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5 May 2003

Dr Ken Michael
Acting Rail Access Regulator
PO Box 7459, Cloister Square
Perth WA 6850

Dear Sir

Determination re Weighted Average Cost of Capital

This letter is our response to the Office of the Rail Access Regulator (ORAR) request for public submissions on the issue of the weighted average cost of capital (WACC) as applicable to the WA Rail Access Regime (the Regime). In particular, we comment on a report by NECG, a consultant to ORAR.

Portman Iron Ore Limited (Portman) transports iron ore from Koolyanobbing by rail via Kalgoorlie to the Port of Esperance from where it is exported. Portman's business cannot exist without viable access to the railway network. In this context, "viable" means a cost which is compatible with international iron ore prices; which prices are set without reference to Portman's cost structure.

The WACC will be a material influence on Portman's cost structure. It will be, thereby, a determinant of whether or not Portman remains in the business of exporting iron ore. It is relevant to note that, if Portman was compelled to cease exporting iron ore, the Kalgoorlie – Esperance railway would eventually close because the custom of the minor users alone is, and will remain, insufficient to support the railway costs.

Because of the importance of the WACC to Portman's business, Portman has sought advice from Meyrick and Associates, an organisation expert on the issue and familiar with its application to regulated industries in Australia. The advice we received was prepared independently of Portman officers and our railway consultants. It does, however, have our unqualified endorsement and is recommended for your consideration. A copy of this advice is enclosed with this letter.
We would emphasise two general issues:

1. Portman takes issue with the NECG approach that, where value judgments need to be made about parameters in the WACC calculation, the bias should be in favour of the network owner. We assert that there is no evidence to support a

general contention that price incentive to invest in infrastructure is more in the public interest than incentive to increase volume usage by enhancing the competitive position of rail vis a vis alternative transport modes. In particular:

a. The risk of a WACC set too low mitigating against investment in the network is more than offset by the risk of a WACC set too high mitigating against investment in an efficient export industry; and

b. A WACC set too high will impede development of a competitive "above rail" market, and be contrary to the objective of micro-economic reform in this area.

2. Portman urges the ORAR to give weight to the benefits, to the railway industry and its customers, of a convergence towards uniformity of railway access regulation across Australia. Unless there are compelling reasons to suppose otherwise, we believe that precedent is evidence of satisfactory compromise between business and the wider public interest. Please note that we do not agree with NECG's quantitative recommendations about debt gearing, equity beta, and market risk premium.

Your attention is also drawn to the technical matter of calculating the WACC. Meyrick sees benefit in moving to a post-tax nominal method of calculation. The preference is to retain the existing method of calculating the WACC (as recommended by Macquarie Bank and adopted by ORAR as an interim expedient) because this is more transparent than NECG's "vanilla" formula. It is, however, noted that adoption of the nominal post-tax approach requires a thorough public review of asset values and ways of calculating cash flows so as to ensure compatibility with the WACC.

We hope our comments will assist your deliberations.

Yours sincerely

Tony Schoer
Chief Financial Officer
PORTMAN IRON ORE LIMITED

Att.
Meyrick & Associates (2003)
Comments on NECG Review of WACC for Rail Infrastructure in Western Australia
(Report prepared for Portman Mining April 2003)

Ref: P/CFO11-GenCorresp-WACC-5-May-03

MEYRICK AND ASSOCIATES

Comments on NECG Review of WACC for Rail Infrastructure in Western Australia

Prepared for
Portman Mining

April 2003

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EXECUTIVE SUMMARY

In general, the approach taken by NECG to the task of estimating the cost of capital for WA rail infrastructure is in accordance with current practice in this area, and the approach is pursued consistently and competently.

Estimating the cost of capital is, however, not a precise process, and there is a need to make a number of subjective judgements. In the attached report we review the major judgements that have been made by NECG and comment on each of them. In many cases we concur with NECG's judgment. However, in a number of instances we believe that a different judgment should have been made or different parametric values adopted.

This difference can be divided into two major classes: differences in principle and differences of estimation. There are two major differences in principle:

- whereas NECG advocates a consistent positive or upward bias in the estimation of parameters, we believe that ORAR should adopt a neutral or even a slightly negative bias so as not to deter the development of competition in above rail operations; and
- whereas NECG advocates immediate conversion to the use of a nominal, post-tax WACC, we believe that this would be inappropriate until a thorough public review of the consequent modifications that would need to be undertaken to the treatment of asset values and other costs has been undertaken.

We also note that applying NECG's preferred market transformation formula to its 'vanilla' nominal, post-tax WACC of 9% does not produce its stated equivalent real, pre-tax WACC of 7.86%. This is because NECG's 'vanilla' formula does not explicitly include the taxation impact of the imputation credits and tax write-offs of interest payments. The more detailed nominal, post-tax WACC formula used by Macquarie Bank (1999) did include these effects and applying the market transformation formula to this more detailed nominal, post-tax WACC formula does produce the stated equivalent real, pre-tax WACC. We recommend that the nominal, post-tax WACC should be calculated using the Macquarie Bank formula and be consistently presented in that way.

There are also three areas in which we believe that parameter estimates recommended by NECG should be varied:

- the equity beta adopted by NECG is too high: a value of 0.40 would be more appropriate than the 0.45 used by NECG;
- the market risk premium should be set at 6%, in line with most regulatory practice in Australia, rather than at 7% as advocated by NECG; and
- the appropriate capital structure for WNR comprises 55% debt, rather than the 50% preferred by NECG.

Adopting these values produces a value for the real, pre-tax WACC of 7.02% (compared to NECG's estimate of 7.86%). The equivalent nominal, post-tax WACC using the Macquarie Bank formula is 6.41% compared to 7.01% using NECG's parameter values. Using NECG's simplified 'vanilla' nominal, post-tax formula with our preferred parameter values produces a figure of 8.32% compared to NECG's 9.00%.

Using NECG's parameter estimates, it is not clear whether the NECG report is proposing that the regulatory pricing requirement should be that WNR can set its prices to generate a post-tax, nominal income stream producing a rate of return on the real value of assets that does not exceed 7.01% (roughly equivalent to the status quo) or 9% (implying a major price increase). Clearly, it is the former that is more appropriate, since it reflects the net of tax costs of debt and equity to the firm, and would be applied to net of tax income streams.

1. INTRODUCTION

This comment has been prepared as a response to the Draft Report entitled *Review and Determination of Weighted Average Cost of Capital for rail infrastructure operated by WestNet Rail and Western Australian Government Railway Commission*.[1] Network Economics Consulting Group (NECG) prepared the draft report for the Office of the Rail Access Regulatory (ORAR).

The NECG report consists of three substantive sections:

Framework Issues — NECG was asked to review both the framework and the parameter values for the WACC. The first substantive section of the report deals with the broad conceptual and methodological issues relating to the estimation of the cost of capital. It deals with two major issues:

- whether the Capital Asset Pricing Model provides the most appropriate basis for estimating the cost of capital for the regulated enterprises; and
- what the most appropriate form of specification of the cost of capital is: specifically, whether the cost of capital should be expressed in pre-tax or post-task terms, and whether it should be defined in real or nominal terms.

Parameter Values — This section of the report deals with the estimation of the various parameters required to estimate the weighted average cost of capital.

Calculation of WACC — The report concludes with a short chapter that presents the WACC calculated using the preferred estimates for each of the parameters.

For ease of reference, this comment adopts the same general structure.

[1] In conformity with the practice adopted by NECG, WestNet Rail will be abbreviated as WNR and Western Australian Government Railway Commission as WAGR.

2. FRAMEWORK ISSUES

2.1 Use of the CAPM

2.1.1 NECG Position

NECG reviews several alternatives to the use of the Capital Asset Pricing Model (CAPM) as a means of estimating the cost of capital for regulatory purposes. These are:

- International Capital Asset Pricing model;
- Arbitrage Pricing Theory model; and
- Dividend Discount model.

NECG argues that, 'given the well-established support for the domestic version of the CAPM … there is a need to demonstrate that alternative models have significantly improved empirical properties before shifting from the CAPM' (p16). As it fails to find such improved properties in any of the alternative models, NECG recommends the continued use of CAPM.

2.1.2 Comment

We concur with both NECG's analysis and its conclusion. The CAPM has been almost universally accepted in Australian regulatory circles as the best available tool for assessing the cost of capital, and there is little to commend the adoption of an alternative model at this time.

2.1.3 Recommendation

As recommended by NECG, ORAR should adopt the CAPM as the best available approach to estimating the WACC.

2.2 The exercise of judgement in selection of parameters for use in CAPM

2.2.1 NECG Position

In its earlier report for the WA Department of Transport, Macquarie Bank (1999) noted that the estimation of parameter values for use in the CAPM requires significant exercise of subjective judgement:

> *CAPM theory is very straightforward to apply, but several of the key inputs offer scope for subjectivity and have received significant attention during evolution of Australia's regulatory debate. (Macquarie Bank 1999).*

This point appears to be accepted by NECG, which remarks that 'there is a need for judgement to be exercised at all levels of analysis'. (NECG 2003, p22).

This raises the issue of whether, in the light of the uncertainties that exist, a particular bias should be applied in exercising the necessary subjective judgement in the selection of parameters for use in the WACC estimation. NECG appears to recommend a positive bias in estimating the WACC value, asserting that 'it is socially preferable to err on the side of over estimating WACC rather than under estimating it' (NECG 2003, p14).

2.2.2 Discussion

We agree with Macquarie Bank that the relative simplicity of the mathematical process of calculating the WACC using the CAPM can give a false impression of precision.

Although the CAPM is the best currently available tool, it has many weaknesses as a means of setting regulatory rates of return. These are both conceptual and empirical. Conceptually, there are two sets of limitations:

- Limitations in the CAPM as an instrument for fulfilling its original purpose, which is the explanation of the prices of traded stocks.

  These limitations derive in part from the restrictive nature of the assumptions that underlie the model, which are detailed by NECG (2003, p16). The practical ramifications of the invalidity of these assumptions – and perhaps, though less certainly, of the underlying theory – is summarised by Desmoulins-Lebeault (2002) in the following terms:

> *The CAPM is therefore in a highly fragile position: if the tests including additional variables are justified, they show that the model is a failure. Yet, if, as some argue, the model cannot be tested effectively because of the unobservability of the market portfolio or biases in the data available to researchers, it cannot be of any use for practical applications and is therefore quite vain. (Desmoulins-Lebeault 2002).*

- Limitations that derive from the fact that the CAPM is being applied to the regulation of infrastructure pricing rather than to the pricing of traded securities.

  The CAPM is a technique for estimating the cost of funds – it is a financial parameter and has nothing to do with physical assets. It has been widely used in valuing corporate stocks and in assessing investment options. It is a *prospective* measure: that is, it deals with the expected return current investors (both debt and equity providers) will require in order to induce them to provide funds to the corporation.

  This was made explicit by Macquarie Bank in its Final Report on the maximum rate of return on rail infrastructure for use in the Western Australian Rail Access Regime in 1999:

> *CAPM theory [and hence most estimates of WACC] is founded on the relationship between investors' preferences for risk and return. Investors expect similar returns from investments of similar risk. Therefore, any entity's capacity to attract capital should depend on its returns being equitable with returns of similar risk. (Macquarie, p6)*

  In regulatory application, the CAPM is typically applied to exogenously estimated valuations (either historical or replacement) of physical assets. This distinction is largely academic when a new investment is contemplated. In this case the 'value' of the asset and the quantum of funds needed to acquire it are essentially the same thing, so we can just as well apply the CAPM to asset values as we can to the funds provided to acquire or develop it.

  The situation is different, however, when the CAPM is used to estimate the appropriate rate of return to be applied to existing fixed assets. If, for instance, the new owners acquire a company at a significant premium over the book value of assets, then they will do so expecting to earn at least their target rate of return on the acquisition value. Conversely, if they acquire the company at a discount over asset book

values, it is cost of purchase, not the book values of assets, to which they would have applied their target rate of return in making the decision on whether or not to buy.

This suggests that the use of the CAPM to estimate the appropriate rate of return on a collection of established fixed assets acquired is strictly valid only if:

– the valuation of the assets provides a good proxy for the funds provided by the owner of the assets, or

– the valuation accurately reflects the value that could be realised through the sale of the assets.

It is unlikely that either of these conditions hold in the case of rail infrastructure assets in Western Australia. These assets were acquired over a long period under different management regimes with different objectives in mind using different financing approaches with imperfect recording of costs. The justification for applying the CAPM is correspondingly weakened.

These difficulties are acknowledged in the case of the IPART (1999) recommendation that the 'existing corridor formation vested to the RAC [now RIC] in 1996' be valued at zero. (Zero valuation has the same effect as applying a zero rate of return to part of the asset base when an annualised value approach is used). Corridor formation refers to 'land (the corridor) used to operate rail track and includes cuttings, embankments and tunnels except to the extent that these assets require future expenditure to retain current network capacity'. (IPART 1999, p29).

Empirically, the principal weakness is that accurate estimation of the major parameters requires a long time series of relevant data:

- In some cases the relevant data simply does not exist. For instance, what is needed for the estimation of the parameter β is a time series of share prices for pure rail infrastructure companies in Australia. No such series exists. It is therefore necessary to do what we can with a series of imperfect proxies and indirect estimation techniques.
- In other cases, the time series does exist, but there are concerns about whether the process underlying the time series is static. That is, it is unclear whether the conditions that produced the time series during some or all of the period of record can reasonably be assumed to apply to present and future conditions. This is the case, for example, with respect to estimates of the market risk premium.

Because of these limitations, the CAPM cannot be regarded as providing precise and definitive estimates of the appropriate cost of capital, but at best as providing a plausible range of values within which a regulatory determination should be made. The important question then arises of what guidance should be used in choosing how to position the recommended WACC within this range.

In our view this judgment must take into account broader considerations of economic policy. This view appears to be consistent with that of NECG, who argue that 'a key requirement of this review is to put in place a framework for the WACC that maximizes the social welfare from investing in long-term assets such as rail networks. Such a framework should ensure that appropriate incentives are put in place for network operation and for users to receive benefits from innovation and growth.' (NECG 2003, p9).

However, we would differ from NECG in our understanding of the bias that these broader considerations should give to the selection of various parameters. As noted above, NECG appears to recommend a positive bias in estimating the WACC value.

We acknowledge that a case can be made for such a bias in some circumstances. This is especially so where the regulatory task is setting prices to final consumers for the outputs of industries in which high levels of future investment are likely to be required. In such instances the social costs of deterring investment through setting the WACC too low are likely to be higher than the social costs of any distortion of demand through slightly elevated consumer prices. However, this argument is less strong where business-to-business transactions are at stake, and particularly where the purchaser of services is an exporter trading in low margin commodities on the world market. This is the case for many of the users of the WA rail freight network. Under the circumstances, too low a WACC will result in under-investment in the rail network; too high a WACC is likely to deter investment in the exporting industry. It is not at all clear that the social consequences of the former will on average be worse than the social consequences of the latter.

Moreover, there is an additional consideration in the case of rail track network pricing. Much of the focus of national microeconomic reform has been on fostering opportunities for competition in industries and activities from which competition has until now been absent. In the case of rail operations, securing access to the rail track on appropriate terms and conditions is crucial to the development of above rail competition. Setting the WACC for rail infrastructure too high will have an anti-competitive effect: it will not only distort demand, but also put at risk possible efficiency gains through increased contestability in above-rail operations. Conversely, too low a WACC would have a pro-competitive effect. In our view, this consideration materially affects the balance of social risk, and argues for at least a neutral bias in the selection of parameters for WACC estimation, and perhaps even a slight downward bias.

2.2.3 Recommendation

In determining the values of the parameters of the CAPM, ORAR should adopt a neutral or slightly downward bias.

2.3 Formulation of WACC

2.3.1 NECG Position

There are two key decisions to be made with respect to the formulation of the Weighted Average Cost of Capital:

- should the WACC be calculated before or after tax; and
- should the WACC be calculated in real or nominal terms?

NECG recommends the use of a post-tax, nominal formulation for the WACC. This is a departure from the previous practice of ORAR, which has adopted a pre-tax, real formulation.

2.3.2 Discussion

The Government Railways Access Code 1999 ("the Code") defines the way in which capital costs are to be calculated. Schedule 4 of the Code requires that capital cost be computed as an equivalent annual cost applying:

- the Gross Replacement Value (GRV) of the railway infrastructure as Principal;

- the Weighted Average Cost of Capital (WACC) as the interest rate; and
- the Economic Life which is consistent with the basis for the GRV of the railway infrastructure (expressed in years) as the number of periods.

Although the Code does not specifically say that the WACC to be used must be expressed in real terms, this is a logical consequence of defining capital values in replacement value terms. Using this approach together with a replacement cost valuation would involve an element of double counting, as both asset valuations and the rate of return would be taking account of changes in prices. As Professor King warns: '..the use of a nominal WACC with a replacement asset valuation will over-compensate … for inflation.' (King 1999).

Consistent with Code, Macquarie Bank (1999) calculates the WACC for the WA rail system in real terms. This practice has been adopted in subsequent determinations by the regulator (see, for instance, ORAR 2002).

NECG proposes a significant change to the manner in which regulation of rail infrastructure is undertaken. The proposal is that the pre-tax, real WACC used in previous determinations by the regulator be replaced by the use of a WACC expressed in post-tax, nominal terms.

As NECG points out, there appears to be something of a convergence on this approach in Australian regulatory practice in recent years. The approach is favoured by a number of influential writers in both the academic and business analysis literature (see, for instance, Copeland et al. (1990)), and has important advantages. Because taxation regimes are based on nominal rather than real profits, the concept of an after-tax real rate of return is in fact something of a chimera. The proposed change would bring the use of WACC in the regulation of the Western Australia industry into line with the way in which it is generally used in commercial evaluation, where analysis is almost always based on nominal values that are directly observable.

However, it is essential that appropriate adjustments are made to the way in which costs are measured and assets are valued, if the proposed change is made. This is explicitly acknowledged by NECG:

> *A very important issue with respect to these choices is that the definition of costs (i.e., the implicit cash flows) and the measurement of the asset base must be completely consistent with the definition of the WACC model. (p10).*

NECG does not deal in any detail with how the valuation of the asset base should be dealt with if this change is made, presumably regarding this as outside of its terms of reference: 'we focus on the measurement of WACC and assume that the issues of conformance and consistency of approach in costs and the asset base are dealt with properly.' (p10).

The required modifications to the way in which ongoing costs are treated are likely to be non-controversial. This is not the case with the valuation of the asset base, however. A number of important decisions will need to be made, both with respect to the aggregate valuation of the rail assets and the allocation of this total to specific elements of the asset base. Until the way in which these issues are to be dealt with are clearly spelled out, it is impossible to make an informed judgement on whether the move to the use of WACC defined in nominal terms is likely to produce acceptable outcomes.

2.3.3 Recommendation

No change should be made to the way in which the WACC is formulated until the way in which asset values will be adjusted in response to the proposed change has been clearly articulated and exposed to public comment and debate.

2.4 Transformations between real/nominal and pre/post tax

2.4.1 NECG position

In converting from nominal, post-tax WACC and real, pre-tax WACC, NECG adopts the 'market' transformation method, which in effect adjusts tax payments as well as other costs for the effects of inflation

2.4.2 Discussion

NECG present two arguments for preferring the market transformation method:

- in the current tax environment in Australia, there are few sources of tax timing differences, so the tax liability for accounting purposes will approximate tax paid. That is, the effective tax rate will approximate the statutory tax rate. Therefore, this liability `warrants adjustment for inflation.`
- it is socially preferable to err on the side of over-estimating WACC rather than under-estimating it - the market approach will generally be higher than the alternative method. (NECG 2003, p14)

While, for the reasons outlined previously, we would reject the second of these arguments, the first is sound. The preference for the use of the market transformation method is supported by the fact that there appears to be an emerging consensus in its use amongst Australian regulators.

2.4.3 Recommendation

The market transformation method should be adopted in converting nominal, post-tax WACC and real, pre-tax WACC.

2.5 Separate consideration of freight and urban infrastructure

2.5.1 NECG Position

NECG calculates separate WACC values for freight and urban structure. However, most of the parameters used to calculate these values are common. The only difference between the two calculations is the difference in the values of β adopted for the two businesses.

2.5.2 Discussion

It is clearly appropriate to use common parameters that relate to general conditions in the market. These include:

- the risk free rate;
- the market risk premium (MRP); and
- estimators of inflation.

As NECG notes, 'it is perhaps less obvious for the assumed capital structure and debt margin'. In our view, it is also somewhat less clear in the case of the valuation of imputation credits, since the value of imputation credits is contingent of the actual or putative nature of investors in the company. However, in all three cases, there appears to be no clear reason for adopting specific, different values for WAGR and WNG.

By contrast, it appears likely that there is in fact a difference in systematic risk between the two businesses. NECG points out some of the factors that might lead to this: the most important is the likelihood that urban patronage would be virtually unaffected by economic cycles while freight volumes will respond strongly. This difference justifies the use of different β values or the two sectors.

2.5.3 Recommendation

As recommended by NECG, different WACC values should be estimated for the two businesses based on the differences in the systematic risk that they face

3. COMMENTS ON METHODOLOGY AND INPUT VARIABLES

3.1 Risk free rate of return

3.1.1 NECG Position

NECG uses the 10-year Commonwealth Bond rate to measure the nominal risk-free rate of return (5.25%). This is the same benchmark as adopted by Macquarie Bank in its earlier review. However, the NECG approach differs from that used by Macquarie Bank in that NECG prefers the use of the bond rate on the day on which the regulatory period commences (p26) whereas Macquarie Bank uses a 20-day averaging period.

3.1.2 Discussion

The adoption of the 10-year bond rate as the indicator of the risk free rate is common in Australian regulatory practice and the rationale for its use presented in the NECG report is persuasive.

The argument for preferring the bond rate on the day of the regulatory decision to that estimated by averaging over a period prior to the decision is not entirely clear. It appears to imply a behavioural model in which the regulated entity will go to the market to fix 'any necessary debt' immediately the regulatory decision is made, and that taking rates on any other day into account simply introduces additional 'noise' (p26). Bearing in mind that the principle is to set the WACC is such a way as to encourage appropriate future investment in infrastructure, there seems no reason why the rate at the commencement of the regulatory period should be of any particular interest: what is needed is an estimator of the likely rate at the time at which the company needs to secure additional debt, or (less certainly) decides to refinance its existing debt. For this purpose, an averaged rate will eliminate some random variation, and is for this reason to be preferred.

We have not tested the impact of averaging the bond rates over longer periods on the risk free rate, and therefore on access charges. In an era of relatively stable interest rates, it is not likely to make a big difference one way or the other. However, it is worth noting that in 1999 IPART and Macquarie Bank, using the same approach only a few months apart, arrive at quite different estimates of the risk-free cost of capital – 5.37% in the case of IPART and 6.32% in the case of Macquarie Bank.

3.1.3 Recommendation

Retain the current practice of using a 20-day average of the 10-year bond rate to estimate the (nominal) risk-free cost of capital.

3.2 Inflation

3.2.1 NECG Position

NECG identifies two approaches to estimating the future rate of inflation: official forecasts and implied market forecasts. The later is estimated by the rate of inflation implied by differences between the return on index linked bonds and the return on unindexed 10-year bonds. NECG expresses a clear preference for the market forecast approach.

3.2.2 Discussion

Both approaches are reasonable and, as NECG note, it is common to use both approaches and average the results. However, NECG's preference for the market approach seems well-founded and results in a reasonable estimate of inflation of 2.0%.

3.2.3 Recommendation

Adopt the estimate of inflation of 2.00% derived by NECG using the market approach.

3.3 Cost of Debt

3.3.1 NECG Position

NECG applies a debt margin of 1.235% for freight infrastructure. This comprises:

- 1.11% for the debt risk premium; and
- 0.125% for the cost of debt issuance.

3.3.2 Discussion

NECG's estimate of the debt risk premium is based on the assumption that WNR and WAGR both have very good credit ratings and would be able to raise debt capital with a credit rating of A. This appears to be appropriate. Whether it is appropriate to add to this cost a premium to reflect the transaction costs of debt issuance is more contentious. While clearly some provision must be made in the regulatory framework for compensating the regulated industry for these costs, it is at least arguable that this should be done by including these costs in the cash flow stream as and when they are incurred rather than adding an allowance to the debt margin. However, the latter practice has precedents in the regulatory practice of both ACCC and the Victorian Essential Services Commission (NECG 2003, p49).

The margin suggested by NECG is slightly lower than the level used by Macquarie Bank in its 1999 report to the Department of Transport, but sightly higher than the margin suggested by IPART for NSW rail access. (IPART adopts a debt margin of 1% for RAC on freight infrastructure serving a concentrated market). It is slightly in excess of the total margin for debt cost adopt by the Australian Competition and Consumer Commission (ACCC) for the Australian Rail Track Corporation (ARTC): neither of these rulings clearly separate the debt risk premium and the cost of debt issuance.

3.3.3 Recommendation

Adopt the estimated debt margin of 1.235% recommended by NECG.

3.4 Value of Debt Beta

3.4.1 NECG Position

NECG adopts a value of zero for debt beta

3.4.2 Discussion

NECG explicitly discusses the level of systematic risk on debt, and concludes that it is likely to be very low though non-zero. In the absence of any meaningful empirical evidence, it believes that the most appropriate approach is to use a value of zero rather than an arbitrary low value.

NECG notes that its recommendation is consistent with the majority though by no means all regulatory practice in Australia.

We concur with NECG on this matter.

3.4.3 Recommendation

Adopt the value of zero for debt beta as recommended by NECG.

3.5 Market Risk Premium

3.5.1 NECG Position

NECG adopts a point estimate for the market risk premium of 7%. This is higher than regulatory precedent in Australia which uses a rate of 6%. In part this is based on review of long-term historical data and an examination of benchmarking information. However, in part it also reflects an attempt to introduce a positive bias to the estimation:

> *given that any estimate of MRP is a matter of judgement, the asymmetric consequences of regulatory intervention favour choosing a rate that is tilted to overestimating the MRP rather than under estimating it.*

3.5.2 Discussion

As NECG notes, the value that they recommend is higher than the values that been adopted for the market risk premium (MRP) by other Australian regulators. In determining the WACC for Queensland Rail, the Queensland Competition Authority (QCA 1999) takes the view that the range for the MRP is 5% to 7%, and the preferred point estimator is 6%. This is identical to the value that the ACCC has adopted for its determination on the Access Undertaking from the ARTC (ACCC 2002), and in all of its other regulatory determinations. The previous review by Macquarie Bank for the WA Department of Transport recommended a range of 5%-6%, which is identical to the range used by IPART in its review of aspects of the NSW rail access regime (Macquarie Bank 1999; IPART 1999).

NECG draws on three strands of evidence in making its assessment:

- Long run studies of Australian MRP

These generally show values that are higher than those that are currently used by Australian regulators. However, there is little that is new here: the values produced by such studies were well-known to regulators when the decisions recorded above were handed down. Davis (1999) (cited by NECG) reviews the long range studies and identifies the range of results as 5%-8%. Regulators have consistently and deliberately chosen a value towards the lower end of this range because of a belief that this better reflects the prospective market risk premium, which is the magnitude that is really of interest in calculating this value. In doing so they have been influenced by empirical evidence that there has been some reduction in the MRP in recent years. One very specific reason why this may be the case, mentioned by Macquarie Bank (1999) but not by NECG, is the `impact of dividend imputation.`

- Benchmarking

NECG compares the MRP used by Australian regulators with estimates of the MRP for the US market, and then adjusts this benchmark data to derive estimates for the Australian market. While this material is of some interest, the procedure adds to the uncertainty inherent in estimating the MRP in the US markets (NECG cites a range of 5% to 8%) a range of other uncertainties. NECG identifies taxation, country risk, market composition differences and estimation time horizon as adjustments that need to be made. No clear methodology or statistical data is available for making any of these adjustments. Given all of these uncertainties, it is very doubtful that the benchmarking evidence adds anything meaningful to the debate.

- Survey data

NECG cites five separate surveys that report market observers' perceptions of the MRP, noting that survey data is potentially of particular importance because it aims directly at obtaining information on *forward looking* estimates of MRP. It is future expectations of MRP that matter from the point of view of constructing a WACC: historical analysis is interesting only in so far as it provides a basis for estimating this future value.

The importance of this consideration is underlined by the finding of Fama and French (2001) that average realised equity returns are in fact higher than ex-ante expected returns over the past half century because realised returns included "large unexpected capital gains". If this is so, then estimates derived from historical analysis will not only be inaccurate but consistently biased upwards.

Four of the five surveys produce estimates that are lower than the values currently adopted by Australian regulators: the other produces a value of 7.1%. NECG is rather dismissive of these results, with the (partial) exception of the one of the five that supports an upward revision of MRP. While some of NECG's criticisms are undoubtedly valid, in our view the survey results are too readily dismissed. In particular, the comments on the Graham and Harvey (2001) survey seem to reflect a fundamental misinterpretation of the results of the paper. Graham and Harvey's results in fact correlate very well with those of Fama and French, who use a totally different methodology, based on firm level forecasts of cash flows, to estimate *ex-ante* MRP (Fama and French 2001).

On balance, the evidence adduced by NECG does not seem stringent enough to support selection of an MRP that is above that commonly adopted by Australian regulators.

3.5.3 Recommendation

The estimate used for the market risk premium should be 6.0%, the mid-point of the generally accepted range of 5% to 7%. This would make the ORAR determination consistent with most recent regulatory judgments in Australia.

3.6 Capital Structure

3.6.1 NECG Position

NECG notes that neither of the regulated businesses chose to provide information on their capital structure. NECG's preferred position is to use the actual gearing for the regulated enterprises. However, in the absence of such specific information, NECG adopted a gearing ratio of 50% for both entities.

3.6.2 Discussion

In its report, Macquarie Bank (1999) asserts that the gearing ratio that should be assumed in calculating the debt/equity ratio should reflect an appropriate capital structure. NECG reports that WAGR and WNR have adopted a similar view, arguing that the gearing ratios should be based on observations for other firms in the market.

Copeland (1990) recommends the use of target weights, based on market norms, rather than actual capital structure in undertaking corporate valuations, arguing 'at any point in time the company's capital structure may not reflect the capital structure that is expected to prevail over the life of the business'. In the case of a regulated industry, there is the additional consideration that simply accepting actual gearing would reduce the incentive for firms to pursue an optimal capital structure. For these reasons the use of benchmark capital structures appears most appropriate.

The issue then devolves to one of identifying what an appropriate gearing for a rail infrastructure company should be. Macquarie Bank (1999) assessed the appropriate range for debt as from 50% to 60% of total capital value of the rail freight infrastructure network. This is identical to the range adopted by QCA (1999) in its assessment of appropriate capital structure for QR and by IPART (1999) in its review of rail access regulation in NSW. ACCC (2002) adopted a value of 60% in its determination in the case on ARTC.

3.6.3 Recommendation

A value of 55% should be adopted for the target gearing ratio of WNR. This is the midpoint of the range of 50%-60% that is generally used for rail infrastructure in Australia.

3.7 Estimation of γ

3.7.1 NECG position

NECG adopts an estimate of 0.50 for the value of the dividend imputation factor (γ).

3.7.2 Discussion

NECG notes that there is no consensus in the literature on the appropriate value for this parameter:

> *The early literature generally found a value of around 0.5. Since this time, debate has become increasingly polarised between those arguing for zero and those arguing for one. (NECG 2003, p39).*

Following a review of the arguments for each of these polar positions, NECG arrives at the view that they are inconclusive. This is a view that we and most other commentators share. Under these circumstances, the best guidance available is what appears to be a general consensus amongst regulators that, for the time being, the preferred value should be 0.50. The adoption of this value has the support of the pioneers of the introduction of this parameter in the WACC equation, Professor Officer (NECG 2003, p42), and Dr Bishop (QCA 1999, p396).

3.7.3 Recommendation

In conformity with the majority of current regulatory practice, a value of 0.50 should be adopted for the dividend imputation parameter, γ.

3.8 Estimation of Asset Beta

3.8.1 NECG Position

NECG adopts an asset beta for WNR of 0.45 and for WAGR of 0.30.

3.8.2 Discussion

NECG notes that asset beta estimation is necessarily an imprecise exercise, and that there are three possible avenues through which some insight might be gained into the appropriate level to use in the WACC calculation:

- direct estimation;
- examination of estimates for comparable companies; and

- first principles - this approach requires thinking about the factors that impact on the sensitivity of a firm's returns to movements in the economy/market.

As neither WNR nor WAGR are listed, the first of these options is not available. NECG therefore proceeds to explore the other two avenues in detail.

Comparable companies

The key issue in this case is deciding what are in fact comparable companies. In our view, the rail infrastructure business is fundamentally different from the transport operations business in the nature of its assets, its cost structures, and its competitive environment. In this respect, we concur with Macquarie Bank (1999) which remarked that the level of systematic risk associated with transport operations is likely to significantly higher than for infrastructure. Using operating companies to benchmark the beta for WA rail infrastructure will therefore tend to bias the estimate upwards. Comparisons with transport operating companies are therefore of little value – including direct comparisons with integrated rail companies. This is especially true for international integrated rail operators.

The comparators that should be given most weight are other pure infrastructure enterprises. The other comparisons that merit consideration are regulatory determinations for non-listed rail infrastructure businesses. Only three pure infrastructure companies appear in NECG's list of comparators. All three have, as one would expect, low asset beta values ranging from 0.24 to 0.39.

NECG also recognises the relevance of the regulatory determinations made by Australian regulators for rail infrastructure businesses. In doing so, NECG properly cautions that differences in levering/delevering practices – and, in particular, different views taken on appropriate values for the debt beta – mean that some adjustments need to be made to the asset beta in the case of the QCA and ACCC determinations.

The most relevant determinations in our view are those that indicate appropriate asset betas for infrastructure businesses in established rail systems. The main determinations are:

QCA (1999) for Queensland Rail (after adjustment by NECG for debt beta)	0.35 (unadjusted 0.45)
IPART (1999) for Rail Access Corporation	0.29 – 0.55
ACCC (2002) for Australian Rail Track Corporation (after adjustment by NECG for debt beta)	0.45-0.50 (unadjusted 0.58)

First Principles

NECG describes the 'first principles' approach as

> *thinking about the factors that impact on the sensitivity of a firm's returns to movements in the economy/market. The following firm characteristics should provide indications of a firm's sensitivity to unexpected changes in real gross national product (GNP):*
>
> - *operating leverage;*
> - *income elasticity;*

- *terms of contractual arrangements; and*
- *nature of regulatory regime.*

In our view little reliance can be placed on estimates derived in this way. There is an abundance of evidence – some of which is cited by NECG at various points in its report – that points to the imprecision and instability that has plagued attempts estimate beta even when rich data sources are available. To attempt to develop beta estimates on the basis of a consideration of fundamentals is the absence of meaningful quantitative data is extremely ambitious.

In practice, this is not in fact what NECG does: rather, it endeavours to compile a composite beta for WNR by breaking the business into several components and applying the 'comparable companies' approach to each of these segments individually, then compiling a composite beta for the business as a whole by weighting these 'business component' betas by their share in WNR's revenues.

This approach begs a range of questions. These range from the appropriateness of the comparators used for each component (for instance, the comparator for the grain element is neither a customer nor a provider of similar services) to the statistical validity of the approach (unless the returns for the individual business lines are perfectly correlated, the risk for the portfolio of activities should be less that the weighted average of the sum for the component parts). In our view, little reliance should be placed on this element of the NECG analysis.

3.8.3 Recommendation

The asset beta for WNR should be estimated as 0.40. This represents the middle of the range indicated by NECG's review of Australian infrastructure companies and previous relevant regulatory judgments in the rail infrastructure sector (0.25 to 0.55).

3.9 Adjustment of asset betas

3.9.1 NECG position

NECG notes that several major providers of data on beta provide 'adjusted' beta data that has the effect of moving the estimated beta for a company towards the market mean of 1.0. NECG appears to look with favour on this adjustment process, and presents and discusses similarly adjusted values alongside the estimated beta values throughout its discussion of asset betas. However, the extent to which this adjustment process had affected NECG's recommendation on the choice of asset beta for WNR is not entirely clear from the report.

3.9.2 Discussion

NECG makes no reference to any precedent for adjusting beta estimates in this way in any previous regulatory judgements in Australia and no adjustments have been made in any of the rail infrastructure determinations that we examined in the course of preparing this response. Observed convergence of beta estimates over time to the market mean is cited as a major justification for the innovation, but the graph that NECG presents on the volatility of beta estimates (Figure 3) shows little evidence of this, at least for the transport sector.

Adjusting estimated betas in this way would be a significant innovation in Australian regulatory practice, and would in our view require a far stronger justification than is presented in the NECG report.

3.9.3 Recommendation

In accordance with Australian regulatory practice, estimation of the appropriate asset beta for WNR be based on unadjusted asset betas for comparable businesses.

3.10 Delevering/Relevering

3.10.1 NECG Approach

NECG adopt the Monkhouse equation for delevering and relevering beta estimates.

3.10.2 Discussion

The Monkhouse equation is the most commonly used approach in Australian regulatory circles. It explicitly accounts for the effect of dividend imputation, which is essential if a non-zero value for the parameter γ is adopted.

3.10.3 Recommendation

The Monkhouse equation should be used for undertaking delevering/relevering calculations as recommended by NECG.

3.11 Calculating the post-tax, nominal WACC

3.11.1 NECG Position

NECG focuses on what it refers to as a 'vanilla' WACC. This is calculated by a very straightforward process:

WACC (vanilla) = $R_d * D/V + R_e * E/V$

Where

R_d is the nominal cost of debt

R_e is the nominal cost of equity

D is the value of debt

E is the value of equity

V is the total value of the business (=D+E)

3.11.2 Discussion

In its final WACC estimation, NECG (2003) presents its estimate of the nominal, post-tax WACC as 9.0%, and states that the equivalent pre-tax, real WACC is 7.86%.

Earlier in its report (p12), NECG (2003) notes that 'there are two common methods that can be used to convert between a nominal post-tax WACC and a real pre-tax WACC' and expresses a clear preference for the 'market' method. It presents the appropriate conversion relationship as:

$$R^H{}_{pre} = \frac{r_{post} - i + iT}{(1-T)(1+i)}$$

where:

$R^H{}_{pre}$ is the pre-tax, real WACC;

r_{post} is the post-tax, nominal WACC;

T is the rate of taxation; and

i is the rate of inflation.

However, applying the market transformation formula to NECG's estimated nominal, post-tax WACC of 9% produces a value of 10.64%, not the stated 7.86% real, pre-tax rate. The reason for this is that there is an intermediate step in the transformation that is not transparently presented in the NECG report. The 'vanilla' WACC calculation does not explicitly include the taxation impact of imputation credits and tax write-offs of interest payments in the WACC calculation. In order to estimate a post-tax, nominal WACC that transforms to an equivalent real, pre-tax WACC via the market transformation formula it is necessary to 'embed' these tax effects in the WACC calculations. Macquarie Bank (1999) used a more complex formula for nominal, post-tax WACC which explicitly includes these effects:

$$WACC = k_e \frac{(1-t_c)}{1-t_c(1-\gamma)} \times \frac{E}{V} + k_d(1-t_c)\frac{D}{V}$$

where:

k_d is the nominal cost of debt;

k_e is the nominal cost of equity;

t_c is the corporate tax rate;

γ is the dividend imputation factor; and

all other symbols are as previously defined.

Applying the Macquarie Bank (1999) formula to the NECG parameter values produces a nominal, post-tax WACC estimate of 7.01%. This then converts, via the 'market' transformation equation, to the stated real, pre-tax rate of 7.86%.

The point of this discussion is that it is not clear from the NECG report precisely what is being proposed. Is the proposition that the regulatory pricing requirement is that WNR should set prices at a level that will generate a post-tax nominal income stream that will generate a rate of return on the real value of assets that does not exceed 7.01%, which would be roughly equivalent to the status quo? Or is the proposition that the post-tax incomes should generate a rate of return on the real value of assets that would not exceed 9%, which would represent a major increase in the price ceiling?

Clearly, it is the former that is more appropriate, since it reflects the net of tax costs of debt and equity to the firm, and would be applied to net of tax income streams. The fact that NECG states that its recommendation is equivalent to a pre-tax real rate of 7.86% suggests that may be the case. However, it is essential that complete clarity should be established on this point.

3.11.3 Recommendation

The appropriate post-tax, nominal WACC should be calculated using the Macquarie Bank formula and be consistently presented in that way.

4. IMPLICATIONS

There are many points of agreement between our analysis and that of NECG. However, there are a small number of points of difference that may make a significant difference to the estimation of the WACC.

The main point of principle is that where the inevitable imprecision of an estimation process gives rise to a range of plausible values, a central estimate should be adopted. This is opposed to the NECG practice of preferring a positive, or upward, bias.

Partly for the technical reasons discussed above, and partly as a result of this difference in principle, in our judgement some changes should be made to the parameters used in estimating the WACC for WNR:

- the equity beta adopted by NECG is too high: a value of 0.40 would be more appropriate than the 0.45 used by NECG;
- the market risk premium should be set at 6%, in line with most regulatory practice in Australia, rather than at 7% as advocated by NECG; and
- the appropriate capital structure for WNR comprises 55% debt, rather than the 50% preferred by NECG.

The table below compares the WACC that would be derived using these principles with that estimated by NECG. Our preferred value for the 'Macquarie Bank definition' post-tax, nominal WACC is 6.41%, compared to the 7.01% preferred by NECG. This translates to a pre-tax, real rate of 7.02%, compared to the 7.86% estimated by NECG.

	NECG	*Preferred*
Risk fee rate (nominal)	5.25%	5.25%
Debt Proportion	50%	55%
Equity Proportion	50%	45%
Debt Risk Premium	1.110%	1.110%
Debt Issuance Costs	0.125%	0.125%
Cost of debt	6.485%	6.485%
Market Risk Premium	7%	6%
Debt Beta	0.000%	0.000%
Tax Rate	30%	30%
Gamma	50%	50%
Asset Beta	0.45	0.40
Equity Beta	0.90	0.88
Indexed bond rate	3.186%	3.186%
Inflation	2.00%	2.00%
Nominal post tax cost of equity	11.52%	10.56%
WACC estimates		
Nominal, post-tax - 'Vanilla' definition	9.00%	8.32%
Nominal, post-tax - Macquarie Bank definition	7.01%	6.41%
Nominal, pre-tax	10.02%	Not calculated
Real, pre-tax	7.86%	7.02%

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