The Allen Consulting Group

Railways (Access) Code 2000: Weighted Average Cost of Capital

2008 WACC Determinations

October 2007

Report to the Economic Regulation Authority

The Allen Consulting Group

The Allen Consulting Group Pty Ltd

ACN 007 061 930

Melbourne

Level 9, 60 Collins St

Melbourne VIC 3000

Telephone: (61-3) 8650 6000

Facsimile: (61-3) 9654 6363

Sydney

Level 12, 210 George St

Sydney NSW 2000

Telephone: (61-2) 9247 2466

Facsimile: (61-2) 9247 2455

Canberra

Empire Chambers, Level 2, 1-13 University Ave

Canberra ACT 2600

GPO Box 418, Canberra ACT 2601

Telephone: (61-2) 6204 6500

Facsimile: (61-2) 6230 0149

Perth

Level 21, 44 St George's Tce

Perth WA 6000

Telephone: (61-8) 9221 9911

Facsimile: (61-8) 9221 9922

Brisbane

Level 9, 379 Queen St

Brisbane QLD 4000

PO Box 7034 Riverside Centre, Brisbane QLD 4001

Telephone: (61-7) 3016 3500

Facsimile: (61-7) 3221 7255

Online

Email: info@allenconsult.com.au

Website: www.allenconsult.com.au

Contents

Executive summary

Introduction

Schedule 4, Clause 3 of the *Railways (Access) Code 2000* (the Code) requires the Economic Regulation Authority (the Authority) to make an annual determination of a weighted average cost of capital (WACC) to be applied in determination of floor and ceiling prices for access to each of the freight and passenger rail systems in the south west of Western Australia.

This clause of the Code further requires that in every fifth year subsequent to 2003, the Authority undertake a public consultation program prior to determining the WACC values for that year. Consequently, the Authority is required to undertake a public consultation program prior to making its WACC determination for the regulatory year commencing 1 July 2008.

The Authority has requested that the Allen Consulting Group:

- undertake a review of the existing WACC calculation method and input parameters, that were determined in 2003 (the "2003 Determination"); and
- recommend any changes that may be required to the calculation method and/or input parameters for its 2008 WACC determination.

In undertaking this review and making recommendations, the Authority has requested that the Allen Consulting Group take into account the relevant evidence from capital markets for rail-infrastructure or other infrastructure businesses of a similar nature to the freight and passenger rail systems in the south west of Western Australia.

The scope of the Authority's request does not extend to providing the Authority with detailed statistical analysis of capital market data. Rather, the Allen Consulting Group's advice to the Authority is required to rely on recent studies that have been undertaken for economic regulators in a number of regulated industries and, as necessary, some limited reference to primary data.

The Authority also requested that the Allen Consulting Group take into account the WACC calculation methods and parameter values utilised by other regulators of major infrastructure assets, including taking particular account of the parameter values that are required to be applied by the Australian Energy Regulator (AER) for regulation of electricity transmission services in the National Electricity Market, and any relevant outcomes from the proposed national gas law and national gas rules.

Conclusions and recommendations

General Methodology

It is recommended that the Authority continue with estimation of WACC values by use of the capital asset pricing model (CAPM) to estimate the cost of equity.

It is recommended that inflation be treated in estimation of the WACC by specification of the WACC in real terms. For the purposes of applying the CAPM and estimating the WACC, it is further recommended that that a real risk free rate not be estimated directly, but this be calculated from a nominal risk free rate estimated from capital market data and an assumption of a forecast of inflation.

As a general principle of regulation, the Allen Consulting Group is of the view that it is appropriate and preferable to use a post-tax WACC in determination of regulated revenues and prices for reason that this approach would determine regulated revenues and prices with recognition of a cost of taxation that is closer to the cost of taxation that would be incurred by an efficient provider of rail services.

There are, however, factors that the Authority may accept as reason to follow its own precedent and continue to apply pre-tax WACC values; in particular, the consideration that the asset-valuation methodology and building-block approach to determining regulated revenues and prices under the *Railways (Access) Code 2000* would complicate the calculation of regulatory taxation accounts and determination of taxation costs. The Allen Consulting Group considers that the treatment of taxation is ultimately a matter for the Authority to determine taking these factors into account. Accordingly, both post-tax and pre-tax WACC values are presented in this report.

CAPM and WACC parameters

Recommended values of CAPM and WACC parameters are set out in Table ES.1, together with estimated returns on equity and WACC values. Of these parameters, the market variables of the nominal risk free rate of return and debt margins should be updated at the time that the Authority issues its determination on the WACC values.

If compared with the same values of risk free rates and inflation:

- the real pre-tax WACC value for the freight rail system calculated with the parameter values recommended for 2008 is higher than the values of the 2003 Determination by 1.16 percentage points; and
- the real pre-tax WACC value for the passenger rail system calculated with the parameter values recommended for 2008 is lower than the values of the 2003 Determination by 0.26 percentage points.

Table ES.1

RECOMMENDATIONS FOR DETERMINATION OF WACC VALUES UNDER THE RAILWAYS (ACCESS) CODE 2000

CAPM Parameter	Freight rail system		Passenger rail system	
	2003 value	2008 value	2003 value	2008 value
Nominal risk free rate of return (%)	4.80	**5.99**	4.80	**5.99**
Inflation rate (%)	2.01	**3.00**	2.01	**3.00**
Real risk free rate of return (%)	2.74	**2.90**	2.74	**2.90**
Debt proportion (%)	55	**35**	55	**35**
Equity proportion (%)	45	**65**	45	**65**
Market risk premium	6.0	**6.0**	6.0	**6.0**
Asset beta	0.45	**0.60**	0.30	**0.25**
Equity beta	1.00	**0.92**	0.66	**0.38**
Debt margin (%)	1.11	**1.55**	1.11	**1.40**
Debt issuance costs (%)	0.125	**0.125**	0.125	**0.125**
Taxation rate (%)	30	**30**	30	**30**
Franking credit value (gamma)	0.5	**0.5**	0.5	**0.5**
Nominal pre-tax cost of debt	6.04	**7.67**	6.04	**7.52**
Nominal post-tax cost of equity	10.80	**11.53**	8.76	**8.30**
Real post-tax cost of equity	8.62	**8.28**	6.62	**5.14**
Nominal pre-tax cost of equity	12.71	**13.56**	10.31	**9.76**
Real pre-tax cost of equity	10.49	**10.26**	8.13	**6.57**
Nominal pre-tax ("Officer") WACC	9.04	**11.50**	7.96	**8.98**
Real pre-tax ("Officer") WACC	6.87	**8.25**	5.83	**5.80**
Nominal post-tax ("vanilla") WACC	8.18	**10.18**	7.26	**8.02**
Real post-tax ("vanilla") WACC	6.05	**6.97**	5.15	**4.88**

Note:
1. The nominal risk free rate is as derived from implied returns on nominal government bonds, as the average return over the 20 trading days to 28 September 2007.
2. For the 2008 WACC, equity beta values are calculated from estimated asset beta values assuming a debt beta of zero.

Chapter 1

Introduction and background

1.1 Introduction

Schedule 4, Clause 3 of the *Railways (Access) Code 2000* (the Code) requires the Economic Regulation Authority (the Authority) to make an annual determination of a weighted average cost of capital (WACC) to be applied in determination of floor and ceiling prices for access to each of the freight and passenger rail systems in the south west of Western Australia.

This clause of the Code further requires that in every fifth year subsequent to 2003, the Authority undertake a public consultation program prior to determining the WACC values for that year. Consequently, the Authority is required to undertake a public consultation program prior to making its WACC determination for the regulatory year commencing 1 July 2008.

1.2 Scope of project

The Authority has requested that the Allen Consulting Group:

- undertake a review of the existing WACC calculation method and input parameters, that were determined in 2003 (the "2003 Determination"[1]); and
- recommend any changes that may be required to the calculation method and/or input parameters for the Authority's 2008 WACC determination.

In undertaking this review and making recommendations, the Authority has requested that the Allen Consulting Group take into account the relevant evidence from capital markets for rail-infrastructure or other infrastructure businesses of a similar nature to the freight and passenger rail systems in the south west of Western Australia.

The scope of the Authority's request does not extend to providing the Authority with detailed statistical analysis of capital market data. Rather, the Allen Consulting Group's advice to the Authority is required to rely on recent studies that have been undertaken for economic regulators in a number of regulated industries and, as necessary, some limited reference to primary data.

The Authority also requested that the Allen Consulting Group take into account the WACC calculation methods and parameter values utilised by other regulators of major infrastructure assets, including taking particular account of the parameter values that are required to be applied by the Australian Energy Regulator (AER) for regulation of electricity transmission services in the National Electricity Market, and any relevant outcomes from the proposed national gas law and national gas rules.

[1] Office of the Rail Access Regulator, July 2003, Weighted Average Cost of Capital to Apply to WestNet Rail and the Western Australian Government Railways Commission.

1.3 Structure of this report

The remainder of this report is set out as follows.

- Chapter 2 addresses issues of general methodology in determination of the WACC values for the freight and passenger rail systems, including elements of methodology for the treatment of inflation and taxation.
- Chapters 3 to 8 examine evidence from capital markets on the values of parameters applied in determining WACC values, together with regulatory precedent for these values. Recommendations are made on parameter values that may appropriately be applied by the Authority in its 2008 determination of WACC values.

Chapter 2

Estimation methodology

2.1 Introduction

The cost of capital is a market price for funds, dependent upon a supply and demand for capital funds. As with the market price for any good or service, the market price for capital cannot be calculated *a priori*, but is determined by transactions within the market.

The cost of capital is typically considered as comprised of the cost of two types of funds: debt and equity. A WACC for a project is the average cost of funds across the two types, weighted according to the proportions of debt and equity in the financial structure for the project.

One component of the cost of capital – the cost of debt – can be observed at particular times in the market as either a posted price (for example, an advertised rate of interest payable on loans) or an implied price (for example, an implied rate of return on traded debt securities).

The other component of the cost of capital – the cost of equity – cannot be observed directly and must be estimated.

There have been a number of approaches developed for estimating the cost of equity for particular projects or activities. These are briefly described in this chapter with a recommendation made that the Authority should continue with its past practice of applying the capital asset pricing model (CAPM).

In addition to the choice of methodology applied in estimation of the cost of equity and WACC, there are two further matters that must be determined as elements of the general approach to determining a rate of return on investment, and hence the WACC. These are the treatment of inflation and the treatment of taxation. Both of these matters are dealt with in this chapter with recommendations that:

- the Authority continue its past practice of a real WACC approach, with regulated revenues and prices determined initially in real terms and subsequently indexed for actual inflation; and
- the Authority continue to determine a WACC in pre-tax terms using the "Officer WACC" model, but with consideration given to determining a benchmark rate of taxation by estimating an effective rate of taxation that would be paid by a benchmark service provider, rather than assuming an effective taxation rate equal to the statutory rate of corporate income taxation.

2.2 General methodology

Alternative methodologies

Four alternative methodologies for determining the cost of capital are described below. These comprise:

- the capital asset pricing model;
- arbitrage pricing theory
- the Fama-French model; and
- the dividend growth model.

Capital Asset Pricing Model

The capital asset pricing model (CAPM) is the most common methodology adopted in Australia to estimate a cost of capital. The CAPM is used widely by regulators and the finance industry.

In its simplest form, the CAPM provides a direct estimate of the required return for a project. That is:

$$R_a = R_f + \beta_a \left(R_m - R_f\right)$$

where R_a is the required return on assets, R_f is the risk free rate, β_a is the asset beta, and $(R_m – R_f)$ is the return over the risk free rate (the market or equity risk premium) that investors would need to expect in order to invest in a well-diversified portfolio of assets.

Under the CAPM, the required return for any asset depends upon the return that could be earned from an investment that is risk free as well as a risk premium that an investor would require over the risk free rate to provide compensation for risk borne in the investment. This risk premium is a function of two inputs:

- an estimate of the return that investors would require in order to hold a widely diversified portfolio of assets, which is also the return that an investor would require in order to hold an asset which has an "average" level of risk; and
- a ranking of the risk associated with the particular asset in question relative to the risk associated with the well-diversified portfolio of assets – the beta of the asset.

The risk premium that investors would require in order to hold a particular asset is estimated by scaling up, or scaling down, the risk premium required for the well-diversified portfolio of assets according to the beta measure of that asset's relative risk.

Asset betas cannot be observed or measured directly but rather must be estimated. The most common means of estimation is to examine historical information on the economic returns to the relevant asset (comprising the value of the returns plus the change in the market value of the asset), and on economic returns to the well-diversified portfolio of assets. This type of information is only available on assets that are traded on a stock exchange, which only comprises trading in the equity share of an asset. Therefore, in practice, the CAPM is used to estimate the required return to the equity share of an asset, and stock market indices are used as a proxy for the market portfolio. Accordingly, the more common formulation of the CAPM is the following expression relating to the return on equity:

$$R_e = R_f + \beta_e (R_m - R_f)$$

where R_e is the required return on equity and β_e is the equity beta.

Once a return on equity has been estimated, a proxy for the cost of debt financing is then normally derived from observed or estimated debt financing costs. The WACC is estimated by observing or assuming a level of gearing for the entity and calculated the weighted average of the costs of equity and debt, expressed in simple terms as:

$$WACC = R_e \frac{E}{V} + R_d \frac{D}{V}$$

where R_d is the cost of debt, and E/V and D/V are the shares of equity and debt, respectively, in the financing structure.

Arbitrage Pricing Theory

Arbitrage pricing theory specified a linear relationship between the expected return on a risky asset and returns on a range of portfolios of other assets for which returns vary with a set of factors, typically macroeconomic variables:

$$E(R_j) = E(R_z) + b_{j1}\left[E(R_{p1}) - E(R_z)\right] + \ldots + b_{jk}\left[E(R_{pk}) - E(R_z)\right]$$

where $E(R_z)$ is the expected rate of return on a portfolio of assets uncorrelated with all factors (a risk free rate of return), $E(R_{pi})$ is the expected rate of return for a portfolio of assets with unit coefficient on the ith factor.[2] Compensation for non-diversifiable risk is reflected in the regression parameters (sensitivity coefficients) for the observed return on the asset against the differences in observed returns between asset portfolios and the risk-free asset.

As with the CAPM, arbitrage pricing theory would typically be applied to estimate the cost of equity.

Fama–French Model

The Fama–French model is an augmentation of the CAPM with two additional explanatory variables with explanatory power over cross sectional variation in equity returns:

$$E(R_j) = R_f + \left[E(R_m) - R_f\right]\beta_j + s_j E(SMB) + h_j (HML)$$

[2] Lally, M., 2000. *The Cost of Equity Capital and Its Estimation*, McGraw-Hill Series in Advanced Finance Volume 3, Sydney: McGraw-Hill, pp 41,42.

where SMB is the differential return between a portfolio of small capitalisation stocks and one of large capitalisation stocks, and HML is the differential return on a portfolio of stocks with high book to market equity ratios and one of stocks with low book to market equity ratios.[3] Compensation for non-diversifiable risk remains reflected in the beta value for the stock.

As with the CAPM, the Fama-French model would typically be applied to estimate the cost of equity.

Dividend growth model

The dividend growth model derives an estimate of the cost of equity from observations of a stock price and dividends per share and an assumed rate of dividend growth:

$$k_e = \frac{D_0(1+g)}{P} + g$$

where k_e is the cost of equity, D_0 is the observed current dividend per share, P is the observed stock price, and g is an assumed constant growth rate in expected dividends per share.[4]

Methodology to be applied in determination of the WACC under the Railways Access Code

The *Railways (Access) Code 2000* does not specify a methodology to be applied to in estimating values of the WACC for the freight and passenger rail systems. Accordingly, the methodology to be applied is a matter for determination by the Authority.

In the 2003 Determination, the Rail Access Regulator used the CAPM to estimate WACC values. The stated reason for this was that the CAPM is almost universally used to estimate costs of capital for regulated infrastructure in Australia and that the CAPM had previously been applied in regulation of rail access in Western Australia.[5] The Rail Access Regulatory and the Authority have maintained use of the CAPM in subsequent annual determinations of WACC values.

The CAPM remains the sole methodology applied by Australian economic regulators in consideration of the cost of capital and regulated rates of return. As a result, there is a broad familiarity and understanding of this approach by regulated businesses and other stakeholders in the regulation of infrastructure services, and regulatory determinations on rates of return are readily comparable across regulators, regulated businesses and infrastructure sectors. Given this situation, it may be inappropriate to contemplate alternative methodologies for determining the WACC under the *Railways (Access) Code 2000* in the absence of consideration in a broader forum of whether there would be benefit in adopting an alternative methodology for regulation of infrastructure services more generally. For this reason, it is recommended that the Authority continue with estimation of WACC values by use of the CAPM.

---

[3] Lally, M., 2000. *The Cost of Equity Capital and Its Estimation*, McGraw-Hill Series in Advanced Finance Volume 3, Sydney: McGraw-Hill, pp 42.

[4] Lally, M., 2000. *The Cost of Equity Capital and Its Estimation*, McGraw-Hill Series in Advanced Finance Volume 3, Sydney: McGraw-Hill, pp 42,43.

[5] Office of the Rail Access Regulator, 2003, Weighted average cost of capital to apply to WestNet Rail and the Western Australian Government Railways Commission, p5.

2.3 Accounting for inflation

Alternative methodologies

Two standard methods exist for compensating a service provider for inflation in the costs of service provision.

- Indexation method – the regulatory asset base and revenues are escalated year on year for actual inflation, which compensates for the effect of inflation (that is, the value of the investment is maintained in 'real' terms, so the investor is protected from inflation). Consistent with this, a real WACC is applied.
- Historical cost approach – the regulatory asset base and revenues are fixed in historical cost terms (that is, not adjusted for inflation), and the compensation for inflation comes from adopting a nominal WACC.

The choice of method determines the allocation of inflation risk – under the indexation method, the asset owner receives a constant real return on assets (all else constant), irrespective of the outturn rate of inflation. In contrast, under the historical cost approach, the asset owner's real return will be higher or lower than expected depending on the outturn rate of inflation.

Use of a real WACC approach provides incentives for efficiency. By protecting the regulated business from inflation risk – which historically has been a significant risk in Australia and other countries – a commitment to retain a price control for a period of time without review is more credible.

Methodology to be applied in determination of the WACC under the Railways Access Code

The Authority and its predecessor regulators have adopted a convention of indexing regulatory asset values for inflation and using a real WACC approach in regulatory determinations for rail and other infrastructure services. Under the *Railways (Access Code) 2000*, asset values are re-valued over time by periodically estimating a gross replacement value. This practice of asset re-valuation implies an indexing of asset value for inflation. Accordingly, the Allen Consulting Group recommends that the Authority continue its practice of applying a real WACC in determining a rate of return on assets.[6]

The real WACC approach implies that the cost of equity may be estimated (using the CAPM) by either of two approaches, as follows.

- The cost of equity may be estimated by determining a real risk free rate and adding a scaled risk premium:

  $$R_e^{real} = R_f^{real} + \beta_e (R_m - R_f)$$

  where R_e^{real} is the real cost of equity, R_f^{real} is the real risk free rate, β_e is the equity beta, and $R_m - R_f$ is the market (equity) risk premium.

[6] The standard real WACC approach requires assets to be escalated at the rate of change in the consumer price index, whereas re-valuation of assets at replacement cost will escalate assets according to a price index of construction costs. Hence, the asset owner may receive windfall gains (if the index of construction costs is greater than the CPI) or windfall losses (if the index of construction costs is less than the CPI). The correct regulatory approach in dealing with this discrepancy would be to recognise any forecast re-valuation in excess (or deficit) of CPI as income (or loss) to be deducted (or added) to the annual revenue requirement (these are referred to by accountants as holding gains and losses).

Likewise, the cost of debt is estimated as:

$$R_d^{real} = R_f^{real} + DM$$

where R_d^{real} is the real cost of debt and DM is the margin on debt over the risk free rate.

- The cost of equity may be estimated by determining a nominal risk free rate, adding a scaled risk premium and then adjusting for an expected rate of inflation by the Fisher equation:

$$R_e^{nominal} = R_f^{nominal} + \beta_e (R_m - R_f), \text{ and}$$

$$R_e^{real} = ((1 + R_e^{nominal}) / (1 + i)) - 1$$

where $R_e^{nominal}$ is the nominal cost of equity, $R_f^{nominal}$ is the nominal risk free and i is the expected rate of inflation.

Likewise, the cost of debt is estimated as:

$$R_d^{nominal} = R_f^{nominal} + DM, \text{ and}$$

$$R_d^{real} = ((1 + R_d^{nominal}) / (1 + i)) - 1$$

where $R_d^{nominal}$ is the nominal cost of debt.

In this report, it is recommended that a real risk free rate not be estimated directly, but rather a nominal risk free rate be estimated from capital market data and an assumption made of a forecast of inflation (addressed in Chapter 3 of this report). Accordingly, it is recommended that the latter approach to determining real costs of equity and debt be applied. This is consistent with past practice of the Authority.

2.4 Accounting for taxation

Alternative methodologies

The key question for treatment of taxation is whether an allowance for the costs of taxation to the service provider should be made by:

- making a high level assumption about the effective tax rate that would apply to the regulated activity and providing compensation for taxation by including an allowance in the WACC; or
- explicitly modelling the likely taxation payments for the regulated activity and allowing for taxation costs as an explicit cost in the building block calculation of regulated revenue.

Australian regulators have adopted different approaches to account for the cost of taxation in regulated revenues and prices for infrastructure services, based on these alternative treatments.

- The first approach is to make allowance for the cost of taxation in the WACC. This necessitates transforming the post-tax WACC that is derived from the CAPM into a pre-tax WACC (reflecting an assumption about the effective tax rate of the entity), thus making an allowance for tax by using a higher regulated WACC.
- The second approach has been to make an explicit forecast of the cost of taxation to the regulated entity, based upon an assessment of the taxation liabilities for the regulated activity. It has been typical practice amongst Australian regulators using this approach to base the projections of company tax liabilities upon benchmark assumptions, for example, assumptions as to the applicable tax depreciation rates, and calculating the interest deduction based upon the benchmark financing arrangements (that is, the capital structure and cost of debt).

The first methodology has the benefit of computational simplicity; however, it has number of problems, the most important of which is that no simple transformation method can capture the complexities of the Australian tax system. There has been an impression amongst regulators that the simple transformation generally proposed by regulated entities (that has become known as the forward transformation), together with a simple assumption of the effective rate of taxation being the headline rate of corporate income tax, is likely to overstate the taxation liabilities of infrastructure firms.

The second methodology, in contrast, requires an explicit statement of the assumptions being made about the taxation system, and thus is more transparent. In addition, the estimate of the taxation liabilities could reflect a range of assumptions about the taxation system – at one end of the scale, attempting to replicate the actual taxation position of the firm, and at the other end, adopting high-level benchmarks about the taxation system. The latter option has the advantage of not creating incentives for the regulated business to (inefficiently) alter its financial structures to seek more favourable regulatory outcomes.

Methodology to be applied in determination of the WACC under the Railways Access Code

In the 2003 Determination, the Rail Access Regulator adopted a pre-tax WACC for reason of consistency with previous regulatory determinations and financial modelling undertaken for railway access in Western Australia.[7]

The Rail Access Regulator and the Authority continued to use a pre-tax WACC in subsequent annual determinations of WACC values.

[7] Office of the Rail Access Regulator, 2003, Weighted average cost of capital to apply to WestNet Rail and the Western Australian Government Railways Commission, p6.

The Authority and its predecessor regulators have also consistently used a pre-tax rate of return in regulatory determinations for other infrastructure services. Other than in the 2003 Determination, neither the Authority nor its predecessor regulators have indicated reasons for using a pre-tax WACC and doing so appears to be a matter of convention rather than a reasoned position. In using a pre-tax WACC, the Authority differs in practice from the ACCC/AER and the Victorian Essential Services Commission that have adopted a convention of using a post-tax rate of return for reason that this approach (involving an explicit forecast of taxation costs for the regulated activity) produces a better estimate of the cost of taxation than using a pre-tax rate of return.[8]

Determining the treatment of taxation to apply in determining WACC values under the *Railways (Access) Code 2000* requires a balancing of considerations of simplicity in calculation and the quality of the estimate of taxation costs.

As a general principle of regulation, the Allen Consulting Group is of the view that it is appropriate and preferable to use a post-tax WACC in determination of regulated revenues and prices for reason that this approach would determine regulated revenues and prices with recognition of an estimated cost of taxation that is closer to the cost of taxation that would be incurred by an efficient provider of rail services.

There are, however, particular factors that the Authority may accept as reason to continue to apply pre-tax WACC values.

First, in determining whether to apply a pre-tax or post tax WACC, the Authority may take into account its own conventional practice in regulatory determinations and a preference for relative simplicity in financial modelling that is achievable with a pre-tax WACC.

Secondly, the methodology used to determine regulated revenues under the *Railways (Access) Code 2000* differs from other regulatory schemes in the manner in which assets are valued. Under the *Railways (Access) Code 2000*, the value of the asset base to which the rate of return is applied is determined by periodic estimation of a "gross replacement value" for the assets. This is a different approach to asset valuation that applied in price regulation for other infrastructure services, for which assets are typically valued by a roll-forward calculation, involving adding values of new investment and subtracting values of depreciation determined on the basis of the economic life of the asset. The asset-valuation methodology applied under the *Railways (Access) Code 2000* would complicate the calculation of regulatory taxation accounts and determination of taxation costs.

The Allen Consulting Group considers that the treatment of taxation is ultimately a matter for the Authority to determine taking into account these factors. Accordingly, both post-tax and pre-tax WACC values are presented in this report.

In this report, a nominal post tax WACC is derived by the "vanilla" WACC formula, as follows.

$$WACC_{post\ tax}^{nominal} = R_e^{nominal} \cdot \frac{E}{V} + R_d^{nominal} \cdot \frac{D}{V}$$

[8] Essential Services Commission, October 2002, Review of Gas Access Arrangements Final Decision, pp 379 – 385.

where T is an assumed or calculated effective taxation rate, γ reflects the value to the regulated business of dividend imputation, E/V is the proportion of equity in the financial structure of the business and D/V is the proportion of debt (gearing) in the financial structure.

A nominal pre-tax WACC is derived by the following "Officer WACC" formula:

$$WACC_{pre\text{-}tax}^{nominal} = R_e^{nominal} \frac{1}{1-T(1-\gamma)} \cdot \frac{E}{V} + R_d^{nominal} \cdot \frac{D}{V}$$

Real post-tax and real pre-tax WACC values are derived from the respective nominal WACC values using the Fisher equation.

Chapter 3

The risk free rate of return and inflation

3.1 Introduction

The risk free rate measures the return an investor would expect from an asset with zero volatility and zero default risk. It is required for estimating the cost of equity capital in the capital asset pricing model (CAPM), and also forms the base to which a debt premium is applied to derive a cost of debt.

Australian regulators have typically derived values of nominal and real risk-free rates from capital market observations of yields on Commonwealth Government securities (government bonds): either nominal government bonds to derive a nominal risk free rate, or inflation indexed (that is, real) government bonds to derive a real risk free rate. A forecast of inflation is then derived from the real and nominal risk free rates by application of the Fisher equation:

$$R = (1 + r) / (1 + i) - 1$$

where: R is the real risk free rate;
r is the nominal risk free rate; and
i is the rate of inflation.

Recent capital market evidence suggests that a bias may exist in using observed yields on real government bonds to derive the real risk free rate and, hence, the forecast rate of inflation ordinarily derived through the Fisher equation.

In view of this potential bias, the Allen Consulting Groups considers that reliance should be placed on an estimate of the nominal risk free rate derived from the observed yield on nominal government bonds and a forecast of inflation that is derived from another source.

3.2 2003 Determination

In the 2003 Determination, real and nominal risk free rates were derived as 20-day averages of observed yields on nominal and real government bonds. A forecast of inflation was derived from these rates using the Fisher equation.

3.3 Capital market evidence

Recent capital market evidence suggests that a bias may exist in using observed yields on real government bonds to derive a real risk free rate. In a recent study, NERA suggests there is:[9]

- a relative (downward) bias of about 20 basis points in yields on real government bonds as a result excess demand for these securities; and
- an absolute (downward) bias of 42—44 basis points in yields on nominal government bonds, also as a result of excess demand for these securities.

For real government bonds, theses biases would be additive.

[9] NERA Economic Consulting, 2007, *Bias in Indexed CGS Yields as a Proxy for the CAPM Risk Free Rate*, A report for the ENA, March 2007,

The Reserve Bank of Australia (RBA) has acknowledged that current conditions in the market for real government bonds appears to be lowering the usefulness of the Fisher equation in measuring forecast inflation. The RBA has also stated on many occasions that inflation expectations derived from the market for real government bonds were at odds with other measures of inflation, such as surveys.[10] The Commonwealth Treasury Department has also recognised the potential bias in yields on real government bonds and has advised the AER that it:[11]

> ...agree[s] that as Treasury Indexed Bonds (TIBs) mature without replacement, their usefulness for estimating long term real risk free rates will diminish. Consequently, their use for estimating the market-implied inflation forecast will lead to inflation estimates with an upward bias.

The RBA and Commonwealth Treasury Department have both rejected the contention of a downward bias in returns on nominal government bonds.

The Allen Consulting Group has previously complied evidence that the yields on real government bonds provide a downward-biased estimate of the real risk free rate of return. Specifically, the Allen Consulting Group has confirmed that forecasts of inflation implied by returns on government bonds are generally above the RBA's target inflation range of two per cent to three per cent:[12]

- as at 28 June 2007, the average annual levels of inflation implied by the 2010, 2015 and 2020 real government bonds were 2.77 per cent, 3.26 per cent and 3.47 per cent respectively; and
- as at the same date, the level of inflation implied by the 10 year nominal and real risk free rates calculated using the Fisher equation was 3.33 per cent.

The Allen Consulting Group has also consulted a number of financial market participants on conditions in the market for indexed government bonds, revealing that many participants consider that there is an element of downward bias in the yields of these bonds.[13]

In previous advice on the derivation of the real risk free rate, the Allen Consulting Group has concluded that there is some evidence of a bias in yields of real government bonds, and advised that there is no straightforward means of either estimating the level of the bias or obtaining an unbiased estimate of the true real risk free rate of return. The Allen Consulting Group has, accordingly, proposed two possible alternative approaches to determining a value for the real risk free rate to be applied in the CAPM and WACC models:[14]

- use a value equal to the observed yield on the shortest-dated real government bond, recognising that this may overstate the true risk free rate of return due to possible liquidity premium in the value of these bonds reflecting limited trading, or

---

[10] Reserve Bank of Australia, 2007, Letter from Mr Guy Debelle, Assistant Governor (Financial Markets) to ACCC, 9 August 2007.

[11] Commonwealth Treasury, 2007, Letter from Mr Jim Murphy, Executive Director (Markets Group) to ACCC, 7 August 2007.

[12] Allen Consulting Group, 2007, *'Relative bias' in yields of indexed Commonwealth Government Securities when used as a proxy for the CAPM risk-free rate*, Statement by Balchin and Lawriwsky, August 2007, p.4.

[13] Allen Consulting Group, 2007, *'Relative bias' in yields of indexed Commonwealth Government Securities when used as a proxy for the CAPM risk-free rate*, Statement by Balchin and Lawriwsky, August 2007.

[14] Allen Consulting Group, 2007, *'Relative bias' in yields of indexed commonwealth government securities when used as a proxy for the CAPM risk-free rate*, Statement by Balchin and Lawiwsky, July 2007, pp.6-7.

- use the observed yield on 10-year nominal government bonds as the nominal risk free rate, adjust this value (using the Fisher equation) for a value of the forecast rate of inflation that is derived from another source.

3.4 Regulatory precedent

Australian economic regulators have, in the past, almost invariably determined values of risk free rates as observed or imputed yields on long-term nominal and real government bonds.

To date, the Authority has applied this 'conventional' approach to derive the real risk free rate and a forecast of inflation across industries it regulates: gas pipelines under the National Gas Code, electricity transmission and distribution under the *Electricity Networks Access Code 2004*, and the freight and passenger rail systems under the *Railways (Access) Code 2000*. That is, nominal and real risk free rates are derived from observed yields on nominal and government bonds, with a forecast of inflation then being derived from these rates using the Fisher equation.

The potential bias in the real risk free rate observed from indexed government bonds and the implications this has for establishing WACC parameters have been considered in recent regulatory decisions by the AER and the Victorian Essential Services Commission.[15]

Under Rule 6A.6.2 of the National Electricity Rules, the AER is required to establish a *nominal* post-tax WACC for the purposes of setting revenue caps for electricity transmission service providers. The AER does not require an estimate of the real risk free rate in setting a value for the WACC, but in past regulatory decisions it has used the difference in yields on nominal and real government bonds to derive a market forecast of inflation for the regulatory period to which the WACC applies.

In its determinations on regulated rates of return applied in determining revenue caps for SP AusNet and Powerlink, the AER departed from past practice in determining an inflation forecast and instead adopted an assumed value for forecast inflation based on consideration of a range of inflation indicators: the RBA's target inflation range; Australia's historical inflation rate; independent market forecasts; commentary provided by the RBA and the Commonwealth Treasury Department; current Bloomberg inflation swap rates; and the current difference between nominal and indexed Commonwealth Government bond yields. The AER subsequently favoured adopting a forecast inflation rate of 3 per cent.

[15] Australian Energy Regulator, 2007, Draft decision: SP AusNet transmission determination 2008-09 to 2013-14, 31 August 2007.
Australian Energy Regulator, 2007, Decision: Powerlink Queensland transmission network revenue cap 2007-08 to 2011-12.
Essential Services Commission, 2007, Gas Access Arrangement Review 2008-2012: Draft Decision, 28 August 2007.

In its recent draft decision on proposed revisions to access arrangements for the Victorian gas distribution networks, the Victorian Essential Services Commission recognised the potential bias in observed yields on real government bonds as an estimate of the real risk free rate and determined that observed yields on indexed government bonds cannot be relied upon to provide an unbiased estimate of the real risk-free rate, or to derive a market forecast of inflation. The Commission concluded that the most appropriate methodology to estimate the real risk free rate in the current market environment was to observe the yield on 10-year nominal government bonds to derive a nominal risk-free rate, to then establish a forecast for the expected rate of inflation, and then to use the Fisher equation to derive the real risk-free rate.[16] In doing so, The Commission applied a forecast of inflation of 3 per cent based on a number of short-term forecasts of inflation of between 2.5 per cent and 3.8 per cent (including forecasts made or assumed by ANZ Economic and Financial Market forecasts; BIS Shrapnel; KPMG; the Melbourne Institute Survey of Consumer Inflationary Expectations; the RBA; the Commonwealth Government; and the Victorian Government) and giving weight to the RBA's target range for inflation of 2 to 3 per cent.[17]

3.5 Recommendation

Current capital market evidence indicates that observed yields on real government bonds may no longer be able to be relied upon to provide an unbiased estimate of the real risk-free rate or, when considered with observed yields on nominal government bonds, to provided un unbiased forecast of the rate of inflation.

Recent regulatory decisions by the AER and the Victorian Essential Services Commission have recognised this potential bias and these regulators have adopted a forecast rate of inflation derived from consideration of inflation forecasts made by a range of parties and the RBA's target range for inflation. The Commission has derived a real risk free rate of return from observed yields on nominal government bonds and the assumed forecast of inflation using the Fisher equation.

In light of capital market evidence, the Allen Consulting Group supports the revised approach adopted by the AER and the Victorian Essential Services Commission in deriving a forecast rate of inflation and the real risk free rate and in, and consequently recommends that the Authority:

- derive the nominal risk free rate based on the 20 trading day average of the 10-year nominal government bond rate;
- use its judgement to establish a forecast rate of inflation from other sources (which may have regard to forecasts prepared by the RBA, financial institutions and governments); and
- then use the Fisher equation to derive the real risk free rate.

The average yield on nominal government bonds for the 20-days prior to 28 September 2007 was 5.99 per cent.

[16] Essential Services Commission, 2007, Gas Access Arrangement Review 2008-2012: Draft Decision, 28 August 2007, p.382.

[17] Essential Services Commission, 2007, Gas Access Arrangement Review 2008-2012: Draft Decision, 28 August 2007, p.382.

There is no clearly "best" forecast of inflation to apply in estimating a real WACC. The Authority may adopt a forecast of inflation of 3 per cent, consistent with recent regulatory decisions of the AER and Victorian Essential Services Commission. The Allen Consulting Group notes, however, that this value is at the upper bound of the RBA's target range for inflation.

Chapter 4

Financial structure and the cost of debt

4.1 Introduction

A firm's capital structure refers to the relative levels of debt and equity used to finance its assets. The proportion of debt to total asset value is referred to as a business's level of "gearing".

The capital structure assumed for the purposes of estimating the WACC affects the value of the WACC through the relative weightings given to the costs of debt and equity, the value of the equity beta (which is levered to reflect the assumed capital structure) and the value of the debt margin over the risk free rate (which is affected by assumptions of the credit rating of the business, of which gearing is an important determinant).

It is common regulatory practice to make a benchmark assumption for the financial structure of a regulated business or activity, rather than base an estimation of the cost of capital on the actual financial structure of the individual business. This approach is taken to avoid regulatory decisions distorting the incentives of regulated businesses to adopt efficient financing structures.

The cost of debt in the WACC is normally estimated as the risk free rate plus a debt risk premium (debt premium). The debt premium reflects the margin above the risk free rate that would be required by lenders providing debt funding. Regulators typically establish a value of the debt premium from capital market data on yields on corporate bonds consistent with benchmarks assumptions for the capital structure and credit rating of the regulated business or activity.

4.2 2003 Determination

In the 2003 Determination, the Rail Access Regulator determined that appropriate benchmark assumptions of the capital structure for the freight and passenger rail systems is 55 per cent debt to assets.

The Rail Access Regulator also determined that the cost of debt should be estimated on the basis of a benchmark assumption of an "A" credit rating for both the freight and passenger rail businesses. The cost of debt was determined at 1.11 per cent above the risk free rate, with this debt margin estimated from bond-market data obtained from CBA Spectrum.

4.3 Capital market evidence

Consideration of capital market evidence for determining benchmark assumptions on financial structures and for estimating the cost of debt involves:

- examining capital market evidence on a representative or efficient capital structure for each of the freight and passenger rail businesses;
- determining an appropriate assumption of a credit rating that would be attached to the debt of each business; and

- based on the assumed credit ratings, estimating the debt margin over government bonds for each business.

Benchmark capital structures and credit ratings

Capital-market evidence able to be considered in determining appropriate benchmark assumptions of capital structures comprises the observed capital structures of comparable listed businesses.

The freight rail system provides services to operators in bulk minerals transport, bulk grain transport, passenger transport and intermodal (container) traffic.

Comparable listed businesses are considered to comprise:

- listed rail infrastructure businesses in the United States and Canada; and
- listed transport infrastructure and services firms in Australian and New Zealand.

Tables 4.1 to 4.4 show observed capital structures and credit ratings for a range of comparable businesses for the freight rail system, details of which are provided in Appendix A.

The first group shown in Table 4.1 are the US below-rail operators. These businesses provide services primarily for on intermodal freight traffic. The average gearing level (debt/debt plus equity) for the US rail operations is approximately 40 percent, and with this level of gearing, the general credit rating is BBB or lower. The weak credit rating is likely to indicate vulnerability to fluctuations in cash flows.

The average gearing of the Canadian rail comparators (Table 4.2) is lower that the US comparators at 20 to 30 per cent. These businesses do not have public credit ratings.

The Australian, and New Zealand comparator firms (Tables 4.3 and 4.4) have average gearing of approximately 30 percent. Limited data on credit ratings (available only for one New Zealand comparator) indicates a credit rating of BBB+ at 24 per cent gearing.

The passenger rail network provides rail services to the Public Transport Authority for Perth metropolitan public passenger transport.

No directly comparable listed rail companies have been identified. In the absence of directly comparable entities, it is considered that the most appropriate comparable businesses are mature toll-road companies.

Data on the comparator businesses are shown in Table 4.5, and indicate an average gearing of 35 per cent and credit ratings of BBB+ or, more commonly, A.

Table 4.1

GEARING AND CREDIT RATING OF US COMPARATOR FIRMS

Company	Country	Debt to asset ratio	Credit Rating
Kansas City Southern	US	41.2%	B+
Union Pacific Corporation	US	27.5%	BBB
RailAmerica Inc	US	56.9%	NR
CSX Corporation	US	43.5%	BBB-
Burlington Northern Santa Fe	US	30.1%	BBB
Average		**39.8%**	

Source: Bloomberg, ACG analysis

Table 4.2

GEARING AND CREDIT RATIING OF CANADIAN COMPARATOR FIRMS

Company	Country	Debt/ Debt plus Equity	Credit Rating
Canadian Pacific Railway Ltd	Canada	32.4%	NR
Canadian National Railway Company	Canada	21.9%	NR
Average		**27.5%**	

Source: Bloomberg, ACG analysis

Table 4.3

GEARING AND CREDIT RATING OF AUSTRALIAN COMPARATOR FIRMS

Company	Country	Debt/ Debt plus Equity	Credit Rating
Adsteam Marine Limited	Australia	39.4%	NR
Macquarie Infrastructure Group	Australia	36.3%	NR
Patrick Corporation Ltd	Australia	6.5%	NR
Toll Holdings Limited	Australia	18.0%	NR
Average		**25.5%**	

Source: Bloomberg, ACG analysis

Table 4.4

GEARING AND CREDIT RATING OF NEW ZEALAND COMPARATOR FIRMS

Company	Country	Debt/ Debt plus Equity	Credit Rating
Auckland International Airport Ltd	New Zealand	20.6%	A
Infratil Ltd	New Zealand	39.4%	NR
Port of Tauranga Ltd	New Zealand	23.7%	BBB+
Toll NZ Ltd	New Zealand	41.9%	NR
Average		**31.4%**	

Source: Bloomberg, ACG analysis

Table 4.5

GEARING AND CREDIT RATING OF GLOBAL TOLL ROAD OPERATORS

Company	Country	Debt/Debt + Equity	Debt rating
Vinci SA	France	29%	BBB+
Albertis Infraestructuras SA	Spain	35%	A
Atlantia SPA	Italy	48%	A
Brisa Auto-Estradas-Priv SHR	Portugal	36%	A
Macquarie Infrastructure Group	Australia	22%	NR
Transurban Group	Australia	39%	NR
Average Leverage		**35%**	

Source: Bloomberg

Debt margins

Debt margins for A and BBB+ rated debt have been estimated from empirical data for 10 year A and BBB+ rated bonds for a 20-day period commencing 24 August 2007 and concluding on 20 September 2007.

The margins were derived from the fair yield margins of A and BBB+ bonds over Commonwealth Government bonds, using data from the CBA Spectrum and Bloomberg services. Each of these services provides a prediction of yields on 10 year bonds. Data on yields of actual bonds was used to judge the accuracy of the CBA Spectrum and Bloomberg yield margin predictions in order to then determine a debt margin.

Seven A-rated corporate bonds[18] with maturity greater than 5 years[19] were used to judge the accuracy of the CBA Spectrum and Bloomberg yield margin predictions in order to then determine a debt margin.

[18] These A rated bonds were: Telstra (5.27), St George (5.77), Telstra (6.27), Telstra (7.68), Telecom (8.02), Suncorp-Metway, (7.85), St George (7.94), with the remaining term of each of these bonds identified in parentheses.

[19] Longest term of 7.94 years and an average term of 6.97 years.

The range of estimates of the debt margin (not including debt raising transaction costs) of a 10 year, A-rated bond over a government bond of the sensitivity provided by the two sources of evidence are as follows (Table 4.6).

- The two 'fair value yield' prediction services – Bloomberg and CBA Spectrum – predict a yield of 165bp and 132bp, respectively.
- Using seven bonds with maturities of five or more years to test the predicted 'fair value yields' suggests that, in this sample, the Bloomberg service over-predicted yields by 24.1 bp and the CBA Spectrum service under-estimated by 5.1 bp. If the two fair-value predictions are adjusted by the average error across the seven test-bonds, 'error adjusted margins' of 141 bp and 137 bp are derived for the Bloomberg and CBA Spectrum predictions, respectively.[20]

Table 4.6

PREDICTED YIELD MARGINS FOR 10 YEAR A-RATED BONDS – BLOOMBERG AND CBA SPECTRUM FOR 20 DAYS TO 20 SEPTEMBER, 2007

Service	Raw Prediction (bp)	+/- average error (bp)	Error adjusted margin (bp)
Bloomberg	165	24.1	141
CBA Spectrum	132	-5.1	137

Source: Bloomberg, CBA Spectrum and ACG analysis

Four BBB+ rated corporate bonds[21] with maturity greater than five years[22] were used to judge the accuracy of the CBA Spectrum and Bloomberg yield margin predictions in order to then determine a debt margin.

The range of estimates of the debt margin (not including debt raising transaction costs) of a 10-year BBB+ rated bond over a government bond provided by the different sources of evidence are as follows (Table 4.7):

- The two 'fair value yield' prediction services – Bloomberg and CBA Spectrum – predict a yield of 159 bp and 152 bp, respectively.
- Using four bonds with maturities of five or more years to test the predicted 'fair value yields' suggests that, in this sample, the Bloomberg and CBA Spectrum services slightly under-estimated the true yield. If the two fair value predictions are adjusted by the average error across the four test-bonds, an 'error adjusted margin' of 160 bp and 152 bp is derived for the Bloomberg and CBA Spectrum and predictions, respectively.[23]

[20] This is assuming that the error identified above is constant across bonds with a term of greater than five years.

[21] These bonds were: IPG Finance (5.0 years), Snowy Hydro (5.51 years), GPT Management (6.0 years), and Santos Finance (8.08 years), with the remaining term of each of these bonds identified in parentheses.

[22] Longest term of 8.08 years and an average term of 6.15 years

[23] This is assuming that the error identified above is constant across bonds with a term of greater than five years.

Table 4.7

PREDICTED YIELD MARGINS FOR 10 YEAR BBB+ BONDS – BLOOMBERG AND CBA SPECTRUM FOR 20 DAYS TO 20 SEPTEMBER, 2007

Service	Raw Prediction (bp)	+/- average error (bp)	Error adjusted margin (bp)
Bloomberg	159	-0.5	160
CBA Spectrum	152	-0.1	152

Source: Bloomberg, CBA Spectrum and ACG analysis

4.4 Regulatory precedent

The assumptions and values of financial structures, credit ratings and debt margins applied in determination of WACC values are specific to the relevant regulated industry rather than the capital market as a whole. As such, it is precedent regulatory decisions on these parameters in the particular context of rail or other transport infrastructure that is of greatest relevance to the Authority's determination of WACC values for the freight and passenger rail systems, rather than regulatory decisions on these parameters for infrastructure services more generally. Relevant precedent decisions on rail and transport infrastructure comprise:

- the ACCC's approval of the access undertaking for the Australian Rail Track Corporation in 2002, that approved a WACC based on a gearing of 60 per cent and debt margin of 120 bp for a rail business that provides services largely for intermodal, bulk grain and passenger traffic;[24]
- the Queensland Competition Authority's approval of an access undertaking for Queensland Rail, which provided for a gearing of 55 per cent, a credit rating of BBB+ and a debt margin of 130 bp;[25] and
- the Victorian Essential Services Commissions determination of access arrangements for the Victorian rail system, which provided for gearing of 50 per cent, credit rating of BBB+ and debt margin of 116 bp for Pacific National's freight rail services business and 0.37 for Connex's freight and passenger rail services business.[26]

In summary, recent regulatory precedent is for determination and/or approval of rates of return based on gearing levels of 50 to 60 per cent and assumed credit ratings of BBB+.

These regulatory determinations were based in large part on precedent in regulatory determinations for energy (gas and electricity) infrastructure for which benchmark assumptions are typically made of 60 per cent gearing and a credit rating of BBB+.

[24] Australian Competition and Consumer Commission, May 2002, Decision Australian Rail Track Corporation Access Undertaking, pp.155, 159.

[25] Queensland Competition Authority, December 2005, Decision QR's 2005 Draft Access Undertaking, p.35.

[26] Essential Services Commission, April 2006, Proposed Rail Access Arrangements 2006 – Draft Decision, pp.154 – 157.

4.5 Recommendation

Capital market evidence indicates that the appropriate assumptions for levels of gearing, credit ratings and debt margins (at the time of this study) are:

- for the freight rail system –
  - gearing of 30 to 40 per cent,
  - credit rating of BBB+ or BBB,
  - debt margin of 155 bp (BBB+) to 165 bp (BBB); and
- for the passenger rail system –
  - gearing of 30 to 50 per cent,
  - credit rating of A,
  - debt margin of 140 bp.

This capital market evidence suggests lower gearing ratios and, for the freight rail system, a lower credit rating than determined for rail businesses by other regulators, including by the Rail Access Regulator in the 2003 Determination. However, these precedent regulatory determinations have given considerable weight to benchmark assumptions of gearing and credit rating adopted for energy infrastructure businesses that are not necessarily representative of rail businesses.

In light of the capital market evidence, the Allen Consulting Group recommends adopting benchmark assumptions.

- for the freight rail system –
  - gearing of 35 per cent,
  - credit rating of BBB+, reflecting a level of gearing below the upper bound of the range suggested by capital market data,
  - debt margin of 155 bp; and
- for the passenger rail system –
  - gearing of 35 per cent,
  - credit rating of A,
  - debt margin of 140 bp.

Chapter 5

Market risk premium

5.1 Introduction

The market risk (or equity) premium (MRP) is the difference between the expected return on a well-diversified portfolio of stocks and the risk free rate. It represents the reward that investors require to accept the risk associated with the diversified portfolio of equity investments.

The MRP is not an observable or measurable parameter and, consequently, a range of information sources have generally been relied upon to derive an estimate or assumption of the expected MRP. These data sources have tended to include:

- capital market observations of historical returns to equity;
- studies on imputed expectations of the MRP;
- surveys of opinions and assumptions of capital-market participants; and
- qualitative considerations of factors that may cause the expected MRP to change over time and to vary from historically observed returns.

5.2 2003 Determination

In the 2003 Determination, a MRP of 6 per cent was adopted after consideration of capital market observations of historical returns to equity and precedent decisions of Australian regulators.[27]

5.3 Capital market evidence

Capital market evidence on the MRP comprises:

- capital market observations of historical returns to equity;
- studies on imputed expectations of the MRP;
- surveys of opinions and assumptions of capital-market participants; and
- qualitative considerations of factors that may cause the expected MRP to change over time and to vary from historically observed returns.

There have been several recent studies of historical returns to equity in the Australian stock market, undertaken in the context of regulatory determinations for regulated infrastructure.

[27] Office of the Rail Access Regulator, 2003, Weighted average cost of capital to apply to WestNet Rail and the Western Australian Government Railways Commission, p 11.

Capital Research[28] and the South Australian Centre for Economic Studies (SACES)[29] separately undertook studies of historical returns to equity with weight given to relatively recent (post 1950s) observations, various use of geometric and arithmetic means of observations, and removal of bias caused by expected inflation of asset values. These studies concluded that historical returns to equity support MRP values of 4.5 to 6 per cent (Capital Partners) and 5.0 to 5.6 per cent (SACES).

The conclusions of Capital Partners and SACES are consistent with results of a further study by Brailsford et al that indicated, using only post 1958 data, geometric average returns to equity in a range of 3.8 per cent to 6 per cent and arithmetic average returns to equity in the range of 5.1 per cent to 7.3 per cent.[30]

The conclusions of Capital Research and SACES have been disputed by Gray and Officer[31] on the basis of contentions that the weight of evidence indicates historical returns to equity in excess of 6 per cent, and estimates below 6 per cent can only be achieved by making selective adjustments to the historical data (as made by both Capital Partners and SACES).

On the matter of future expectations of the MRP, Dr Shane Oliver, Chief Economist at AMP, has suggested that the MRP for the coming 5 to 10 years might be around 3.8 per cent, arguing that there were several reasons to suspect that the MRP demanded by investors may have fallen over time, including:[32]

- low inflation and reduced business cycle volatility;
- a greater feeling of global political security – no major wars in 60 years and the end of the Cold War;
- improved regulatory and legal protection for investors;
- lower trading costs in equities, greater scope to spread risk via diversification & improved market liquidity; and
- increased demand for shares from pension funds.

5.4 Regulatory precedent

A MRP of 6 per cent has become fairly firmly entrenched as precedent in Australian regulatory decisions, either as a point estimate of the MRP or the upper bound of a range of values.

Under the National Electricity Rules and MRP of 6 per cent is required to be applied in determining price controls for transmission network service provides in the National Electricity Market.

---

28 Capital Research Ltd. January 2005, Australian Market Risk Premium, submission to the Essential Services Commission of Victoria in response to the 2006-10 Victorian ElectricityDistribution Price Review Position Paper.

29 South Australian Centre for Economic Studies (SACES) April 2005, The Market Risk Premium for Australian Regulatory Decisions, submission to the Essential Services Commission of Victoria in response to the 2006-10 Victorian ElectricityDistribution Price Review Position Paper.

30 Brailsford, T., J. Handley, and K. Maheswaran 2006, *A re-examination of the historical equity risk premium in Australia*, 1 August. Working Paper, UQ Business School, and Department of Finance, University of Melbourne, quoted in Essential Services Commission, 2007, Gas Access Arrangement Review 2008-2012: Draft Decision, 28 August 2007, p.401.

31 Gray, S and Officer, R.R. 2005, *A review of the market risk premium and commentary on two recent papers*, A report prepared for the Energy Networks Association, August 2005, p.3.

32 AMP 2006, *The equity risk premium – is it enough?* Oliver's insights, AMP Capital Investors, Edition 13, May 2006.

In its 2005 electricity distribution price review, the Victorian Essential Services Commission adopted an MRP of 6 percent, noting that while this value is less than might be suggested by historical equity returns on the Australian stock market, the Commission is confident that the value does not understate the expected MRP, taking into account the "totality of evidence".[33]

In its more recent draft decision on gas distribution access arrangements in Victoria, the Victorian Essential Services Commission indicated that it considered the MRP should be assessed with reference to a range of possible values of 4 per cent to 7 per cent, but a rate of return determined with an MRP value of 6 per cent.[34]

For example, in its most recent decisions on price controls for electricity transmission and distribution networks, the Authority determined a range of values for the MRP of 5 to 6 per cent.[35]

5.5 Recommendation

The Allen Consulting Group considers that the weight of capital market evidence, including evidence on the expected future MRP, provides support for a MRP of no greater than 6 per cent and possibly lower values.

Consistent with recent regulatory precedent, the Allen Consulting Group recommends that the Authority again adopt a value for the MRP of 6 per cent.

[33] Essential Services Commission, October 2005, Electricity Distribution Price Review 2006-10, Final Decision Volume 1, Statement of Purpose and Reasons, p.365.

[34] Essential Services Commission, August 2007, Gas Access Arrangement Review 2008-2012 Draft Decision. pp. 403, 416.

[35] Economic Regulation Authority 2006, *Draft Decision on the Western Power Networks Business Unit Proposed Access Arrangement for the South West Interconnected Network,* Submitted by Western Power Corporation, 21 March 2006, p.167.

Chapter 6

Systematic risk (beta)

6.1 Introduction

The systematic risk (beta) of a firm is the measure of how the changes in the returns to the firm's stock are related to the changes in returns to the market as a whole. It reflects that businesses' exposure to non-diversifiable risk, which relates to that portion of the variance in the return on an asset that arises from market-wide economic factors that affect returns on all assets, and which cannot be avoided by holding the assets as part of a diversified portfolio of assets.

Beta may be estimated from observed capital-market returns on equity stocks. Where a firm is not listed on the stock market, an equity beta is commonly estimated by estimating asset beta from observations on equity returns for comparable listed entities and 're-levering' the asset beta values into equity beta values that are consistent with the assumed capital structure (debt to equity ratio) of the entity being examined.

6.2 2003 Determination

In the 2003 Determination, the Regulator adopted an equity beta of 1.0 for the freight rail system and an equity beta of 0.66 for the passenger rail system.

As neither of the businesses of the freight rail system or passenger rail system were listed on the stock market, the Authority estimated an equity beta for each by consideration of asset beta values for comparable listed entities and 're-levering' these into an equity beta that is consistent with an assumed gearing of 55 per cent for both businesses.

6.3 Capital market evidence

The Allen Consulting Group has considered capital market evidence for beta values using the same general methodology adopted by the Office of the Rail Regulator (and its consultants) in the 2003 Determination. That is, consideration has been given to capital market evidence on beta values for listed businesses that are expected to have a similar exposure to non-diversifiable risk as the Western Australian freight and passenger rail systems. This capital market evidence is considered separately for each of the two rail systems, as set out below.

Asset betas for comparable companies have been derived from Bloomberg "raw" (that is, unadjusted) equity betas using five years of monthly observations. Each five-year equity beta has been de-levered using the average five-year debt to asset ratio for each company, again based on Bloomberg data. Proxy asset beta values derived from the comparable businesses were then re-levered to equity beta values for the benchmark financial structures recommended in this report (35 per cent gearing for both the freight and passenger rail systems).

In undertaking this analysis, de-levering and re-levering of beta values has been undertaken using the Brealey & Myers formula:

$$\beta_a = \frac{E}{V} \cdot \beta_e$$

Capital market evidence on beta values for each of the freight and passenger rail systems is considered in turn below.

Freight rail system

The freight rail system provides services to operators in bulk minerals transport, bulk grain transport, passenger transport and intermodal (container) traffic.

Comparable listed businesses are considered to comprise:

- listed rail infrastructure businesses in the United States and Canada; and
- listed transport infrastructure and services firms in Australian and New Zealand.

Beta data on the comparator businesses (Appendix A) are shown in Tables 6.1 to 6.3, and indicate that an appropriate assumption for an asset beta for a rail services provider with a diversified use of the rail infrastructure is in the range of 0.65 to 0.75. Re-levering this range of asset beta values to equity beta values (at an assumed capital structure of 35 per cent debt to assets) indicates a range in equity beta values of 1.0 to 1.15.

An assumed asset beta value in this range may overstate an asset beta for the freight rail system in Western Australia. The reason for this is that the comparator businesses would have a greater proportion of revenues derived from intermodal (container) traffic, which would generally be expected to have higher levels of non-diversifiable risk (and higher beta values) than the freight rail system, which as a greater proportion of revenues from bulk transport of grain and mineral products. However, no relevant comparator businesses have been identified that have a greater proportion of revenues from bulk commodity traffic.

Table 6.1

RELATIVE ASSET AND EQUITY BETAS OF US COMPARATOR FIRMS

Company	Country	Raw equity beta	Debt/assets ratio	Asset beta
Kansas City Southern	US	1.23	0.70	0.74
Union Pacific Corporation	US	0.81	0.38	0.59
RailAmerica Inc	US	1.61	1.32	0.69
CSX Corporation	US	1.15	0.77	0.65
Burlington Northern Santa Fe	US	1.07	0.43	0.75
Average				**0.69**

Source: Bloomberg, ACG analysis

Table 6.2

RELATIVE ASSET AND EQUITY BETAS OF CANADIAN COMPARATOR FIRMS

Company	Country	Raw equity beta	Debt/assets ratio	Asset beta
Canadian Pacific Railway Ltd	Canada	0.956	0.48	0.65
Canadian National Railway Company	Canada	1.023	0.28	0.80
Average				**0.73**

Source: Bloomberg, ACG analysis

Table 6.3

RELATIVE ASSET AND EQUITY BETAS OF AUSTRALIAN COMPARATOR TRANSPORT SECTOR FIRMS

Company	Country	Raw equity beta	Debt/assets ratio	Asset beta
Adsteam Marine Limited	Australia	1.238	0.90	0.65
Macquarie Infrastructure Group	Australia	0.745	0.31	0.57
Patrick Corporation Ltd	Australia	1.056	0.07	0.99
Toll Holdings Limited	Australia	0.869	0.22	0.71
Average				**0.73**

Source: Bloomberg, ACG analysis

Table 6.4

RELATIVE ASSET AND EQUITY BETAS OF NEW ZEALAND COMPARATOR TRANSPORT SECTOR FIRMS

Company	Country	Raw equity beta	Debt/assets ratio	Asset beta
Auckland International Airport Ltd	New Zealand	0.944	0.26	0.75
Infratil Ltd	New Zealand	1.29	0.65	0.78
Port of Tauranga Ltd	New Zealand	0.873	0.31	0.67
Toll NZ Ltd	New Zealand	0.773	0.72	0.45
Average				**0.66**

Source: Bloomberg, ACG analysis

Passenger rail system

The passenger rail network provides rail services to the Public Transport Authority for Perth metropolitan public transport.

No directly comparable listed rail companies have been identified. In the absence of directly comparable entities, it is considered that appropriate comparable businesses are mature toll-road companies.

Beta data on the comparator businesses are shown in Table 6.5, and indicate that an appropriate assumption for an asset beta for a rail services provider with a diversified use of the rail infrastructure may be a value of about 0.30. Macquarie Infrastructure is one of the comparator businesses included in this group and has a substantially higher asset beta than the other businesses, possibly reflecting a market view of Macquarie Infrastructure as an aggressive investor with substantial growth options. The asset betas for comparator businesses other than Macquarie Infrastructure have a mean value of 0.25.

A range of asset beta values of 0.25 to 0.30 corresponds to re-levered equity beta values (at an assumed capital structure of 35 per cent debt to assets) of 0.38 to 0.46.

Table 6.5

GLOBAL TOLL ROAD COMPARATOR FIRMS

Company	Country	Raw equity beta	Debt/assets ratio	Asset Beta
Vinci SA	France	0.26	0.44	0.18
Albertis Infraestructuras SA	Spain	0.21	0.56	0.13
Atlantia SPA	Italy	0.64	0.95	0.33
Brisa Auto-Estradas-Priv SHR	Portugal	0.51	0.58	0.32
Macquarie Infrastructure Group	Australia	0.75	0.30	0.58
Transurban Group	Australia	0.46	0.66	0.28
Average Asset Beta				**0.30**

Source: Bloomberg, and ACG analysis. Betas measured by monthly data from August 2002 to September 2007.

6.4 Regulatory precedent

The values of asset and equity betas applied in determination of WACC values are specific to the nature of the regulated business or activity rather than the capital market as a whole. As such, it is precedent regulatory decisions on beta values in the particular context of rail or other transport infrastructure that is of greatest relevance to the Authority's determination of WACC values for the freight and passenger rail systems, rather than regulatory decisions on beta values for infrastructure services more generally. Relevant precedent decisions on rail and transport infrastructure comprise:

- the ACCC's approval of the access undertaking for the Australian Rail Track Corporation in 2002, including approval of an asset beta value of 0.58 to be applied in determining a WACC – an asset beta of 0.58 for a rail business that provides services largely for intermodal, bulk grain and passenger traffic;[36]
- the Queensland Competition Authority's approval of an access undertaking for Queensland Rail, which contemplated an asset beta in the range of 0.35 to 0.5 for a rail business that provides services largely for bulk coal traffic;[37] and
- the Victorian Essential Services Commission's determination of access arrangements for the Victorian rail system, which determined asset beta values of 0.50 for Pacific National's freight rail services business and 0.37 for Connex's freight and passenger rail services business.[38]

In summary, recent regulatory precedent is for determination and/or approval of rates of return based on:

- asset beta values of up to about 0.60 for rail businesses that provide services for traffic dominated by intermodal services, equating to an equity beta of 0.92 at a gearing of 35 per cent debt to assets;
- asset beta values of 0.35 to 0.50 for rail businesses that provide services largely for bulk commodity traffic, equating to equity beta values of 0.54 to 0.77 at a gearing of 35 per cent debt to assets; and
- lower asset beta values of about 0.35 for rail business that provide services to mixed freight and passenger traffic equating to an equity beta values of 0.54 at a gearing of 35 per cent debt to assets.

6.5 Recommendation

For the freight rail system, the Allen Consulting Group considers that available capital market evidence supports an asset beta value in the range of 0.65 to 0.75, corresponding to equity beta values in the range of 1.0 to 1.15 at a gearing of 35 per cent. Beta values in these ranges may, however, overstate beta values for the freight rail system in Western Australia for reasons that the comparator businesses considered for this study would have a greater proportion of revenues derived from intermodal (container) traffic, which would generally be expected to have higher levels of non-diversifiable risk (and higher beta values) than the freight rail system in Western Australia, which has a greater proportion of revenues from bulk transport of grain and mineral products. Lower beta values of perhaps in the range of 0.5 to 0.6 (corresponding to equity beta values 0.77 to 0.92) may be more appropriately determined for the freight rail system in Western Australia, and would be consistent with recent regulatory precedent. An exercise of judgement to adopt such lower values would necessarily be subjective. Taking these matters into account, an asset beta value of 0.6 is recommended for the freight rail system, corresponding to an equity beta value of 0.92 at a gearing of 35 per cent.

[36] Australian Competition and Consumer Commission, May 2002, Decision Australian Rail Track Corporation Access Undertaking, p.157

[37] Queensland Competition Authority, December 2005, Decision QR's 2005 Draft Access Undertaking, p.35.

[38] Essential Services Commission, April 2006, Proposed Rail Access Arrangements 2006 – Draft Decision, p.154.

For the passenger rail system, the Allen Consulting Group considers that available capital market evidence supports an asset beta value in the range of 0.25 to 0.30, corresponding to a range of equity beta values of 0.38 to 0.46 at a gearing of 35 per cent dent to assets. Such values are consistent with recent regulatory precedent for rail businesses providing services for mixed freight and passenger tariff. Taking into account that the passenger rail system in Western Australia involves solely government-supported passenger services, beta values at the lower end of these ranges are recommended for application by the Authority.

Chapter 7

Debt issuance and equity raising costs

7.1 Introduction

Debt raising costs may include underwriting fees, legal fees, company credit rating fees and other costs incurred in raising debt finance. Regulators have typically included an allowance for these costs in cost of debt as an increment to the debt margin.

Recently, regulators have also given consideration to including an allowance, usually through an operating cost allowance, for costs that may be incurred when additional equity needs to be raised (to maintain the benchmark capital structure). Such equity raising costs may include underwriting fees, legal fees, company credit rating fees and other costs.

7.2 2003 Determination

In the 2003 Determination, an allowance of 12.5 bp was included in the debt risk premium for debt issuance costs. The determination did not provide for equity raising costs.

7.3 Capital market evidence

The Allen Consulting Group undertook a study for the ACCC in 2004 on appropriate debt and equity raising costs to be included in costs recognised for the purposes of determining regulated revenues and prices.[39]

This study determined debt raising costs consistent the benchmark assumption applied in determining costs of debt benchmark regulated entity, being that the form of debt finance is long term bond issues. It was based on costs associated with Australian international bond issues and for Australian medium term notes sold jointly in Australia and overseas. Estimates of these costs were equivalent to 8.0 to 10.4 bp per annum when expressed as an increment to the debt margin.

The study determined equity raising costs by consideration of costs incurred in actual infrastructure capital raisings, deriving an estimate of costs of 3.83 per cent of capital raised.

7.4 Regulatory precedent

Two broadly different approaches have been adopted by regulators in the treatment of debt and equity raising costs in determination of regulated revenues and prices.

[39] Allen Consulting Group, 2004, *Debt and equity raising transaction costs*: Final report to the ACCC, December 2004.

The ACCC and AER have tended to derive estimates of debt raising costs as a bottom-up calculation cost costs notionally incurred for particular values and terms of debt. Other regulators, including the Authority, the Victorian Essential Services Commission and the Queensland Competition Authority have adopted a regulatory 'benchmark' of 12.5bp, although often acknowledging that this would tend to overstate debt-raising costs.

Equity raising costs have generally not been considered in regulatory determinations. A recent exception is with the AER recently accepting that equity raising costs may reasonably be expected to occur where a regulated entity is not able to fund all of the approved capital expenditure through retained earnings and debt.[40] The AER calculated the additional amount of equity required, and assumed transaction costs of three per cent of this amount.

7.5 Recommendation

Capital market evidence set out in the Allen Consulting Group's 2004 study for the ACCC indicates that debt issuance costs, expressed as margin on the cost of debt, may amount to some 8.0 bp to 10.4 bp depending mainly on the amount of debt finance and the term of the debt.

Regulatory precedent has varied from precise calculation of debt issuance costs debt margin, to adopting a benchmark allowance of 12.5 bp that is generally acknowledged as a conservatively generous allowance for these costs.

The Allen Consulting Group recommends that the Authority continue to include an allowance of 12.5 bp for debt issuance costs, on the basis that this figure is likely to be close to the reasonable estimate of these costs.

The Allen Consulting Group considers that equity raising costs are a legitimate component of the cost of investment. However, The Allen Consulting Group further considers that equity raising costs should be taken into account in the valuation of assets rather than in the rate of return.

[40] Australian Energy Regulator, 2007, Decision: Powerlink Queensland transmission network revenue cap 2007-08 to 2011-12, p.102.

Chapter 8

Taxation and dividend imputation

8.1 Introduction

Adjusting the WACC to reflect taxation liabilities requires an assumption to be made about the effective rate of company income tax, and the value of franking credits attached to distributions to shareholders.

A franking credit is received by Australian resident shareholders for corporate taxation paid at the company level when determining their personal income taxation liabilities under the system of dividend imputation.

The actual value of franking credits, represented in the WACC by the parameter 'gamma', depends on the proportion of the franking credits that are created by the firm that are distributed, and the value that the investor attaches to the credit, which depends on the investor's tax circumstances (that is, their marginal tax rate). As these will differ across investors, the value of franking credits may be between nil and full value (ie. a gamma value between zero and one).

8.2 2003 Determination

In the 2003 Determination, the statutory rate of corporate income taxation of 30 per cent was used in the real pre-tax WACC calculation to ensure consistency with other regulators using the real pre-tax approach to calculating the WACC. The Regulator also adopted value of taxation imputation (the gamma value) of 0.5.

8.3 Capital market evidence

Taxation rate

In the pre-tax specification of the WACC, the assumed effective tax rate is generally the statutory rate of company income tax, which is currently 30 per cent. Due to particular features of the Australian taxation system, particularly provisions for accelerated depreciation of assets, effective taxation rates for infrastructure businesses are typically less than the statutory taxation rate. The determination of the effective taxation rate for a particular regulated entity of activity would comprise a calculation specific to that entity or activity. Such a calculation is beyond the scope of this study.

Dividend imputation

The value of gamma depends on the proportion of franking credits that are distributed by the firm, and the value placed on the distributed credits by investors. The capital market evidence on the appropriate values for these two parameters, and hence an appropriate value for gamma, was considered in detail by the Victorian Essential Services Commission in its recent draft decision on gas distribution arrangements in Victoria and are outlined below.

Proportion of franking credits created that are distributed

In 2004, Hathaway and Officer found that between 1988 and 2002 an average of 71 per cent of franking credits were distributed to Australian shareholders.[41]

The value adopted for the proportion of franking credits distributed by the firm should reflect that of a benchmark firm in the respective industry rather than an average for all Australian firms.[42] For regulated energy utility businesses, the Essential Services Commission has found that 100 per cent of franking credits created would be distributed, reflecting the higher dividend yields of utility firms than the average for Australian firms.

Value placed on distributed franking credits by investors

Conflicting estimates have been made for both the value placed on imputation credits by the 'marginal investor' in the economy and by the actual composition of investors in Australian listed securities.

- Handley and Maheswaran found that 81 per cent of distributed imputation credits were used to offset taxation liabilities over the 2001 2004 period.[43]
- Beggs and Skeels found that changes to taxation law in 2000, which provided full income rebates for unused franking credits, had caused the market to put a statistically significant value on franking credits, which the authors estimated at 0.572.[44]
- Hathaway and Officer found that the marginal investor placed a value of around 63 per cent on distributed franking credits.[45]
- A review of studies by the Strategic Finance Group found support to adopt a zero value for distributed franking credits.[46] Specifically, the Strategic Finance Group referred to a study by Cannavan, Finn and Gray in 2004, which concluded that:[47]
  - cash dividends are fully valued
  - franking credits were valued at up to 50per cent of their face value prior to 1997; and
  - franking credits are not valued by the price-setting investor (and therefore do not affect the corporate cost of capital) after 1997.

[41] Hathaway, N. and Officer, B. 2004, The Value of Imputation Tax Credits: 2004 Update, 2 November 2004, p.12.

[42] Essential Services Commission, 2007, Gas Access Arrangement Review 2008-2012: Draft Decision, 28 August 2007, p.422 and p.427.

[43] Essential Services Commission, 2007, Gas Access Arrangement Review 2008-2012: Draft Decision, 28 August 2007, p.422 and p.423.

[44] Essential Services Commission, 2007, Gas Access Arrangement Review 2008-2012: Draft Decision, 28 August 2007, p.422 and p.425.

[45] Hathaway, N. and Officer, B. 2004, The Value of Imputation Tax Credits: 2004 Update, 2 November 2004, p.24.

[46] Strategic Finance Group 2007, *The impact of franking credits on the corporate cost of capital: Empirical evidence*, Report Prepared for Envestra, 22 March 2007, p.13.

[47] Strategic Finance Group 2007, *The impact of franking credits on the corporate cost of capital: Empirical evidence*, Report Prepared for Envestra, 22 March 2007, p.15.

Of these studies, the Essential Services Commission has claimed that the results of Cannavan et al. have limited validity due to a failure to recognise changes in tax law that increased the value of franking credits to superannuation funds and life insurance companies.[48]

Gamma

The Essential Services Commission's recent review of evidence for the value of franking credits indicates that the value of gamma may be determined with reference to a proportion of franking credits distributed of 71 to 100 per cent, and a value of franking credits to investors of 0.57 to 0.81 per cent, indicating a possible range of gamma values of 0.4 to 0.8.

8.4 Regulatory precedent

The Authority's past regulatory decisions for gas, electricity and rail infrastructure have calculated pre-tax WACC values using the statutory tax rate of 30 per cent and a gamma value of either 0.5 (for decisions prior to 2003) or within a range of 0.3 to 0.5 (for decisions in or subsequent to 2003).

The National Electricity Rules require the AER to apply the prevailing statutory tax rate and a gamma value of 0.5 in establishing the estimated cost of corporate income tax in regulatory determinations for electricity transmission in the National Electricity Market.

The Victorian Essential Services Commission has consistently adopted a gamma value of 0.5, including in its recent draft decision for gas distribution networks.[49]

8.5 Recommendation

Consistent with regulatory precedent of the Authority, the Allen Consulting Group has determined pre-tax WACC values for the freight and passenger rail systems with reference to an effective taxation rate equal to the statutory rate of corporate income tax of 30 per cent. The Authority may wish to give consideration to a rigorous determination of an effective taxation rate that may be apply to these businesses, but such a determination is beyond the scope of this study.

The most recent capital market evidence supports use a gamma value of between 0.4 and 0.8 for regulated utility businesses. It is unclear whether typical rail businesses would have dividend yields as high as energy utilities, which underlie the higher values of this range. As such, it is recommended that lower values in the range may, conservatively, be more relevant for the rail businesses. This would support the continued application of a value of 0.5, consistent with regulatory precedent.

[48] Essential Services Commission, 2007, Gas Access Arrangement Review 2008-2012: Draft Decision, 28 August 2007, pp.425, 426.

[49] Essential Services Commission, 2007, Gas Access Arrangement Review 2008-2012: Draft Decision, 28 August 2007, p.433.

Appendix A

Comparator company descriptions

Company descriptions appearing in this Appendix have been sourced from Bloomberg.

Table A.1

NORTH AMERICAN RAIL

Company	Code	Description
Union Pacific Corporation	UNP US	Union Pacific Corp., through its subsidiaries, operates as a rail transportation provider. The Company's railroad hauls a variety of goods, including agricultural, automotive, and chemical products, across the United States and portions of Mexico.
RailAmerica Inc.	RRA US	RailAmerica Inc. owns and operates short line freight railroads in North America and regional freight railroads in Australia and Chile. The Company also owns, operates, or has an equity interest in a diversified portfolio of railroads located in the United States, Australia, Canada, Chile and Argentina.
Kansas City Southern	KSU US	Kansas City Southern, through its subsidiary, is the holding company for transportation segment subsidiaries and affiliates. The Company operates a railroad system that provides shippers with rail freight services in commercial and industrial markets of the Unites States and Mexico.
Burlington Northern Santa Fe Corporation	BNI US	Burlington Northern Santa Fe Corporation, through its Burlington Northern and Santa Fe Railway Company subsidiary, operates a railroad system in the United States and Canada. The Company transports a wide range of products and commodities, including the transportation of containers and trailers, coal, grain, chemicals, metals, minerals, forest products, autos and consumer goods.
CXS Corporation	CSX US	CSX Corporation is an international freight transportation company. The Company provides rail, intermodal, domestic containers-shipping, barging and contract logistics services around the world. CSX's rail transportation services are provided principally throughout the eastern United States.
Canadian Pacific Railway Limited	CP CN	Canadian Pacific Railway Limited is a Class 1 transcontinental railway, providing freight and intermodal services over a network in Canada and the United States. The Company's mainline network services major Canadian ports and cities from Montreal to Vancouver and key centres in the United States Midwest and Northeast.
Canadian National Railway Company	CNR CN	Canadian National Rail company operates a network of track in Canada and the United States. The Company transports forest products, grain and grain products, coal, sulfur and fertilizers, inter-modal and automotive products. Canadian National operates a fleet of locomotives and railcars.

Table A.2

AUSTRALIA AND NEW ZEALAND TRANSPORT

Company	Code	Description
Adsteam Marine Limited	ADZ AU	Adsteam Marine Limited provides marine support services for the Australian international shipping industry. The Company provides marine towage and lines, work boat and offshore services and ocean marine salvage, agency and related services at various ports around Australia and in Papua New Guinea, United Kingdom, India, New Zealand, Fiji and the United States.
Macquarie Infrastructure Group	MIG AU	Macquarie Infrastructure Group is an investment group consisting of two unit trusts. The investment assets of the Group include infrastructure projects, which encompass various motorway constructions and toll road construction and maintenance in Australia, the United Kingdom and Canada.
Patrick Corporation Ltd	PRK AU	Patrick Corporation Limited has operations in freight and transport logistics sector with activities in rail and seaborne trade movements. The Company hauls freight by rail including coal, grain, minerals and industrial products along with operating container and general stevedoring facilities and terminals at designated ports. Patrick also has an interest in Virgin Blue Airlines.
Toll Holdings Limited	TOL AU	Toll Holdings Limited provides express freight transport by road, rail and sea throughout Australia and provides integrated logistics and distribution systems, including specialised warehousing, port operations, beverage container recycling and packaging design manufacture. The Company also provides coastal shipping, refrigerated freight services and wharf services.
Transurban Group	TCL AU	Transurban Group is involved in the Melbourne City Link freeway project. The project involves the design, financing, construction, operation and maintenance of 22 kilometres of privately–developed tollroad linking the north–western and south–eastern suburbs of Melbourne. There are two main sections of the project, the Western and Southern Link.

Company	Code	Description
Auckland International Airport Limited	AIA NZ	Auckland International Airport Limited owns and operates the Auckland International Airport. The Airport includes a single runway, an international terminal and two domestic terminals. The Airport also has commercial facilities which includes airfreight operations, car rental services, commercial banking centre and office buildings.
Infratil Ltd	IFT NZ	Infratil Limited is a New Zealand based investment company which invests in the shares and securities of New Zealand infrastructure and utility companies. Infratil's investment portfolio includes electricity, gas, airport and port companies such as Wellington International Airport, TrustPower and Port of Tauranga.
Port of Tauranga Limited	POT NZ	Port of Tauranga Limited activities include the provision of wharf facilities, back up land for the storage and transit of import and export cargo, berthage, cranes, tug and pilotage services for exporters, importers and shipping companies and the leasing of land and buildings. The Group also operates a container terminal and has bulk cargo marshalling operations.
Toll NZ Limited	TRH NZ	Toll NZ Limited is a multi–model freight transport and distribution company in New Zealand. The Company operates a commercial railroad, providing both long–haul bulk freight and passenger services. Toll NZ also operates passenger and freight transport across the Cook Strait and provides mode–neutral supply chain management.