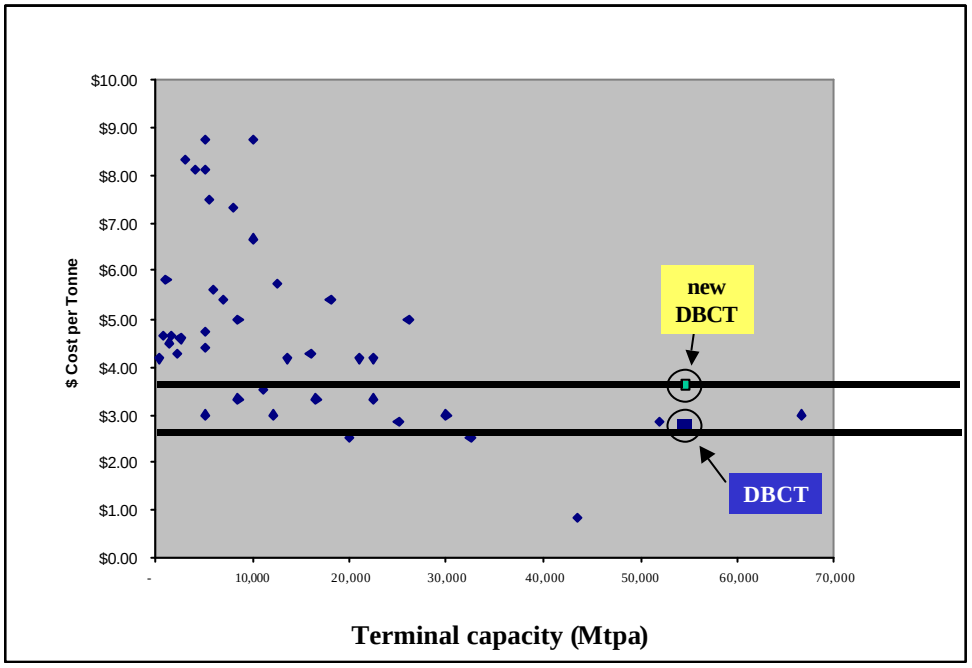


Figure A1 indicates that DBCT's current pricing is at the low end of what might be considered a reasonable commercial range for a coal handling facility of its type. At the current total tariff, the coal loading charge per tonne for DBCT of $2.76 is the lowest in Australia, with the exception of HPS, which is a single user port owned by the coal producer and is therefore not a valid comparison.

Australian tariffs are, in general, among the lowest in the world as illustrated in Figure A2. The commercial range of prices for Australian ports lies at the bottom end of global prices, excluding the Norfolk tariff which seems inconsistent with other data[4]. The DBCT facility is a capital intensive facility (given the reality that it is a deepwater facility with its berths some four kilometres out to sea and its high level of automation) which, along with the third party terminal operator's general efficiency, results in an extremely competitive overall cost to ship product at both the current and proposed tariffs when compared to other worldwide coal handling ports.

Figure A2: Coal loading charge per tonne ($A) vs. port capacity – WORLDWIDE COAL LOADING PORTS



Recovery of DBCT Management's Annual Revenue Requirement ("**ARR"**) and other relevant issues are covered in Chapter 6. Terminal operating and maintenance costs are a direct 'pass through' in the pricing arrangements for DBCT (as discussed in Section 6.4). The Reference Tariff and the ARR deal only with the capital charge component of access charges." – Pages 4 to 6 of the Report.

[4] The Lamberts Point terminal at Norfolk in the US is operated by the railway company that delivers the coal to the terminal. It is likely that the benchmark price does not compare the same scope of services as DBCT.

APPENDIX 2

Comments on Chapter 9 (Cost of Capital) of the QCA Draft Decision

In section 9.2 the QCA gives an overview of its current approach. It describes the weighted average cost of capital equation as version 3 of that reported in the paper by Officer (1994). It is defined as equation 1 in the Overview. However, equation 3 which relates the equity beta to the asset and debt betas using what the Draft refers to as the Brealey and Myers formula is inconsistent with equation 1. The correct formula, which can be derived very simply from equation 1, is the formula that the QCA finished up using and they refer to as the "Conine formula".

The choice of the appropriate WACC model is eventually made to follow the procedures that have been adopted previously which they refer to as the Officer model.[5] It is then asserted by the QCA, presumably on the basis of assertions by Lally that the WACC equation is depicted by equation 1 above assumed capital gains and income are equally taxed. This is obviously false and easily verified if one cared to go back to the original proofs underlying the model (Officer, 1994 and earlier in 1981[6]) one can see that the tax parameter is the effective company tax, it makes no assumptions about the relative tax on capital gains or income that the company make might face. Equation 1 is an after company tax equation.

Capital markets typically trade securities after company tax but before personal taxes and therefore to adopt equations consistent with the prices that are generally determined in capital markets it is wise to adopt a model that is after company tax but before personal tax. To use the alternative as Lally recommends, is to use an after company tax and after personal tax equation. Such a model requires additional assumptions which invariably lead to errors, the assumptions relate to the level of effective personal tax which is typically unobservable because securities are not traded on that basis except in exceptional circumstances.

The QCA decides to retain the WACC equation 1 and to make no change in the value of imputation taxes ("the gamma"). However, the reasoning considering alternatives is flawed although the conclusion that a change is not appropriate at this time is justifiable.

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[5] This title has been conferred by Dr Lally, it is not known by this title elsewhere and it is the most widely used form of WACC equation in the world. It is not the WACC equation that is recommended by Officer as it only gives accurate estimates for investments that are perpetuities and, in effect, have no depreciation. Where assets have finite lives and therefore are depreciable there is a compounding effect between tax and depreciation which creates 'errors" in adopting this model. This can be overcome by adopting the model often described as the "Vanilla" WACC where all tax effects are captured in the cash flows – incidentally this is the model recommended by Officer.

[6] Officer, R.R. [1981], "Measurement of a Firm's Cost of Capital". *Accounting and Finance*, November, pp.31-62.

APPENDIX 3

THE BASIS OF ACG'S CONCLUSION ON DBCT'S ß's

ACG's Assessment of DBCT's Asset Beta

(see page 5 of Analysis of Proxy Betas)

"Assessment of asset betas requires judgment even when the comparator group is drawn from the same industry as the company and its risk characteristics closely match those of the average industry member. In this case, it is not valid to refer to a group of listed port companies when those ports have significantly different risk characteristics to DBCT. Instead, the following list of comparators has been derived after consideration of their relatively low operating leverage and their systematic risk characteristics relative to DBCT:

- *Port of Tauranga (POT) – approximately 50 percent of its revenue is derived from exports of raw materials.*
- *Macquarie Infrastructure Group (MIG) – approximately 65 percent of MIG's revenue is derived from toll roads in the UK and Canada.*
- *Macquarie Office Fund (MOF) – all of its revenue is derived from leasing buildings to a number of Australian governments.*

As instructed by the QCA, ACG has estimated asset and equity betas applying the Conine methodology with a debt beta assumption of 0.10. This approach has been undertaken to achieve consistency with the likely approach to be applied by the QCA in its broader assessment of an appropriate regulatory WACC for DBCT.

Taking account of:

- *(limited) market evidence on Prime's asset beta,*
- *market evidence for the Ports sector.*
- *regulatory decisions by the Office of the Regulator General with respect to Melbourne Ports Corporation and the Victorian Channels Authority;*
- *the asset beta estimates for the group of chosen comparators, and,*
- *evidence that the currently low market estimates of equity and asset betas can be expected to turn up in future.*

The Allen Consulting Group concludes the following:

- *Assuming a debt beta of 0.10, an asset beta range of 0.30 to 0.40, with a mid-point estimate of 0.35."*

The ACG Report makes no stronger or more justifiable conclusion elsewhere in their report when estimating DBCT's asset ß.