GPU GasNet

Asset, equity and debt beta

1 Introduction

The Capital Asset Pricing Model (CAPM) assumes that all returns are normally distributed, that all specific risks are diversifiable and the only risk for which CAPM acknowledges a need for commensurate reward is market risk. CAPM is therefore an under-specified model. Types of asymmetric risk that will be rewarded in the market place but are not captured by the CAPM include liquidity, default risk and asset stranding risk. Accordingly it is necessary to supplement the CAPM to take account of these factors. Clearly there is a difficulty in estimating the appropriate reward for those risks, but techniques are available (eg real options) which are discussed in a separate paper.[1]

This paper discusses the market risk encompassed in the CAPM and includes:

- a discussion of methods to estimate the asset beta in an Australian context;
- a discussion of the appropriate debt beta to use in de-levering and re-levering the equity beta; and
- an estimate of an asset beta range for GPU GasNet.

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[1] Another example of asymmetric risk arises with construction costs. A regulator can only partially insure against construction risk by agreeing prior to construction to accept the eventual actual capital cost of a facility, and in doing so allow the impact of cost blow outs to be passed onto customers. Nevertheless, the regulated business remains exposed to the risk that the market will not support an appropriate return on its asset value with the consequence that some part of that investment is stranded.

2 Estimating asset beta

The CAPM assumes all non-systematic (specific) risks are diversifiable and hence are not provided an expected return in a competitive market. The systematic risk (β or beta) of a firm is the only risk factor incorporated in the CAPM.

The asset beta represents the risk arising from the sensitivity of the operating cash flows generated by an entity's assets compared with the market in general, that is, the market risk associated with an entity's business. Asset betas vary with the volatility of free cash flows and are driven by the sensitivity of those cash flows to fluctuations in the economy.

Asset betas are not directly observable and therefore must be derived from equity betas. The difference between an asset beta and an equity beta reflects the additional financial risk to a shareholder arising from the use of debt to finance the entity's assets. Accordingly, in order to estimate the asset beta for an entity, it is necessary first to assess the observable equity betas and adjust (de-lever) to remove the effect of financing risk from the equity beta.

2.1 Approaches to estimating beta

There are three basic approaches to estimating systematic risk:

- direct measurement;
- comparable companies ("method of similars"); and
- first principles.

Ideally all three will be used and will reinforce each other.

2.1.1 Direct measurement

Equity betas are measured by performing a regression on an entity's returns versus the returns of the market as a whole. For a firm such as GPU GasNet, where there is no time-series of market returns available, direct measurement is not possible. Therefore, a beta will need to be derived using the latter two methods.

2.1.2 Method of similars

Under the "method of similars", a set of comparable (listed) firms is identified, and the average asset beta of those firms is used as a proxy for the asset beta of the company in question.

Given that systematic risk is largely country specific, the most meaningful beta estimates can generally only be derived using domestic comparators. Caution is required in comparing betas of companies operating in similar industries but in different countries as betas reflect the risk of a company relative to the market in which it operates. Adjustment mechanisms proposed to correct for market conditions are currently unproven.

Adjustment factors

Estimates of beta are often adjusted to reflect the fact that since the average beta of the market is one, any estimate diverging significantly from one is likely to contain some measurement error that on average will be accentuating its divergence. Historically betas have exhibited mean reversion in empirical work. In practice this is likely to be a manifestation of measurement error, given the lower (higher) the equity beta, the more likely that it is a measurement issue such that it rises (falls) over time – especially given high standard errors often exhibited by betas.

Equity betas may be adjusted in a number of ways including:

- Blume - $\beta_{e\ adjusted} = 0.67 \times \beta_{e\ raw} + 0.33 \times 1$. This reflects a reasonable prior belief that the beta of a stock is one. This adjustment is also carried out by Bloomberg; and
- Vasicek – which adjusts individual beta estimates towards the average of a peer industry group.

This relationship is also borne out in Australian research.[2]

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[2] The Australian study by Castagna, A. and Z. Matolcsy (1978) 'The Relationship between Accounting Variables and Systematic Risk and the Prediction of Systematic Risk', *Australian Journal of Management*, vol. 3. pp. 113-26, found that it was possible to adjust the estimated OLS beta as follows:

Historically, regulatory bodies in Australia have implicitly adopted the Blume adjustment. Where regulators have explicitly estimated an equity beta (as opposed to considering a business proposal) they have been willing to adopt adjustment factors in their estimates of equity betas:

- The QCA has consistently used the Blume adjustment in its beta estimation for gas, electricity and rail; and
- The ORG used a Blume adjustment in its estimation of beta for the Victorian electricity distribution businesses – despite being criticised that such adjustments unduly favour the regulated business.

2.1.3 First principles

The third approach to estimating an asset beta is to work from first principles. This approach requires thinking about the factors that impact on the sensitivity of a firm's returns to movements in the economy/market. One way to analyse this is to refer to the Arbitrage Pricing Theory research, particularly the seminal empirical study by Chen, Roll and Ross.[3] They find that the factors that explain stock market returns are unexpected changes in real GNP, inflation, market risk aversion and long-term real interest rates. The latter three will

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$\beta_i^{CM} = 0.541 + 0.464\,\beta_i$

A study by Brooks, R. And R. Faff (1997) ,A Note on Beta Forecasting', *Applied Economics Letters,* vol. 4, pp. 77-78 compared a series of adjustments to betas estimated from a market model during the period 1983-1987 and also found that the adjustments based on the following provided a very useful adjustment:

$\beta_i^{BF} = 0.50 + 0.50\,\beta_i$

[3] N. Chen, R. Roll and S. Ross, "Economic Forces and the Stock Market," *Journal of Business,* 1986, pp 383-403.

usually have a similar impact on the systematic risk of firms, so the first factor is the most useful to analyse.

2.2 De-leverage and Re-leverage

Under the approaches mentioned above, we find that asset betas are not directly observable and can only be inferred from equity betas. Since equity betas reflect both the systematic risk from the underlying business (asset beta) and the risk associated with the firm's financing structure, it is necessary to "de-lever" the equity beta, which removes the financing risk.[4] This is accomplished by way of a formula that imputes the impact of the firm's gearing to its asset beta.

A difficulty that arises with estimates of systematic risk is to properly reflect the leverage of the firm. As leverage increases, systematic risk increases. Given the debt level, asset and debt betas, the tax rate and gamma, it is possible to calculate an asset beta from an equity beta. The purpose of this section is to consider the various approaches that have been developed to de-lever equity betas. Each approach implies a different set of assumptions. There are a number of alternatives:[5]

2.2.1 Brealey Myers

The original approach that was adopted simply derives the de-levering formula from the formula from the weighted average cost of capital:

$$\beta_e = \beta_a + (\beta_a - \beta_d)\, D / E$$

where

β_e = equity beta,

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4 Similarly, when seeking to estimate the cost of equity for a firm, it is also necessary to convert the asset beta to an equity beta through a reversal of this process.

5 These formulae are presented in their re-levering form because they are inherently easier to understand in that form.

β_a = asset beta,

β_d = debt beta,

E = market value of equity,

D = market value of debt.

2.2.2 Officer

Officer proposed the following formula, which was used by the Victorian Government in its Victorian gas access application:

$$\beta_e = \beta_a (1 + (1\text{-}T) D/E) + \beta_d D/V$$

where

T = tax rate,

V = market value of the firm (E+D).

2.2.3 Davis (ACCC Victorian gas)

In its Victorian gas decision, the ACCC adjusted for imputation credits using the following formula:

$$\beta_e = \beta_a (1 + (1\text{-}T(1\text{-}\gamma)) (D/E)) - \beta_d (D/V)$$

where:

γ = value of imputation credits,

2.2.4 Monkhouse formula

The ACCC currently utilises what is referred to as the Monkhouse formula.

$$\beta_e = \beta_a + (\beta_a - \beta_d) * \{1 - [r_d / (1 + r_d)] * (1 - \gamma) * T\} * (D/E)$$

where:

r_d = cost of debt capital.

2.2.5 International version

Internationally, the standard formula that is used is:[6]

$$\beta_e = \beta_a (1 + (1\text{-}T) (D / E)) - \beta_d (1\text{-}T) (D / E)$$

This formula does not include consideration of the effect of dividend imputation, but has the advantage of extensive scrutiny and exposure on a worldwide basis. Also, the US does not have dividend imputation so this is the appropriate formula. The UK has a form of partial dividend imputation, but it is not accepted practice there to recognise this in computations of WACC, CAPM or de-levering.

2.2.6 Analysis

So long as the underlying assumptions for the comparator firms and the company that is being estimated are broadly similar, the impact of the various approaches is unlikely to be significant. It must be remembered that the apparent accuracy of all of the techniques is subject to the considerable error inherent in the CAPM model.

One advantage of the Brearley Myers approach is that it is intuitive and easily understood. However, it would appear that the Monkhouse formula most closely reflects the underlying cash flows that are the subject of the analysis.

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6 This formula was developed by T. Conine ("Corporate Debt and Corporate Taxes: An Extension," *The Journal of Finance*, September 1980, pp 1033-1037). It builds upon the work of R. Hamada ("The Effect of the Firm's Capital Structure on the Systematic Risk of Common Stocks," *The Journal of Finance*, May 1972, pp 435-452) by not requiring that debt is riskless.

3 Estimating debt betas

The debt beta reflects the financial risk borne by shareholders due to the entity's use of debt financing. Basically, debt betas are calculated as follows:

$$\beta_d = (r_d - r_f) \ / \ MRP$$

However, there are a number of issues associated with the estimation of debt betas, including:

- the method by which the cost of debt should be assessed;
- whether or not an adjustment should be made to the actual cost of debt; and
- the assumption that the debt beta should be zero.

3.1 Assessing the cost of debt

There are two ways in which the cost of debt can be assessed:

- using the actual cost of debt for the firm based on a weighted average of long term debt instruments; or
- imputing a credit rating for the firm and using financial market benchmarks to infer an appropriate cost of debt.

The most intuitive approach to the assessment of the cost of debt is to assess the actual cost of debt for the firm. However, there are two reasons why this might not provide the most appropriate basis for the assessment of a debt beta:

- the regulator uses an assumed capital structure that departs from firm's actual capital structure; and
- movements in the risk free rate may cause the market value of fixed interest loans to depart significantly from the book values of debt.

Consequently, an alternative approach is to estimate the cost of debt that would be appropriate for the firm based on its credit rating (whether assessed by an independent credit rating agency or by another source) and the market premia for long term debt based on trading activity.

3.2 Adjustments to the cost of debt

In the past, for example in its Victorian gas decision, the ACCC has used the following formula:

$$\beta_d = (r_d - 0.5\% - r_f) \ / \ MRP$$

The ACCC stated that the 0.5% adjustment represents "banks' costs", namely the administrative costs of establishing and maintaining debt financing. The resulting adjusted debt beta will be lower than the unadjusted debt beta. The adjustment process is somewhat ad hoc, particularly as equity capital will also incur administrative costs and other fees. However, the adjustment will have very little impact provided the same formula is used for all re-gearing as is used for the de-gearing.

Whilst NECG has reservations as to the appropriateness of the reduction on account of bank costs[7], it does believe that an adjustment is appropriate on account of the fact that the CAPM seeks to measure systematic risk and the observed cost of debt may also price a diversifiable component. In other words, the cost of debt may comprise two components:

- the systematic risk that should be reflected in the debt beta; and
- an additional risk reflecting the asymmetric nature of default risk – such that the *expected* return corresponds to the systematic component of the cost of debt. In practice this really reflects the difference between the expected return and headline rate to generate expected returns – i.e. it incorporates a diversifiable component.

There is an arbitrary element to the choice of 0.5% for this factor – in practice, the relationship between the cost of debt and the systematic risk is likely to be non-linear (ie the additional margin for default risk increases at an increasing rate relative to the level of gearing).

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7 NECG considers that these costs are better described as simply a component of the typical (and efficient) costs of doing business and hence should be incorporated into the cash flows from which prices are set. This applies for the costs associated with both debt and equity financing. This way, the cost of capital is confined to its proper domain – the compensation to investors for the risks associated with the business.

3.3 Assumption of a zero debt beta

A number of regulators including the ACCC have assumed a debt beta of zero. This amounts to an assumption that the debt is riskless. This is clearly too low.

The debt beta is clearly an area where the ACCC has reached a pragmatic position that it is not completely comfortable with. For example, after discussing this issue in its draft Statement of Principles for the Regulation of Transmission Revenues, the ACCC states,

> *"In conclusion the Commission will use judgement in establishing the asset beta and how the equity beta is derived from it." (p 81)*

It could be argued that if a single formula is used consistently to de-lever and then re-lever betas, the difference between the various methods should be inconsequential – so long as all firms in the comparator sample and the regulated entity have similar capital structures etc.

However, it is argued that this approach is dangerous – there is simply no case for applying a debt beta of zero. At best, this approach distorts the analysis. At worst, it distorts regulated entities' financing decisions.

4 Estimating an asset beta range for GPU GasNet

In this section of the report we estimate an equity beta for GPU GasNet following the approach outlined above. Since GPU GasNet is not listed and insufficient data is available to allow an application of the APT model, it is proposed to adopt the method of similars to identify a range for GPU GasNet. This is followed by a brief assessment of some of the other factors that will be relevant to an assessment of GPU GasNet's asset beta. The section concludes with a brief consideration of the matters GPU GasNet may wish to consider when formulating its regulatory strategy.

4.1 Data on asset beta

In order to place GPU GasNet in a position to present numbers in which it can be confident in any future submission to the ACCC, relevant equity betas have been sourced from a range of providers:[8]

- data from recent regulatory decisions;
- data on individual companies from recent regulatory decisions;
- data on individual companies from the AGSM Risk Management Service; and
- data derived by NECG from raw share price data.

4.1.1 Data from recent regulatory decisions

In their decisions, regulators have generally allowed gas businesses higher beta values than electricity businesses, with gas transmission companies allowed higher beta values than gas distribution businesses. A breakdown of recent decision on asset beta (and the re-levered equity beta) is given in table 1.

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[8] Given that systematic risk is largely country specific, the most important comparators for the purposes of estimating beta are domestic.

Table 1: Recent regulatory decisions – asset and equity betas

Year	Regulator	Decision	Asset beta	Equity beta
Gas Transmission				
2001	OffGAR	Dampier to Bunbury (draft)	0.60	1.20
2001	ACCC	Moomba to Adelaide	0.50	1.16
2001	ACCC	NT Gas (draft)	0.50	1.16
2000	ACCC	EAPL	0.50	1.16
2000	ACCC	Central West Pipeline	0.60	1.50
2000	Offgar	Parmelia pipeline	0.65	1.33
1998	ACCC	TPA (GPU GasNet)	0.55	1.20
Gas distribution				
2001	QCA	Qld gas distribution	0.45-0.60 (0.55)	0.97
2000	SAIPAR	SA distribution systems (draft)	0.45-0.50	0.94-1.06
2000	OffGAR	Mid West and South West	0.45-0.60 (0.55)	1.05
1999	IPART	AGL Gas Network	0.40-0.50	0.9-1.1
1999	IPART	Gt Southern energy gas network	0.40-0.50	0.96-1.10
1999	IPART	Albury gas distribution system	0.40-0.50	0.9-1.1
1998	ORG	Victorian gas distributors	0.55	1.20
Electricity transmission				
2001	ACCC	Powerlink	0.40	1.00
2000	ACCC	SMHEA	0.30-0.50 (0.40)	1.00
2000	ACCC	Transgrid	0.35-0.50	0.78-1.25
Electricity distribution				
2001	QCA	Electricity distributors	0.45	0.71
2000	ORG	Victorian distribution businesses	0.40	1.00

.Note: Asset betas for Dampier to Bunbury and Parmelia have been calculated using a debt beta of 0.2

As seen in table 1 regulatory decisions have considered the appropriate range for electricity companies as 0.35-0.50, gas distribution 0.40-0.60 and gas transmission 0.50-0.60. The adoption of a higher asset beta for gas companies is consistent with overseas practice. The QCA and IPART have drawn attention to a World Bank policy research paper[9], examining regulatory structure and risk in infrastructure companies, which found that gas utilities consistently had higher asset betas than their counterparts in the electricity industry regardless of the form of regulation.

It would also be expected that gas betas would be higher than electricity betas given that electricity transmission is regulated under revenue caps, whereas gas transmission and distribution is predominately regulated under price caps[10].

4.1.2 Data on individual companies from recent regulatory decisions

The most recent estimate of equity and asset betas for Australian energy companies was undertaken by the QCA in its decision on electricity distribution. Its findings, which covered the period up to 28 February 2001, are given in table 2:

Table 2: Estimates of equity beta and asset beta

Company	Primary business	Equity beta	Leverage (%)	Asset beta

9 Alexander I, Mayer C, Weed H: Regulatory Structure and Risk and Infrastructure Firms: An International Comparison, World Bank Working Paper, 1996

10 See OFFGAR, Draft Decision, Goldfields Gas Pipeline Access Arrangements, April 2001 Part B: 138-139 for a classification of various decisions in the electricity and gas industries by form of regulation

Allgas Energy	Gas distribution and retailing	0.5	17%	0.47
Australian Gas Light	Gas distribution and retailing	0.62	30%	0.44
Envestra Ltd	Gas distribution and retailing	0.48	80%	0
Energy Developments Limited	Electricity generation	1.17	25%	0.92
Pacific Energy Limited	Electricity generation	2.03	29%	1.42
Pacific Hydro Limited	Electricity generation	1	45%	0.66
United Energy Limited	Electricity distribution	0.84	53%	0.42

Source: Queensland Competition Authority, Final Determination Regulation of Electricity Distribution, May 2001

Of the businesses listed here, the most comparable comparators for GPU GasNet are probably the distribution businesses listed, with the exception of Envestra[11]. However, given that the asset beta for gas transmission businesses is traditionally higher than for gas and electricity distribution businesses (probably in part due to bypass risk), the average for Allgas, AGL and United (0.44) will underestimate the appropriate asset beta for GPU GasNet.

4.1.3 AGSM Risk Management Service

The estimates in table 2 seem low compared with asset betas we have estimated from AGSM data (issued June 2001), which are given in table 3.

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[11] Envestra is a questionable comparator. Although it is a natural gas distribution company, over the period when the beta would have been estimated it had loss making operations, a gearing of about 95% and was involved in a merger that approximately doubled its size. The company was only listed on the stock exchange in August 1997, so the data available to reliably calculate an historical beta would be less than is normally considered necessary. As a result, the statistical and explanatory power of the estimation regression will be low.

Table 3: Estimates of asset betas

Company	Equity beta (Blume)	Asset beta (Monkhouse)
AGL	0.550	0.441
Envestra	0.480	0.227
United Energy	0.850	0.742
Average	0.627	0.470
Average (exc Envestra)	0.700	0.592

Source: AGSM

Even allowing for the fact that Envestra may not be an appropriate comparator, the average for AGL and United Energy is 0.59.

4.1.4 NECG estimate

NECG has estimated beta from data available from Dow Jones (www.djinteractive.com) as given in table 4.

Table 4: NECG estimates of asset betas

Company	**Equity beta**	**Asset beta**

	(Blume)	(Monkhouse)
Alintagas Limited	0.945	0.758
Australian Pipeline Trust	0.968	0.732
Energy Development	0.723	0.532
Australian Gas Light	0.882	0.667
Envestra Ltd[12]	0.925	0.378
Origin Energy	0.703	0.359
United Energy	0.818	0.638
Average (exc Envestra, APT and Alinta)	0.781	0.549

This table includes estimates for Alintagas and APT, who have been recently listed on the ASX. While there is only limited data on these companies, early indications suggest a relatively higher beta than the regulated distribution businesses in the list. Excluding these companies and Envestra produces an average asset beta for the firms in question of 0.55.

4.1.5 Summary

The various sources considered above suggest the following for the asset beta of a gas transmission company, as set out in table 5:

Table 5: Summary of estimates of asset beta

Source	Asset beta
Regulatory decisions	0.50-0.65
QCA estimate	at least 0.45

[12] Note that the various estimates of asset beta for Envestra have varied widely. This is partly a result of different approaches to de-levering the equity beta but mainly a result of the wide standard error in its estimate – confirming its unreliability as a comparator at this time.

AGSM data NECG data	at least 0.60 at least 0.55
Plausible range	0.45 – 0.70

4.2 Factors in assessing asset betas

In assessing the appropriate asset beta for GPU GasNet, the following factors will be relevant:

- regulatory arrangements;
- increasing competition leading to greater vulnerability to bypass – either by another fuel source (such as electricity) or by other gas transmission pipelines;
- customer concentration and characteristics;
- correlation of gas sales with economic activity; and
- impact of economic conditions on costs;
- size effects.[13]

The arguments that can be assembled will impact on where the asset beta ultimately falls in the assessed range. One factor that is of particular relevance concerns the regulatory

[13] Whilst size effects may not strictly be captured by CAPM, empirical evidence suggests capital markets place a significant premium on the cost of capital for small firms relative to large firms which is most likely to be associated with default risk. A further consideration is liquidity. Smaller firms tend to operate with lower levels of turnover than larger firms with the consequence that a liquidity premium is incorporated into the rate of return. However, this premium is not captured by the CAPM model.

arrangements, how these will impact on the systematic risk faced by GPU GasNet, and how regulators have compensated regulated entities for such risks.

The form of regulatory regime will influence the level of revenue fluctuation. As the ACCC state:

> A further consideration is the form of regulation applied to the firm as this may also affect beta risk. For example, incentive regulation regimes imply a higher level of risk than rate of return regulation. Hence, the regulatory environment also needs to be considered when assessing the comparability of particular companies [14]

However, this view has not been shared by all regulatory bodies. For example, in its decision on Victorian distribution businesses (September 2000) the ORG stated:

> …while the incentive properties inherent in the US system might be weaker than under the Victorian regime (as the holding period for the benefit of an efficiency gain is less certain), it is not so clear that the volatility of revenue – and systematic risk – is significantly different[15].

Despite this statement, NECG considers that a price cap exposes a regulated business to greater systematic risk than a revenue cap. This is because a revenue cap provides an inbuilt stabilising mechanism. Under that form of regulation, prices may fluctuate in order to smooth variations in total revenue, which would have occurred through volume fluctuations. In other words, under revenue cap regulation, customers are exposed to the (intra-regulatory period) volume risk whereas this risk is borne by the regulated entity under a price cap. However, to date, Australian regulators have generally not distinguished between these forms of regulation in assessing regulatory rates of return.

Another insight into the appropriate beta can be seen in estimates of future demand growth. Vencorp's most recent estimates of demand for the Victorian gas industry are given in Table 2. For the period 2001-06, Table 2 sets out Vencorp's low, medium and high growth

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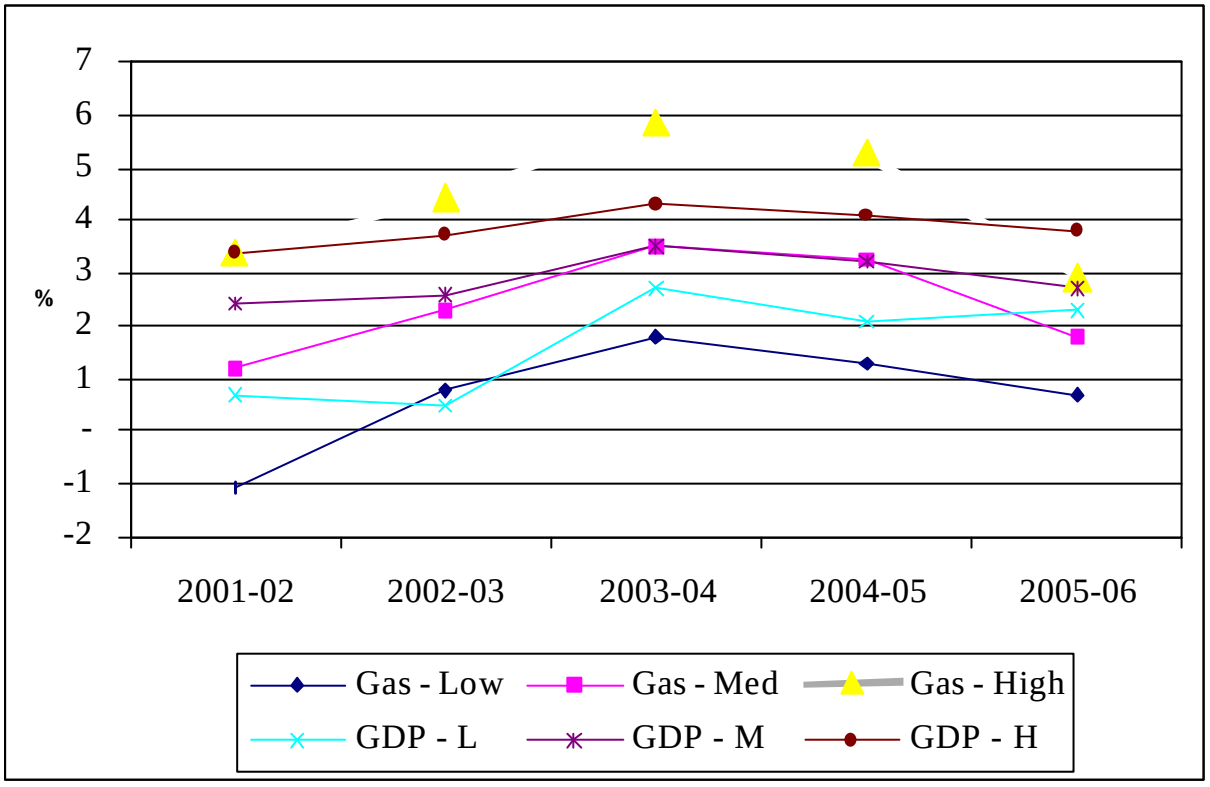
14 ACCC: NSW and ACT Transmission Network Revenue Caps Decision, January 2000 p27.

15 Office of the Regulator General, Victoria, Electricity Distribution Price Determination 2001-05, Volume I p272

scenarios for GDP and the corresponding growth in gas demand. The low and high scenarios represent the 10% and 90% confidence limits of the estimates respectively.

Table 2: Vencorp forecasts of gas demand and State GDP 2001-02 to 2005-06 (% per annum)



Source: Vencorp annual planning review 2001-06

For the corresponding growth scenarios (high-high etc), the path of gas demand does not move uniformly with state GDP. This is particularly the case for the high and low scenarios and suggests that gas growth is relatively more volatile than state GDP growth.

Another factor affecting the risk of GPU GasNet revenues is its linear pricing schedule, which involves the regulated business facing a greater exposure to economic fluctuations than would be the case with a two-part tariff with a significant fixed component to the tariff schedule. This is because under the latter pricing structure a change in volume will have relatively less impact than it would under a linear pricing schedule. Again, regulatory bodies have rarely considered such issues in assessing regulatory rates of return.

It is also worth noting that GasNet revenues are not under contract and are therefore completely exposed to the market. Other gas transmission pipelines tend to have secure revenues under long-term contracts, despite having a price cap.

Accordingly, we believe that if GPU GasNet were to seek a price cap with a linear pricing schedule from the ACCC, there is a significant risk that the ACCC will not allow appropriate allowance in beta for the increased systematic risk this will entail.

5 Concluding comment - issues for ACCC submission

Since its original decision on GPU Gas Net's rate of return in 1998, the ACCC in particular appears to have revised down its assessment of asset beta. For example in both of its subsequent decisions on gas transmission companies, it has adopted an asset beta of 0.5 rather than the 0.55 that was adopted for GPU Gas Net.

However, that occurred at a time when the risk in the industry is increasing by virtue of:

- the convergence of gas and electricity markets;[16] and
- the increasingly interconnected natural gas market.[17]

The combination of these factors serves to amplify that the key industry dynamic at present is the increasingly competitive and volatile environment for gas transmission companies. Contractual terms for gas transmission services are shortening together with increased customer choice as to source of gas. This means that for the first time, gas transmission pipelines face the prospect of volatility in both prices and volumes.

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16 The convergence of these markets poses an increased threat that electricity suppliers will bypass gas suppliers

17 The increasing interconnection of these markets poses an increased threat that alternative gas transmission firms will supply an incumbent's current customers

The inevitable conclusion therefore is that, GPU Gas Net is likely to be entering a period of higher systematic risk. A comparison of asset betas for electricity generators and distributors highlights the effect of competition on beta.