Brookfield Rail

Synergies
ECONOMIC CONSULTING

Review of the WACC to apply to rail networks under the Railways (Access) Code 2000

Response to the Economic Regulation Authority's Issues Paper

June 2013

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1 Introduction

Brookfield Rail has requested Synergies Economic Consulting to review and respond on its behalf to the Economic Regulation Authority's (the Authority's) Issues Paper on the WACC to apply to rail networks regulated under the *Railways (Access) Code 2000*.

We have been asked to respond on the following areas:

1. The criteria for exercise of discretion in determining the WACC
2. Gearing
3. Market risk premium
4. Equity beta
5. Gamma.

This report is structured to respond to the questions in the Issues Paper.

2 Criteria for exercise of discretion in determining the WACC

Response to Q1

Is it reasonable to consider criteria when evaluating alternative WACC methodologies?

The need for the exercise of discretion

The determination of WACC is inherently subjective, necessitating the exercise of sound and reasoned judgement.

One of the key issues is the models that are used. Historically, most Australian regulators have applied the Sharpe-Lintner CAPM to estimate the cost of equity and have also used broadly similar approaches to estimating the cost of debt (based on prevailing estimates of the risk free rate plus a debt margin derived from corporate bond market data).

It is recognised that the Sharpe-Lintner CAPM has its deficiencies (noting that all models have their strengths and weaknesses). For example, it has been shown that the relationship between risk (as measured by beta) and return is actually much flatter than this model predicts, which can result in betas for lower beta stocks (i.e. firms that are likely to have a beta less than one) being underestimated and betas for high beta stocks being overestimated.[1]

One of the key problems with the CAPM is how it has been applied in Australian regulation. This has become much more evident since the commencement of the GFC. The proxies used to estimate the parameters have been greatly affected by the GFC. In particular, the combination of spot estimates of the risk free rate with a long run market risk premium (MRP) has resulted in historically low cost of equity estimates. This in turn implies that investor expectations of the forward-looking return on equity have been revised downwards, while corporate debt margins (which are readily observable) have not materially contracted since the start of the GFC. This is considered highly unlikely. The more likely explanation is that the cost of equity is being under-estimated.

[1] For example, refer: Fama, E. and French, K. (2004). The Capital Asset Pricing Model: Theory and Evidence. Journal of Economic Perspectives, 18(3), pp.25-46.

The Australian Energy Market Commission (AEMC) has recognised these issues and this has resulted in changes to the rules governing regulated energy network businesses: [2]

> The rate of return estimation should not be formulaic and be driven by a single financial model or estimation method. The estimation approach to equity and debt components should include consideration of available estimation methods, financial models, market data and other evidence to produce a robust estimate that meets the overall rate of return objective. This means giving the regulator discretion on how it should estimate these components, rather than limiting the estimation process to a particular financial model or a particular data source. In the context of estimating the return on equity, the estimation should not be limited to the standard CAPM, but should consider other relevant evidence.

The AEMC concluded that the use of a specific model or models should not be prescribed. Instead, it requires that a range of estimation methods, financial models, evidence and market data be considered.[3] The Australian Energy Regulator (AER) is currently reviewing how this will be implemented as part of its review of the WACC guidelines to apply to regulated energy network businesses.

The consideration of models other than the Sharpe-Lintner CAPM is a welcome development as it could lead to a more reliable and less volatile cost of equity estimate through time. However, it also has the potential to considerably broaden the discretion that can be applied by the regulator and therefore increase the risk of error.

It is therefore important to place some reasonable constraints or boundaries around the exercise of this discretion. This is not just in terms of the choice of the models and methods that are used to estimate the WACC, but also how they are applied.

Application of the criteria

The use of criteria to guide the exercise of judgement is therefore welcomed. However, in addition to specifying the criteria themselves, consideration needs to be given as to how they will be applied. The two main issues are:

- whether the criteria are binding; and
- how they will be applied in decision making.

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[2] Australian Energy Market Commission (2012). Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services, Draft Rule Determinations, 23 August, p.47.

[3] Australian Energy Market Commission (2012). Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services, Final Position Paper, 29 November.

These are discussed in turn below.

Are the criteria binding on the Authority or are they more in the nature of guiding principles or considerations?

It is noted that this issue has been raised in the AER's current review. For example, the Energy Networks Association (ENA) submitted that they are better described as "considerations" that the AER should take into account. The Major Energy Users Inc. (MEU) submitted that while the principles were laudable goals "they must not be used to close off issues that will assist in ensuring the outcomes will be demonstrably efficient."[4]

It is neither practical nor is it necessarily desirable to enforce rigid application of the criteria, including a strict 'pass/fail' assessment against each criterion. For example, while the widespread application and acceptability of an approach is desirable, there may be newer approaches that could better inform the estimates (provided the approach is sufficiently robust and can be implemented). In any case, it is extremely difficult to: (1) define what is meant by 'widespread application and acceptability'; and (2) measure this in a definitive way.

In our view, the establishment of criteria should do at least three main things.

First, it should increase regulatory certainty. The regulated business and stakeholders need to be able to understand how the regulator will approach the issue and make its decisions. This should also guide regulated businesses in making their submissions as they will know what needs to be satisfied. They can also expect an appropriate degree of consistency in decisions made through time.

Second, it should increase transparency and accountability. Decisions should be presented in a way that links back to each of the criterion and clearly shows if and how they have been satisfied. It should be possible for other factors to be taken into account, however the decision should be transparent as to why the factor was considered relevant, how it was assessed and how it impacted the final outcome. Importantly, if the regulator is rejecting the proposal submitted by the business in favour of its own assessment, it is essential that the regulator demonstrates why its approach (or estimate) better satisfies the criteria.

Finally, it should reduce the risk of error. WACC is particularly prone to estimation error (and regulatory error) given the degree of judgement that needs to be applied. The risk of error cannot be eliminated however it should be minimised. This requires a

[4] Australian Energy Regulator (2013). Consultation Paper, Rate of Return Guidelines, May, p.23.

robust and transparent framework that allows for the application of different models and a range of relevant market data. The potential for error needs to be consistently recognised and addressed, from the specification of the models through to the estimation of parameter values.

How will the criteria be applied in practice?

As noted above, it is not considered appropriate to apply a strict pass/fail test to each criterion. It is also possible that criteria could be in direct conflict. For example, the Sharpe-Lintner CAPM may be seen as a 'well accepted' model but its application may result in an outcome that does not reflect prevailing conditions in the market (which could require flexibility in the application of the model or flexibility in the overall approach used to develop the estimate, including using other models and adjusting the proxy measures in the model).

In order to improve regulatory certainty it needs to be possible to predict how the criterion might be applied. It may therefore be necessary to develop guidelines under the key criterion, including examples or case studies of how they could be applied in practice (including in different market conditions).

For example, as noted above the rule changes approved by the AEMC contemplate the use of more than one model to estimate the cost of equity. One important issue that is being considered by the AER in implementing the rule change is how the estimates from the different models will be used to inform the decision, presuming that a number of different models could satisfy the criteria, although in potentially different ways. Different approaches could include:

- basing the estimate on a preferred model and using the others as reasonableness checks. However, the question that then arises is how adjustments will be made if the reasonableness checks are materially different to the modelled estimate;
- establishing a range based on the different estimates and then selecting the preferred estimate from a point within that range. Alternatively, a range for WACC is produced using ranges for key inputs and then a point estimate is selected from within that WACC range (similar to the approach adopted by IPART); or
- weighting the estimates. Any such weights would need to be referenced back to the criteria, which in turn may need to be weighted or at least ranked in order of priority.

To further reduce uncertainty, the supporting guidelines could identify models that would be considered acceptable and how they would be implemented. For example, in estimating the cost of equity the suite of acceptable models could include the Sharpe-

Lintner CAPM, the Black CAPM, the Fama-French model and the dividend growth model. In essence, in developing the guidelines there is a 'pre-screening' of current available models that are known to meet the criteria, which would reduce a potentially significant source of uncertainty and debate in future reviews. This would still not rule out the application of a different model however it would be necessary to show how the inclusion of that model would result in a better estimate of the WACC based on the criteria.

Another important issue in applying the criteria is the application of reasonableness checks on the overall outcome. For example, in some jurisdictions application of the Sharpe-Lintner CAPM following the GFC saw cost of equity estimates that were below the cost of debt. This does not make economic or commercial sense. Indeed, it is possible that models that have 'strong theoretical underpinnings' and are even regarded as 'well accepted' are based on assumptions that abstract too far from reality and therefore perform poorly in anything other than stable financial market conditions. As outlined above, it will also be necessary to consider how the checks would be undertaken and how the results will be interpreted and applied in the decision.

Response to Q2

Are the criteria identified consistent with the objectives of the rail regime? Are there other criteria that might be considered?

Objectives of the rail regime

The criteria should be based on ensuring the achievement of the objectives of the rail regime however in the case of WA, these objectives are only specified at a very high level. The overarching objective of the *Railways (Access) Act 1998*, being to encourage the efficient investment in, and utilisation of, railway facilities is of fundamental importance. The rate of return has a very important role to play here as this has a significant impact on investment incentives. Uncertainty regarding the regulated rate of return is a key source of regulatory risk and can impact the perceived attractiveness of regulated investments within the broader infrastructure asset class.

Apart from this overarching objective the regime provides limited guidance in relation to the rate of return. Clause 2(4)(c) of the *Railways (Access) Code (2000)* provides that the WACC is the 'target long term weighted average cost of capital appropriate to the railway infrastructure' however such an interpretation of the WACC essentially goes without saying. It is noted that in other jurisdictions (such as Queensland), the governing legislation includes pricing principles based on the *Competition Principles*

Agreement. The most important one in this context is that regulated access prices should be set so as to:[5]

> …generate expected revenue for a regulated service or services that is at least sufficient to meet the efficient cost of providing access to the regulated service or services and include a return on investment commensurate with the commercial and regulatory risks involved.

It is noted that this specifically acknowledges regulatory risk, which to our knowledge, has not been explicitly acknowledged (let alone addressed) in any Australian regulatory regime within the context of rate of return, including those regimes that have this principle in its legislation.

Appropriateness of the criteria

Comments on the proposed criteria are set out below. However, before responding to the criteria themselves, in our view, the most important consideration is that the approach that is adopted:

> …give confidence that the WACC will reflect actual conditions prevailing in the market in the relevant timeframe…

It is important to recognise that the cost of capital (specifically the cost of equity) is measured by reference to models – which are, by their nature, abstractions from reality. How effectively models perform in different circumstances will vary with prevailing conditions. It does suggest however, that regulators need to be conscious of relevant contemporaneous financial market information concerning returns required by the market. Of the other criteria that have been identified, none address this specific issue which in practice is the most important.

1. Strong theoretical underpinning

It is agreed that this is important. Relevant considerations here include:

- does the model have a robust theoretical foundation, that is, is there a sound economic and financial rationale;
- what are the assumptions underpinning the model and how realistic are they in practice. While the model should not necessarily be completely discarded on the basis of limiting assumptions, they need to be recognised and their implications considered; and

[5] Competition Principles Agreement, April 1995 (as amended 13 April 2007), clause 6(f)2(2).

- is there empirical support, that is, is there evidence to support the reliability of the estimates using market data.

2. Well accepted

As noted above, while this is a desirable goal, it is questioned how feasible this is in practice. On the flipside, it is clearly undesirable to use an obscure model or one that has very limited or no acceptance, however if this is the case, it is likely to fail other criteria.

There are a number of alternative models, each of which has its own strengths and weaknesses. Provided that these weaknesses are known and their implications understood, it is questioned whether it is necessary to show that there is 'widespread acceptance' before that model is used to inform estimation of expected returns.

It is therefore questioned whether this criterion should be retained.

3. Supported by robust, transparent and replicable analysis that is internally consistent and is derived from available, current and credible datasets

This criterion, and the supporting points of clarification, is considered reasonable. However, it could be beneficial to include a further point that explicitly addresses estimation error, recognising that implementation of some of the other points should assist in reducing the risk of error. The additional point could be:

> "Identifies potential sources and implications of estimation error, and how this has been addressed."

We consider this to be a sufficiently important issue to warrant prominence in the criteria.

4. Flexibility to reflect changing market conditions and new information as appropriate

While this is an intuitively appealing requirement the key issue is how this should be achieved in practice. As indicated above, we believe the second sub-point should actually be a criterion in its own right, being:

> …give confidence that the WACC will reflect actual conditions prevailing in the market in the relevant timeframe…

This is an important consideration as it is the desired outcome of the process. It directly supports one of the overarching objectives of the regime, being to encourage efficient investment. The sub-points should then address how this can be achieved, which could include:

- implementing checks to evaluate whether the outcomes are commercially and economically reasonable;
- having sufficient flexibility to reflect changing market conditions; and
- recognising the need to deal with uncertainty.

Specific guidelines are then recommended to show how this will occur. For example, reasonableness checks could involve one or more of the following:

- comparing the cost of debt and equity;
- comparisons against analysts' reports and other relevant market evidence; and
- financeability tests.

Recognising the need to deal with uncertainty is also important but potentially vague. For example, this can be addressed by specifying ranges for uncertain parameters and by selecting WACC estimates from above the mid-point of the range, in recognition of the asymmetric consequences of error.[6]

5. Lead to consistent regulatory decisions across industries, service providers and time

While this objective is considered uncontroversial, it is questioned whether this is actually an overarching goal of the WACC framework, as this is one of the key reasons why a robust and predictable framework is required.

Conclusion

As outlined above, the criteria should directly support the objectives of the rail regime, the overarching one being to encourage efficient investment in, and utilisation of, the rail network. The challenge is that this objective is very high level. The criteria can assist in more clearly linking this objective to the required rate of return and how it should be assessed.

While the assessment of the rate of return needs to have a robust theoretical underpinning, in order to encourage efficient investment in the network it needs to be adequate to compensate investors for the risks they are bearing in the current market environment. As the regulator is in effect stepping in the shoes of investors in assessing whether or not the rate of return is adequate, it is imperative that the risk of error is

[6] That is, that the economic and social consequences of under-estimating the WACC, which could result in under-investment in necessary infrastructure, are considered worse than setting the WACC too high. For example, this was recognised in the Productivity Commission's first review of the National Access Regime. Refer: Productivity Commission (2001), Review of the National Access Regime, Report no. 17, AusInfo, Canberra, p.83.

acknowledged and addressed in the methodologies that are applied, and that those methodologies are applied in a manner which promotes efficient investment in the relevant sector.

3 Capital structure

Response to Q15-16

What are the key characteristics or the selection criteria for businesses to be included in the benchmark sample?

Should international railways be included in the sample of benchmark companies used to determine benchmark gearing levels?

As with other inputs into the WACC, determining an 'optimal' capital structure is inherently imprecise. It is necessary to review comparative data to obtain an estimate of a range of plausible capital structures. However, it is important to understand the drivers of capital structure choice before we address the other issues.

Drivers of capital structure choice

There are three main factors impacting capital structure.

The first is taxation. The advantage of debt to the business is the tax deductibility of the interest. Interest payments on debt are tax deductible whereas dividend payments are paid from after tax profits and hence are non-deductible.

Where a business is a tax paying entity, the tax shield created by the interest is an advantage while the business is funding operations via the use of debt. Considering the tax deductibility only, the value of a geared or levered firm exceeds the value of an unlevered firm. To maximise the value of the firm, a business would gear up as much as possible when considering only this factor and (incorrectly) ignoring all others.

The second factor is bankruptcy costs, which limits the amount of debt a firm can employ. As gearing levels increase, so too does the probability that the firm will be unable to pay its lenders. This is not to suggest that the borrower will suffer from financial distress but as debt-holders are price protected,[7] the borrower pays for the possibility of financial distress in the form of a higher interest rate. This is an added cost of debt financing.

It is expensive to suffer from financial distress. The associated costs (or the increased risk of financial distress) will eventually offset the tax-related gains from leverage.

[7] Price protection is the phrase used to describe a situation where a debt holder is protected. If a lender perceives that there is financial distress, the pricing of the loan will reflect the perceived financial distress (through a higher interest rate). The borrower pays for the financial distress today and the lender is price protected.

The third factor is the nature of the business and the industry it operates in (or business risk). This is closely linked to the second factor because business risk influences the probability that the firm might suffer financial distress (although a badly run business in a low risk industry could still suffer financial distress). Firms in high risk industries, with potentially volatile and unpredictable cash flows are less likely to be able to sustain high levels of debt compared to firms that have more stable and predictable cash flows.

Capital structures therefore tend to be similar for firms operating in the same industry. If surviving competitors have a low debt/equity ratio, then the new firm entering the industry should copy the surviving firm. In other words, an approximation of the optimal capital structure is determined by 'natural selection'.

Selection of comparators

As will be outlined below in the discussion on equity beta, we recommend the use of 'first principles' analysis to identify comparators and assess the systematic risk profile of the target firm relative to those comparators. A first principles analysis is a qualitative assessment.

A first principles analysis can similarly be applied in examining capital structure. The factors are different to the factors influencing systematic risk and hence beta, which also means that the final sample of firms that may be relied upon could also be different. A firm would also need to be listed to be included in the comparator sample for the beta assessment but this need not be the case when examining capital structure. Overall, given business risk is relevant to both beta and capital structure choice we would expect that the industries examined will be similar.

The factors that are relevant to the capital structure decision are listed below. The impact on capital structure is considered holding all other factors constant. Ultimately, the decision will be influenced by the interplay between the various factors.

Table 1 Factors influencing the capital structure decision

Factor	Impact on capital structure
Nature of the product or service	The higher the level of longer term certainty as to the demand for the product or service, the higher the level of debt that can be maintained. If a firm has a relatively unique product and/or the demand for the product is highly uncertain, it may only be able to maintain a lower level of debt. A below rail network service provider is likely to have greater certainty as to the long term demand for the service. Of the regulated rail network providers in WA demand risk will be highest (in the long run) for The Pilbara Infrastructure.
Cash flow volatility	Related to the above factor is the certainty of future cash flows. It is important to consider this from the perspective of revenues and costs (and therefore EBIT). The greater the certainty, the higher the level of debt that can be maintained. Regulated below rail network providers tend to have relatively stable cash flows,

Factor	Impact on capital structure
	increasing their borrowing capacity relative to other firms.
Effective tax rate	The tax benefit from leverage is obviously only important to firms that are in a tax paying position. Firms with substantial accumulated losses will get little value from the tax shield. Furthermore, firms that have substantial tax shields from other sources, such as depreciation, will get less benefit from leverage. Also, the lower the tax payable (i.e. the lower the effective tax rate), the lower the incentive to borrow.
Firm size	The larger the firm or the more diversified a firm is relative to its competitors, the greater the debt capacity the firm has. Borrowing involves some fixed cost and the larger the firm the greater the ability to spread this fixed cost over the total amount of funds borrowed. In this context the benchmark firm is assumed to be a stand-alone provider of below rail network services. If capital structure is being assessed using larger and more diversified comparators, the benchmark firm is likely to only be able to maintain a lower level of gearing.
Profitability	Pecking order theory argues that firms will prefer internal financing (profits) to external financing, and then debt followed by equity. The pecking order theory suggests that the more profitable the firm, the more it can rely on internal funding. If external funds are required, it will borrow before looking to raise equity.
Tangible assets	A high level of tangible assets gives rise to a high level of depreciation. Depreciation is a non-cash tax deduction. A non-cash depreciation tax deduction is preferred to an interest tax deduction, which needs to be paid to be tax deductable. Firms with a high level of depreciation tend to have less debt as debt loses its attractiveness because of the requirement for servicing. Infrastructure providers have substantial assets in place and will therefore have high levels of depreciation.
Growth opportunities	Investment in growth opportunities in this context means opportunities to invest in areas that have a potentially different risk and return profile to the assets in place. Firms that can invest in these opportunities will tend to have less long-term debt as they are preserving balance sheet capacity for future investments. For the purpose of assessing the capital structure of the benchmark firm, which is assumed to be a stand-alone below rail network business, the presence of growth opportunities are less relevant to the firm itself. If the firm expands network capacity, it should be able to borrow to fund this expansion up to a level that is consistent with the target gearing level. It is a relevant consideration when examining comparators. If comparators are more likely to be preserving capacity for growth opportunities they may be maintaining lower levels of debt relative to the benchmark firm.
Shareholder concentration	Where there is a high level of concentration of shareholders, lenders perceive the possibility of opportunistic actions and price the debt accordingly i.e. at a high cost. A high concentration of shareholding can therefore mean a lower level of debt.

There is benefit in a larger sample size as this reduces the impact of the idiosyncratic features of individual firms (that is, a larger sample size is more likely to reliably inform the average gearing levels of the industry). With a larger sample size it is recognised that a comprehensive analysis of all of these factors is information intensive as it would require a relatively detailed assessment of each firm in the sample.

Of the above principles, the first two factors are more likely to be at least broadly consistent between firms in the same industry. The remaining factors can be expected to vary between firms.

Overall, we would therefore recommend using the first two factors to identify industries that are more relevant to a below rail network provider. For example, this could include railway companies, industrial transportation firms, utilities and large

infrastructure providers. The range of gearing levels maintained by firms in each sector can then be observed.

The remaining factors can then serve two main purposes. First, they might explain any potential outliers in the range. Second, they can be used to understand any potential differences between the benchmark firm and the comparators, based on an indicative profile that should be able to be established for the benchmark firm.

International firms should be included in the sample on the basis of the first two factors. However, it is important to consider if there are any jurisdictional differences that could materially impact capital structure choice. For example, it is noted that possible changes have been mooted to the US tax laws to reduce the tax deductibility of interest to corporates.[8] If material changes were made in this regard, this could impact the interpretation of data from this jurisdiction for the purpose of assessing capital structure for an Australian firm.

Response to Q17

What are the appropriate time periods and the methodology for determining the benchmark gearing ratio from available market data?

The objective here is to determine a long term sustainable capital structure for the benchmark firm. In any one year, an individual firm's actual capital structure could differ from its long term target, for example depending on where it is in its investment cycle.

It is therefore important to look at longer term averages. We would recommend calculating the average capital structure for each firm in the sample over the last four years.

Ideally, values should be expressed in market value terms, noting that the market value of debt will be sensitive to changes in interest rates. Otherwise, book values are used as a proxy for market value. Information could be obtained from a data service such as Bloomberg (for listed companies) or from financial statements. A consistent measurement approach should be used across the comparator sample.

[8] For example, refer: Heller, M. (2013). Corporate Interest Deduction Proves Sacred Among Reformers: Taxes, Bloomberg, 29 May. http://www.bloomberg.com/news/2013-05-29/corporate-interest-deduction-proves-sacred-amid-reformers-taxes.html

Response to Q18

Is it appropriate to adjust benchmark estimates of gearing levels to reflect differences in the level of risk between benchmark businesses and the regulated railway owner?

As outlined above, we would recommend establishing a capital structure range for each industry sector. A profile for the benchmark firm could then be developed based on the first principles analysis. This is then used to compare where the benchmark firm might sit relative to its comparators. This could be assessed relative to the mid-point of each of the industry ranges.

Determining the capital structure of the benchmark firm therefore requires the application of judgement, although this is to be expected given there is no precise science behind the determination of optimal capital structure. Indeed in practice, this analysis is likely to yield a range of sustainable gearing levels of the firm rather than a point estimate. If such a range is established we would recommend selecting the estimate from the upper bound of that range because in theory, firms would look to maximise their level of borrowing (to obtain the benefit of the tax shield) up to a point where any further increases could expose the firm to financial distress.

Given the degree of judgement that must be applied, it is important that the conclusions are supported by detailed reasoning and evidence, including any assumptions made in arriving at the conclusion.

4 Market risk premium

Response to Q26 - 30

What is the best method for estimating the MRP?

If the approach of using historical data on equity premium is used to estimate the MRP, what is the best sampling period of historical data to be used?

Should the more recent sampling periods, such as financial deregulation (1980) and the introduction of the imputation credit tax system (1980), be used in estimating the MRP as these period may be more relevant to the current financial environment in Australia?

Are there any theoretical grounds for considering an inter-relationship between the risk-free rate of return and the MRP over the horizon of five years or longer?

When the risk-free rate is low/high, should the MRP be revised upwards/downwards? If yes, what is an unbiased mechanism for doing so? What is the threshold of the risk free rate in which the prevailing risk free rate can be considered low?

Application within the CAPM

As noted above, in a regulatory context the CAPM has been the method that is most commonly applied to estimate the cost of equity in Australia. This requires an estimate of the long run forward-looking (or expected) market risk premium (MRP).

The expected MRP is not observable and needs to be estimated. In Australia, regulators have tended to maintain a static value for the MRP. On average, the value applied has been around 6%. This has then been combined with a short term or 'spot' estimate of the risk free rate, which has led to volatility in the observed cost of equity estimates for different time periods.

The risk free rate has been at historical lows, as shown in the following figure.

Figure 1 Ten year Commonwealth Government bond yields 1935 – Jan 2013

Data source: Reserve Bank of Australia

Accordingly, recent estimates that combine a static MRP with a spot risk free rate suggest that the expected return required by equity investors is also at an historical low. On the other hand, debt margins expanded following the commencement of the GFC and have largely remained at these levels since. This is shown in the following chart, which tracks the seven year BBB yield against the seven[9] year risk free rate since the beginning of 2000.

[9] We favour the use of a ten year term to maturity for calculating the debt margin. We have chosen the 7 year BBB yield for the purpose of this illustration as this is currently the longest BBB fair value yield published by Bloomberg and therefore avoids contention about the extrapolation method used.

Figure 2 Spread between the 7 year BBB yield and 7 year risk free rate

Data source: Bloomberg

The economic reasonableness of these cost of equity outcomes needs to be considered. There is no logical reason as to why equity investors would expect lower returns in the current environment, particularly compared to lenders who rank ahead of them in terms of any residual claims on the firm.

As outlined above, the problem is more likely to be the way that the model is being applied. Overall, with the more recent exception of IPART, Australian regulators have been generally inflexible in the way that the CAPM has been applied, particularly in the more difficult post-GFC environment. A more pragmatic and flexible approach is required, including having regard to estimates produced by alternative models as well considering as relevant contemporaneous market information on expected returns.

The implications of model application are considered further below. First, we consider the approaches that can be used to estimate the MRP.

Approaches to estimating the MRP

There are two objective approaches[10] used to estimate the expected MRP. One is to assess the returns earned in the past relative to riskless investments and use this

[10] A third approach that has been used to estimate the forward looking MRP is surveys. We do not consider surveys to be a valid approach. There are many issues in surveying just a subset of investors and managers to get a sense of their expectations about equity returns in the future. They are also vulnerable to bias. We are not of the view that survey evidence should be referred to at all unless the survey is carefully constructed in a way that we can be confident that the responses are relevant to the purpose and are based on a consistent frame of reference (which in

historical premium as the expectation. The second is to attempt to estimate a forward-looking premium based on the market prices of traded securities.

Before considering the two different approaches, the factors that determine the MRP will be examined to determine if it should and does change through time.

Determinants of the MRP

Risk aversion

A critical factor is the risk aversion of investors in the markets. Risk averse investors need a premium to entice them to invest in the market to compensate them for the risk. As investors become more risk averse, the expected MRP will increase and vice versa. Any changes in the average risk aversion will manifest itself as changes in the MRP.

Economic risk

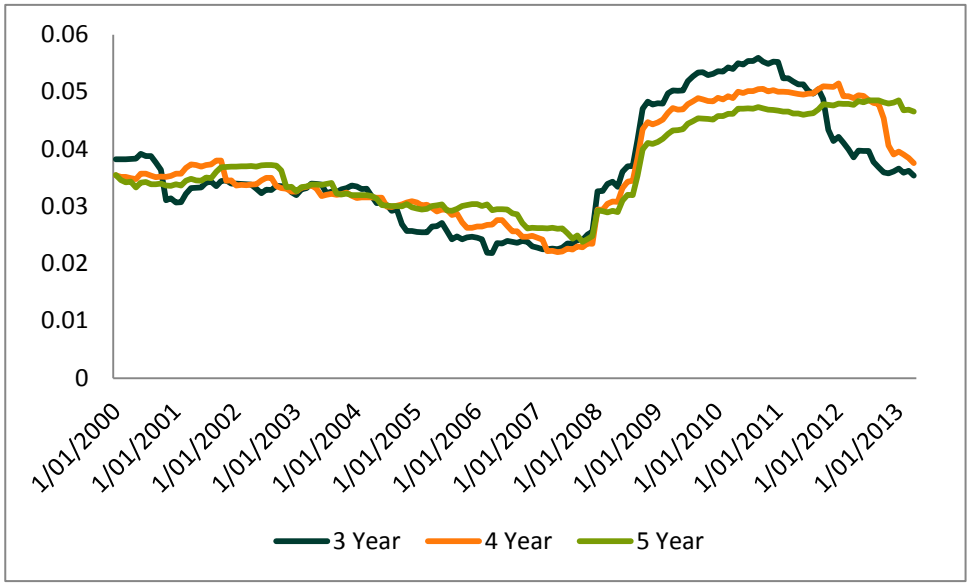
The risk in equities can arise from concerns about the state of the general economy and the degree of certainty underpinning that outlook. All else being equal, the MRP should be lower in an economy with predictable inflation, interest rates and economic growth than in one where these variables are volatile or highly uncertain. Lettau, Ludwigson and Wachter[11] linked the changing MRP in the United States to shifting volatility in the economy. They found a positive relationship between volatility in the economy and the MRP over the 120 years of their study.

The volatility in the Australian share market is displayed in the following graph.

this case, is informing an estimate of the forward-looking MRP). The preferred approach is to rely on independent market based approach.

[11] Lettau, M., Ludvigson, S. and Wachter, J. (2008). The Declining Equity Risk Premium: What Role Does Macroeconomic Risk Play? Review of Financial Studies, 21, pp.1653-1687.

Figure 3 Recent volatility in the Australian share market



Data source: Bloomberg

Volatility has been estimated over a three, four and five year period. The graph displays the volatilities from January 2000 to March 2013. It can be seen that prior to 2007 (the start of the global financial crisis (GFC)) volatility was reasonable constant. Since the GFC, volatility has jumped and it is different to prior to the GFC. This implies that if there is a relationship between the MRP and volatility then the MRP has changed over time. Prior to the GFC, the MRP was reasonably constant and post the GFC, the MRP has increased.

Liquidity

Equity investors may consider the additional risk created by illiquidity. If investors have to accept large discounts to liquidate equity positions, they will pay less for equities today and demand a large risk premium[12].

Liquidity in the equity market is difficult to measure. Liquidity in the debt market has certainly reduced since the GFC. The reduced liquidity has resulted in a smaller number of long term debt securities on offer. If what is observed in the debt market is applicable to the equities market, then liquidity in the equity market has reduced. If this has occurred, then it is expected that the MRP has increased since the GFC.

[12] Gibson R. and Mougeot N. (2004). The Pricing of Systematic Liquidity Risk: Empirical Evidence from the US Stock Market. Journal of Banking and Finance, 28, pp. 157–78.

Catastrophic risk

Rietz[13] investigated the possibility of catastrophic events to justify higher equity risk premiums and Barro[14] extended the argument. It was found that catastrophic risk and government policy affected the market equity risk premium, that is, the greater the catastrophic risk, the higher the MRP.

Catastrophic risk has increased since the start of the GFC. This in turn will contribute to a higher MRP.

Historical averaging

The most widely used approach is to estimate the MRP is using historical data over a long time period, being an average of the annual difference between actual share market returns (typically measured by an accumulation index) and the risk free rate (in Australia, the yield on ten year Commonwealth Government bonds). The outcome can be sensitive to the time period of the estimate, the proxies for the risk free rate and return on the market, as well as the averaging method (geometric or arithmetic).

The table below shows the differences in the MRP using a short and long term risk free rate and different averaging methods, over the period between 1900 and the end of 2012.

Table 2 MRP estimates 1900 - 2012

Short term risk free rate		10 year risk free rate	
Geometric mean	**Arithmetic mean**	**Geometric mean**	**Arithmetic mean**
6.6%	8.1%	5.6%	7.5%

Source: Credit Suisse Global Investment Returns Sourcebook 2013

There are two schools of thought on the question of the length of the averaging period. One view is that as long a horizon as possible should be used. This assumes that investors' risk premiums have not fundamentally changed over time and the average market risk premium has remained stable. A longer horizon also uses more data and will therefore have a lower standard error.

An alternative view is that only more recent data is relevant, particularly if the market has undergone significant structural change over time (for example, the introduction of dividend imputation). This approach results in an estimation problem in that estimates

[13] Rietz, T. (1988). The Equity Premium: A Solution. Journal of Monetary Economics, 22, pp.117-131.

[14] Barro R. (2006). Rare Disasters and Asset Markets in the Twentieth Century. Quarterly Journal of Economics, August, pp. 823-866.

based on more recent data have standard errors that are too high to produce a statistically meaningful estimate. Further, conditions prevailing over a short period of time may not necessarily be an appropriate basis for a long term forecast (for example, unusually high returns or high volatility). Gray and Officer have concluded:

> A long period of data provides better statistical precision (the mean estimate has a lower standard error), but data from long ago may be less representative of current circumstances. It is generally agreed, however, that the minimum period required to provide sensible estimates is 30 years.[15]

If a long term average MRP is being estimated we favour using the longest possible horizon as this is necessary to ensure statistical rigour. As will be discussed below, we recommend examining both historical and forward-looking estimates in determining the cost of equity. It is therefore appropriate to interpret contemporaneous estimates within the context of the average returns that have prevailed in the market over a much longer time period.

This also avoids the need to adjust for specific events or periods in the market's history that can impact estimates over shorter horizons. The difficulty with making such adjustments is determining the circumstances in which they should (and shouldn't) be applied.

Implied MRP

A common approach in estimating an implied MRP is by using a simple dividend discount model. The dividend theory of value states that the price today is the discounted stream of expected future dividends. The constant growth (Gordon) model is:

$$\text{Value of equity} = \frac{\text{Expected Dividends Next Period}}{(\text{Required Return on Equity} - \text{Expected Growth Rate})}$$

The implied MRP can be estimated by subtracting the risk free rate from the expected return on equity. Another variation of this model is to use earnings instead of dividends. The effect of this is that the inverse of the price/earnings (PE) ratio becomes the required return on equity.

Using this approach, the following table shows the implied MRP for the last ten years.

[15] Gray, S. and Officer, R. (2005). A Review of the Market Risk Premium and Commentary on Two Recent Papers, A Report Prepared for the Energy Networks Association, p.21.

Table 3 Implied MRP 2003 - 2012

Year	Return on equity	Risk free rate	Implied MRP
2003	13.03%	5.15%	7.88%
2004	13.34%	5.33%	8.02%
2005	11.95%	5.19%	6.76%
2006	11.79%	5.88%	5.91%
2007	16.66%	6.29%	10.38%
2008	24.80%	4.04%	20.76%
2009	15.30%	5.74%	9.56%
2010	17.55%	5.54%	12.02%
2011	13.03%	3.82%	9.21%
2012	13.03%	5.15%	7.88%

This also shows that the implied MRP is quite volatile. With implied estimates, different models result in different estimates. Judgement also needs to be exercised in estimating expected future dividends and growth rates.

Implications: recommended approach

In summary, we consider that:

- the cost of equity should be informed by more than one model; and
- the CAPM needs to be applied in a way that avoids the potential anomalies that arise from combining short and long run estimates of inputs and gives appropriate regard to prevailing market conditions.

At the current time, in applying the CAPM we consider that regard should be given to:

- the long run average return on equity, which combines a long run average MRP with a long run (say ten year) average risk free rate; and
- a contemporaneous estimate, which combines the implied MRP with the current (short term average) risk free rate.

This also makes questions such as identifying when the risk free rate is 'too high' or 'too low' irrelevant.

The question that then arises is how the estimates should be interpreted. The issue with historical averages is how confident we can be that they remain an appropriate estimate of investors' long run forward looking return expectations. However, forward looking estimates of the MRP are inherently volatile, require the application of judgement in specifying inputs and may not remain representative of the expected

MRP over the term of a regulatory period. This inherent volatility also reduces certainty for the regulated business and stakeholders.

One possibility is to base the estimate on the long run average and use the contemporaneous estimate as a 'reasonableness' check given prevailing market conditions.

In its Interim Report on its WACC methodology IPART proposes the following approach: [16]

1. Estimate a WACC range based on current market data with a 40-day averaging period.

2. Estimate a WACC range based on long-term averages with a 10-year averaging period.

3. Establish a WACC range using the midpoints of these 2 WACC ranges (in Steps 1 and 2). The midpoint WACC, the average of the upper and lower bound of the WACC range, is the default WACC point estimate.

4. Having regard to relevant financial market information, assess the appropriateness of the default WACC point estimate (i.e. whether a WACC point estimate should be above, below or at the midpoint WACC within the range).

While it is necessary to work through the full implications of estimating two WACC ranges (one based on current market data and one using historical averages), we welcome that IPART has acknowledged the current problem and has sought to pragmatically modify the way it applies the CAPM in response. IPART intends to release a Final Decision on its methodology at the end of the year.

[16] Independent Pricing and Regulatory Tribunal (2013.) WACC Methodology, Research – Interim Report, June, p.4.

5 Equity beta

Response to Q31

Results from the econometric evaluation of historic market returns as a means to estimate the equity beta are sensitive to input data. What is the best way to determine the point estimate of the equity beta from the resulting wide range of estimates (e.g. median, average, any relevant quartiles)?

Constructing the initial sample

In the first instance the most important consideration is constructing an appropriate sample of firms. In terms of minimising estimation error, the larger the sample size the better. However, the sample needs to comprise relevant firms, that is, firms that are in a similar industry with similar risk drivers.

This can be informed by a high level first principles analysis that is used to identify relevant industry segments or sub-segments (an overview of first principles analysis is provided below). This will assist in identifying firms that have similar risk drivers, even if the level of risk they bear is not the same as the benchmark firm. For example, the betas of iron ore producers may be able to inform the beta estimate for a railway infrastructure provider that transports that commodity, even if producers are exposed to more risk. This is because the demand for the railway provider's rail access services is directly derived from the demand for iron ore (or conditions in the iron ore export market).

The composition of the sample is discussed further in the response to Question 32.

Selecting the estimate

The main circumstances under which we consider that it would appropriate to take a median or average of the sample is if we are confident that:

- the firms have the same (or a very similar) risk profile, both in comparison to each other and relative to the benchmark firm; and
- the estimates are reliable.

If the firms have the same or a similar risk profile but we cannot confidently conclude that estimation error has been minimised, we would recommend taking the estimate from the upper bound of the range (such as the mid-point of the upper bound, or the 75% percentile). As noted above, taking a more conservative approach gives appropriate regard to the risk of error and recognises its asymmetric consequences.

However, as noted above, we think it is neither realistic, nor is it necessary, to limit the comparators to firms that have the same degree of systematic risk. Provided firms have relevant risk drivers to the benchmark firm, adjustments can then be made for differences in risk between the sample and the benchmark.

The identification and analysis of risk drivers can be done using first principles analysis, which is a qualitative approach to assessing systematic risk and its implications for the beta estimate. Lally[17] identifies a number of factors, which are summarised in the following table.

Table 4 First principles analysis

Factor	Contribution to systematic risk
1. Nature of the product	The key issue here is establishing any linkages between revenues (or demand), costs and GDP. It is relevant to consider firms that provide a similar product or service, or whose demand is directly derived from the demand for a particular product, as this can result in common risk drivers. The income elasticity of demand can also be considered here, as this can provide a direct link between revenues and GDP.
2. Nature of the customer	The number and size of customers is important here. For example, if the customer base comprises a small number of large firms, they can exert countervailing power. This in turn can reduce the ability of a monopoly service provider to misuse its market power. The presence of market power is seen to reduce exposure to systematic risk (and hence beta).
3. Pricing structure	Pricing structure refers to the extent that the firm's pricing arrangements either mitigate or increase its exposure to systematic risk. This includes the extent to which prices are fixed or variable with volume (or both, as is the case with most infrastructure providers).
4. Duration of contracts with customers	On the one hand, long-term contracts can reduce exposure to volume risk because of the increased certainty they provide. However, this will also depend on the extent to which the contracts provide surety in relation to prices and/or volumes, including the ability to revise prices in response to changes in costs.
5. Market power	The existence of market power will have a mitigating effect on systematic risk. This assumes that the firm possesses market power and is able to exercise that power to its advantage.
6. Form of regulation	This is only relevant to a regulated business. In theory, price cap regulation can expose the business to more systematic risk than a revenue cap. However in practice, the implications for beta are unclear, as Australian regulators have tended not to make any distinction between different forms of regulation in assessing beta.
7. Growth options	Growth options refer to the potential to undertake significant new investment, particularly in new areas or products. It is argued that businesses that have a number of valuable growth opportunities, in addition to their existing assets, will tend to have higher systematic risk compared to firms that don't have these opportunities. 'Growth' opportunities are defined as opportunities that can generate a return in excess of the firm's WACC or hurdle rate.
8. Operating leverage	Operating leverage reflects the proportion of the firm's costs that are fixed. The higher the proportion of fixed costs, the higher the operating leverage. High operating leverage is associated with higher systematic risk, as these fixed costs will still be incurred irrespective of actual volumes.

[17] Lally, M. (2004), The Cost of Capital for Regulated Entities, Report prepared for the Queensland Competition Authority.

Depending on the size of the sample it is neither feasible nor is it necessary to undertake this assessment for each individual firm. Instead, firms could be clustered into industry segments and an analysis conducted on each segment. It is reasonable to expect that firms operating in the same industry segment will have similar characteristics in relation to the above. The benchmark firm can then be assessed against each industry segment, that is, does it have lower, higher, or similar risk. This in turn can be used to inform a judgement as to where the beta is to be selected from the range.

This could be reduced by calculating the beta using a weighted average approach. A weight could be applied to each segment depending on how relevant they are to the benchmark firm.

It is important to emphasise that this relative risk-based approach is not intended to imply, or encourage, the search for an unrealistic degree of precision in synthesising the data. This approach involves the application of reasoned judgement, and as with the other aspects of the rate of return, that judgement needs to be informed and transparent.

In retaining a degree of subjective judgement it is acknowledged that this approach will remain vulnerable to gaming (either actual or perceived) and debate. It is therefore imperative that detailed and transparent reasoning is provided.

Portfolios could also be formed for the different sub-segments and regressed against the local sharemarket index. For example, a portfolio beta could be calculated for US Class 1 railroads, Australian transportation firms, US transportation firms etc.

Response to Q32

Given that there are no comparable rail businesses in Australia for the three regulated railway owners, is it appropriate to select businesses from different industries (such as toll road, truck) and/or rail businesses from overseas?

Apart from the fact that there are no 'pure play' listed comparators in Australia for the three regulated railway owners[18], we consider that the beta estimate should be based on an analysis of a larger sample of relevant Australian and overseas comparators. As outlined above, we are of the view that the beta estimate can be informed by businesses from different industries that have similar risk *drivers* but need not have the same level

[18] Aurizon could be used to inform the beta estimate, noting that as a vertically integrated business it is not a 'pure play' comparator for a network only business. However, as explained below, because we recommend using at least five years of monthly share price data we would only look to incorporate it in our sample at a future point in time when we have that necessary share price history.

of risk. First principles analysis can be used to understand these risk drivers and how they might compare with the benchmark firm.

For example, relevant firms could include railway operators (such as the US Class 1 railroads), other firms in the industrial transportation sector (Australia and overseas) and utilities. For The Pilbara Infrastructure, reference could also be made to iron ore producers for the reasons outlined above.

While a larger sample size does mitigate estimation error, it is also important to consider any issues that could materially impact the quality of a firm's equity beta estimates. For example, firms should be excluded from the sample if:

- its estimate is likely to have been materially affected by an unusual event (such as a takeover); and
- its shares are thinly traded, as this can result in an unreliable estimate. For example, it could be required that the firm must have sixty monthly share price observations.

To the extent such adjustments are made, there should be transparent reasoning. It is also possible to specify criteria that need to be satisfied in the guidelines.

Response to Q33

Are there any viable alternative methods to the econometric evaluation of historic market returns, such that the equity beta for regulated businesses might be estimated in a more robust manner?

To the extent that the Sharpe-Lintner CAPM continues to be applied to estimate the expected return on equity, which requires an equity beta, there is no real alternative to an econometric evaluation of historical market returns. However, there are ways that the quality of the estimate itself could be improved, which is discussed below.

Review of the model

As discussed in the response to Question 1, at a higher level there are alternative methods that can be used to estimate the cost of equity. This could include:

- other forms of the CAPM that are not subject to the same deficiencies as the Sharpe-CAPM. For example, the Black CAPM relaxes the unrealistic assumption of risk-free borrowing and lending and allows for the unrestricted short-selling of risky assets. The risk free rate is replaced by the expected return on a zero beta stock;

- models that recognise that there may be other factors that explain stock returns. The Fama-French three factor model recognises firm size and book to market ratios, which empirical evidence has shown influences stock returns[19]; and
- forward-looking models such as discounted cash flow analysis (or the dividend growth model). For example, the US Surface Transportation Board calculates the cost of equity for railroad companies by putting equal weight on estimates produced using CAPM and a multi-stage discounted cash flow approach.[20]

As mentioned above, there could be benefit in publishing guidelines that could address the models that may be used, how they could be applied and how the final cost of equity estimate could be selected. This provides more certainty and reduces some of the scope for future dispute.

It is not proposed that the CAPM be discarded. However, it is also important to examine how it should be applied, particularly in more difficult market conditions. One of the problems that has been identified is combining a spot estimate of the risk free rate with a long run average MRP. This could result in the average expected return on the market being mis-specified (before consideration is given to firm-specific risk via the beta factor).

The Independent Pricing and Regulatory Tribunal (IPART) has recognised these issues, which has prompted a review of its WACC methodology: [21]

> Our WACC methodology worked well from early 2000 until 2008/09, as financial market conditions were fairly stable in Australia. However since the GFC, market conditions have been much more uncertain and volatile. For example, in the past 2 years, the midpoint of this range fell from 6.0% to 3.5%. The gap between the expected costs of debt and equity also narrowed.

As noted above, in its Interim Report on its WACC methodology IPART is proposing to estimate WACC ranges using both current market data and long term averages.

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[19] Fama, E. and French, K. (1993). Common Risk Factors in the Returns on Stocks and Bonds. Journal of Financial Economics. 33(1), pp. 3–56; Fama, E. and French, K. (1996). Multifactor Explanations of Asset Pricing Anomalies. Journal of Finance. 51(1), pp. 55–84.

[20] Surface Transportation Board (2012). Decision: Railroad Cost of Capital – 2011, Docket No. EP 558 (Sub-No. 15).

[21] Independent Pricing and Regulatory Tribunal (2013). WACC Methodology, Research – Interim Report, June, p.4.

Addressing estimation error in the beta estimates

It is also important to identify and address the potential sources of error in the beta estimates calculated using regression analysis.

A 2005 report by Gray et al provides a useful summary of the various methods of estimating beta, as well as their performance.[22] The study uses historical data to compare the predicted beta estimate in accordance with CAPM, with the actual equity return for the relevant forecast period. The closer the predicted estimate to the actual equity return, the better the estimation technique. A summary of the findings of the report are:

- it is preferable to use data periods of longer than four years;
- monthly observations are preferred to weekly observations;
- Blume-adjusted estimates that account for mean reversion provide better estimates;
- statistical techniques that eliminate outliers are preferred, provided the outlier is not expected to re-occur; and
- a beta estimate derived from a sample of firms in an industry is preferred to an estimate for an individual firm.

These measures impact the choice of firms for the comparator sample as well as how the estimates are used. For example, as noted above, we recommend excluding firms that don't have 60 consecutive monthly share price observations. Outliers should also be excluded but only if there is a reasonable economic or commercial rationale, for example, a firm that is a takeover target.

To the extent that beta estimates are produced for individual firms, we also advocate the reporting of measures of the quality and explanatory power of the estimate, such as the R-squared and t-statistic[23]. We consider it prudent to exclude any estimates that have poor results, that is, an R-squared of less than 0.1 and a t-statistic of less than two.

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[22] Gray, S., Hall, J., Bowman, R., Brailsford, T., Faff, R., and Officer, R. (2005). The Performance of Alternative Techniques for Estimating Equity Betas of Australian Firms, Report Prepared for the Energy Networks Association.

[23] The R2, or coefficient of determination, measures the explanatory power of the regression equation (that is, how much of the variability in Y can be explained by X). It takes a value of between 0 and one. For example, an R-squared of 0.7 would suggest that 70% of the variability in the individual share's returns is explained by variability in the returns on the market. The t-statistic is used to test statistical significance. It is calculated by dividing the standard error of the estimate by the beta coefficient. The standard error measures the sampling variability or precision of an estimate. The t statistic is calculated for each coefficient in a regression model (in this case, the beta coefficient) for the purposes of hypothesis testing. The tendency is to test the hypothesis that the regression coefficient is significantly different from zero. This is done within a specified confidence interval (for example, 95%). Generally, the t statistic should exceed two to be considered reliable.

The reason we consider this important is because these poor results suggest that the estimated beta is not a reliable estimate of that firm's true beta. This in turn means that the estimate is potentially misleading, rather than informative, in establishing the beta for the benchmark firm.

6 Credit rating

Response to Q34

Are there appropriate alternatives to the Authority's current method for estimating the credit rating?

Appropriateness of the benchmark approach

The benchmark approach is commonly used by Australian regulators to determine the notional credit rating. The main alternative to this is to clearly define the characteristics of the efficient benchmark firm and assess the rating based on the methodologies applied by ratings agencies, which examine a range of factors, including industry characteristics and firm specific factors.

The ratings process is complex and ratings agencies specialise in this task. We would therefore not be in favour of the regulator undertaking its own assessment, unless an appropriate independent expert was appointed to undertake this task (and it could be verified that the assessment replicated the approach that a ratings agency would apply).

We therefore consider that benchmarking the regulated business against rated comparators remains the most appropriate approach to apply.

Reasonableness checks

The other issue is the extent to which 'financeability' tests are used as a reasonableness check of the regulatory proposal. This is discussed below.

Response to Q35

What are the key characteristics or the selection criteria for companies to be included in the benchmark sample to determine the credit rating for a regulated business in rail?

We are of the view that the same sample of firms that are used to assess capital structure should be used to assess the notional credit rating. It is recognised that not all firms in the capital structure assessment will be rated. While gearing is only one of a number of factors that affect the credit rating, the characteristics of the firms that are used to establish the benchmark capital structure are directly relevant to the credit rating assessment.

Response to Q36

Among the different types of credit rating for the same company, for example, entity credit rating (i.e. the credit rating for the entire entity) versus instruments credit rating (i.e. the credit rating for a particular debt instrument), which type is more appropriate for determining the credit rating for the purpose of determining the WACC as it is to be used under the Code?

Standard & Poor's defines an issuer (or entity) credit rating as:[24]

- Current opinion of an entity's overall creditworthiness—its ability and willingness to repay its financial obligations.
- Credit risk assessment of issuer as a whole, but not of a specific debt issue.

An issue credit rating is defined as:[25]

> Opinion of the credit quality of a specific financial obligation and issuer's willingness and capacity to pay in accordance with term.

It is therefore specific to the nature of the financial obligation.

The choice between an issuer or issue-specific credit rating depends on the purpose that it is being used for. In this context, the notional credit rating is used to assess the likelihood that the benchmark firm would be able to repay its debt (based on the benchmark gearing level), which is used to estimate the benchmark cost of debt.

As the Authority points out, an instrument credit rating could be different to the entity's credit rating. For example, the issue could include additional credit enhancements that provide the lender with greater certainty that the debt will be repaid, impacting the availability and cost of that funding. Standard & Poor's bases its assessment of instrument credit ratings on the following considerations:[26]

- The issue's terms and conditions and, if relevant, its unique legal structure.
- Relative seniority of the issue with regard to the issuer's other debts and priority of repayment in the event of default.
- The existence of external support or credit enhancements (including mechanisms such as letters of credit, guarantees, insurance, and collateral, which are

[24] http://www.standardandpoors.com/aboutcreditratings/RatingsManual_PrintGuide.html. [Accessed 21 June 2013]

[25] http://www.standardandpoors.com/aboutcreditratings/RatingsManual_PrintGuide.html. [Accessed 21 June 2013]

[26] http://www.standardandpoors.com/aboutcreditratings/RatingsManual_PrintGuide.html. [Accessed 21 June 2013]

protections designed to limit the potential credit risks associated with a particular issue. Enhancements are a key factor in analysing structured finance instruments).

Regard also needs to be given as to how the cost of debt is estimated. The benchmark cost of debt is estimated based on corporate bond market data. This in turn should reflect the likely margin payable by the benchmark firm based on its assumed risk profile. It should not be influenced by special features that impact the risk and cost of a particular issue (such as credit enhancements or subordinated debt). Indeed, to the extent that the Authority continues to construct its own sample of bonds to estimate the cost of debt, any such issues should be excluded from that sample.

Hence, where comparators have ratings for the issuer as well as the instruments on issue, the only credit rating that should therefore be used is the credit rating of the issuer.

Response to Q37

How recent should the credit ratings for the company and debt instruments be in order to be considered valid as an input to determining credit ratings? How many years in the past can a credit rating be assigned and still be used?

It is appropriate to assess capital structure over more than one year, mainly because a 'point in time' estimate is sensitive to where the particular business might be in its investment cycle. Accordingly, we observe capital structure over a number of (recent) years as this better informs an estimate of the level of debt that is sustainable, on average, for a business in this industry with this risk profile.

The assessment of credit rating can be treated differently. We consider it appropriate to limit the assessment to the most recent rating for each firm. The currency of a credit rating is extremely important. Once the business has been assessed and a rating assigned, the ratings agency continues to monitor the business (as long as it intends to maintain a public rating). This could result in the business being placed on Creditwatch (signalling a possible change in rating) or the rating could be changed.

A credit rating assessment is forward-looking and in this context, is being used to inform a forward-looking estimate of the benchmark cost of debt. It is therefore considered important to limit the focus to the current rating, which reflects the ratings agency's current view on the future creditworthiness of the firm. We also note that

Standard & Poor's "may withdraw issuer credit ratings when there is not enough information to actively monitor the rating"[27], suggesting the importance of currency.

Historical credit ratings provide no real information regarding the likelihood that the firm will repay its debt in the future. The only thing they may be useful in informing is potential outliers, for example, a firm that has experienced multiple credit rating downgrades in recent years.

Response to Q38

Is the median credit rating of benchmark sample the best indicator for the credit rating of a railway owner? If not, then which is the best method to determine the credit rating from the benchmark sample?

Consistent with our views in relation to determining the equity beta estimate from the sample, we consider that the same overarching principle applies here. That is, to the extent that a review of the comparator sample reveals a range of credit ratings, the selection of the point estimate should be based on an assessment of the risk of the benchmark firm relative to the sample.

We are also of the view that to the extent that firms in the sample have different credit ratings, the range of gearing levels for firms falling in each of the different ratings categories should be examined. Recognising that factors other than capital structure influence the rating outcome, to the extent that this reveals a clear linkage between gearing levels and credit rating, it could be used to inform the final rating assessment based on the benchmark firm's target capital structure.

Response to Q39

What methods are suitable as a cross-check of the robustness of a determination of a credit rating for a railway owner?

Financeability tests can be used to assess the impact of a determination on the financial performance of the benchmark firm and hence the reasonableness of the assumed credit rating. This involves examining the impact of the decision on the financial performance of the business based on key metrics that are used in the credit rating assessment, including profitability and interest cover (holding all of the other factors that influence the credit rating constant).

[27] http://www.standardandpoors.com/aboutcreditratings/RatingsManual_PrintGuide.html. [Accessed 21 June 2013]

IPART recently undertook a review to examine the appropriateness of its current approach to assessing financial viability. Its tests involve the following steps: [28]

- deciding on the gearing ratio to be used in computing the financial ratios, which may be different to that used in calculating the WACC;
- computing the financial ratios using IPART's decision on the gearing ratio and the business' forecast cash flows (based on its preliminary pricing decisions);
- computing the business' likely credit rating in each year of the determination period using these financial ratios; and
- identifying any potential financeability issues by comparing the likely credit ratings to IPART's benchmark credit rating.

Ratings agencies such as Standard & Poor's publish indicative ranges for key financial ratios for the different credit rating categories based on broad industry categories. This provides useful information as to the sustainability of the assumed credit rating, particularly where the ratio/s of the benchmark firm are well outside the recommended range for that credit rating. However, caution still needs to be exercised in interpreting that information given the final rating is determined by a range of factors.

While we see merit in considering the impacts of a regulatory decision on financial performance we do have some concerns with the application of financeability tests. The test only looks at a subset of a range of factors that feed into the credit rating assessment. While we consider it appropriate to limit the focus of the review of firm specific factors (based on financial ratios), caution should be exercised in drawing any conclusions from the assessment, including a possible change in credit rating.

With these concerns in mind, it could still be instructive to compare the actual financial ratios for the benchmark firm against the published ranges recommended by the ratings agencies for different credit rating categories. Again, caution should be exercised in interpreting this data given the range of factors that contribute to the final rating. However, it could be useful in signalling potential issues with the assessment if the ratios of the benchmark firm materially differ from the recommended ranges for the notional credit rating category.

[28] Independent Pricing and Regulatory Tribunal (2012). Financeability Test in Price Regulation – Discussion Paper, September.

7 Gamma

Response to Q46 - 48

What are the best methods and/or studies of estimating the value of gamma that should be considered by the Authority?

What are the main considerations for estimating gamma via the estimates of the payout ratio and theta? Is it possible to estimate gamma directly from available market data?

Are there methods – other than dividend drop off studies – that could be used to better estimate the value of imputation credits?

As these issues are all closely related we have addressed them together.

Gamma is the product of two inputs that need to be estimated:

- the proportion of tax paid that has been distributed to shareholders as franking credits (the distribution rate); and
- the value the marginal investor places on $1 of franking credits, referred to as the value of franking credits (or theta).

Each input is considered below.

Distribution rate

Distribution rates are more readily observable from taxation statistics. In Australia, the rate has remained relatively stable, at around 70%, based on studies by Hathaway and Officer.[29] While the AER had previously proposed an assumption of 100%, in responding to an appeal on the value of gamma by ENERGEX, Ergon Energy and ETSA Utilities, it conceded that there was no empirical evidence to support a value above 70%.[30] The Australian Competition Tribunal (the Tribunal) therefore concluded that for the purpose of establishing a value for gamma, the distribution rate should be set at 70%.

[29] Refer: Hathaway, N., and. Officer, R. (2004). The value of imputation tax credits – Update 2004, Capital Research Pty Ltd, November; Hathaway, N. (2010). Imputation Credit Redemption – ATO data 1988 - 2008, Capital Research Pty Ltd, November.

[30] Australian Competition Tribunal. Application by Energex Limited (Distribution Ratio (Gamma)) (No 3) [2010] ACompT 9.

The value of the distribution rate should therefore not be contentious. Unless there is a structural change in the market that materially alters the willingness and/or ability of firms to distribute franking credits, we consider it appropriate to continue to apply a value of 70%.

Value of franking credits

It is difficult to reliably estimate the value that an investor places on a dollar of franking credits, if they ascribe a value at all. We consider that regard needs to be given to:

- the identity of the price setting investor
- market practice
- empirical evidence.

Identity of the price setting investor

Officer's seminal work on dividend imputation showed that the value of a firm was influenced by the value of gamma from the perspective of the marginal shareholder.[31] The marginal shareholder is the price-setting investor. The price at which this shareholder transacts becomes the market clearing price, or the price equating the demand for capital by the firm with supply that will determine the firm's cost of capital.

A key question is therefore the identity of the marginal investor. In open capital markets such as Australia, which have large capital requirements but an insufficient internal capital source, external capital must be drawn upon. In the context of imputation credits this means that both foreign and domestic investors will hold shares in Australian companies.

Non-resident shareholders are unable to derive any direct benefit from franking credits. Previously this could be indirectly derived via the trading of shares around dividend dates. Schemes were established by investment banks to allow foreign investors to extract value from franking credits, which relied on these investors selling their shares to domestic investors in the period leading up to the payment of the dividend (that is, before the shares go 'ex dividend', which is when the holder is no longer entitled to receive that dividend). The domestic purchasers would receive the

[31] Officer, R. (1994). The Cost of Capital under an Imputation Tax System. Accounting and Finance, 34, pp. 1–18.

cash dividend and franking credit, and subsequently sell the share back to the foreign investor at a small premium.

Some twelve years after becoming aware of these schemes the Commonwealth Government changed the Australian taxation law to introduce a minimum period of holding, requiring that shareholders have to be 'at risk' for a period of time in order to obtain the benefit of franking credits. This amendment, called the 45-day rule, was effective from 1 July 1997, although was not introduced until some time later (July 1999).

Under this law, investors are required to hold shares for a period of 45 days during a qualification period around the dividend event (without substantial hedging) in order to be eligible to rebate franking credits against their tax liabilities. This therefore significantly extended the window over which the previous trades between foreign and domestic investors could be made, to the extent that the extra price risk borne by the parties meant that such transactions were no longer worthwhile.

As a consequence, the return to a foreign investor comprises dividends and capital gain only, whereas the return to a domestic investor comprises dividends, capital gain and franking credits. If both foreign and domestic investors had the same expectations about the future earnings of the firm, which is a well-established tenet of economic theory, then the foreign investor would demand a lower price than the domestic investor, as the foreign investor receives a relatively lower return.

Therefore, in the presence of insufficient domestic capital it is expected that foreign investors will be the marginal investors. As outlined above, even if the clear majority of the shareholders are domestic but there is some reasonable presence of foreign investors, then economic theory dictates that the marginal investor will be foreign because this investor will set the market-clearing price that determines the cost of capital.

In Australia, one can therefore conclude that as the price-setting investor in the 'average' firm is most likely to be foreign, franking credits will not be accorded a value in the pricing of shares.[32] They may have value to domestic investors, but they are not the marginal investor that sets share prices. While they may have had some value prior to the introduction of the 45-day rule, there is no longer any basis for foreign investors to derive any benefit from these credits and their value in setting share prices will therefore be zero.

There is established empirical support for this proposition. For example, the results of a 2004 study by Cannavan, Finn and Gray:[33]

> …are consistent with the notion that nonresidents are the marginal price-setting investors in large Australian firms.

A 2010 study by Feuerherdt, Gray and Hall (2010), which was based on an analysis of the value of imputation tax credits on hybrid securities, drew similar conclusions: [34]

> Our results are consistent with the notion that security prices are set by a marginal investor who does not value franking credits. However, it should be emphasised that our discussion of the marginal investor hypothesis does not form the basis for an assumption leading to the result. Simply, the empirical evidence is that security prices do not incorporate any value for imputation credits. This is consistent with prices being set by an overseas marginal investor. Even if a theory were proposed in which security prices were set by the average investor base, the empirical result would be unchanged.

It is noted that the notion that the marginal investor is foreign has not been clearly accepted by regulators. One of the main arguments made is that if we are to consider the presence of foreign investors, it is argued that we should be using an international CAPM to determine the WACC, not a domestic CAPM (and hence, all parameters would need to be respecified in a global market context). We endorse the pragmatic approach taken by the AER on this issue, which is to adopt a domestic CAPM and recognise foreign investors where appropriate:[35]

> Under a domestic CAPM framework, foreign investors in the Australian market will be recognised in defining the representative investor, but only to the extent they invest in the domestic capital market.

In any case, we are not proposing that franking credits do not have value to some investors – the key is the value to the marginal investor. Furthermore, the study by Feuerherdt, Gray and Hall referred to above refutes the notion that security prices incorporate a value for franking credits, even if these prices are set by the average investor.

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[33] Cannavan, D., Finn, F. and Gray, S. (2004). The Valuation of Dividend Imputation Tax Credits in Australia. Journal of Financial Economics, p.168.

[34] Feuerherdt, C., Gray, S. and Hall, J. (2010). The Value of Imputation Tax Credits on Australian Hybrid Securities. International Review of Finance, 10:3, pp.399-400.

[35] Australian Energy Regulator (2009). Final Decision. Electricity Transmission and Distribution Network Service Providers, Review of the Weighted Average Cost of Capital (WACC) Parameters, p.101.

A paper by Gray and Hall[36] (2006) finds that setting gamma to zero does not, unlike the values of gamma maintained by regulators, violate the deterministic relationship between the value of franking credits, the market risk premium and the corporate tax rate. Thus, assuming a gamma of zero is both agreed to by the theory and empirical bulk, and also is robust to the applicability of this assumption.

Market practice

It is common practice for Australian firms to set gamma to zero (which by definition implies a value of theta of zero). For example, a report by SFG Consulting summarised surveys of market practice, including:[37]

- a study by Lonergan (2001), which reviewed expert valuation reports prepared in relation to takeovers. 88% of these reports made no adjustment for gamma and for those that did, in all but one case the adjustment had a negligible impact;
- a report by KPMG (2005), which also reviewed expert valuation reports prepared in relation to takeovers. Of the 118 reports reviewed, none made an adjustment for gamma; and
- a survey by Truong, Partington and Peat (2008), which showed that the majority of Australian CFOs surveyed make no adjustment for gamma, in either the cash flows or discount rate.

Empirical evidence

It is relevant to examine studies that attempt to estimate the value of theta using market data.

One of the most commonly applied methodologies used in studies that have sought to estimate the value of theta is the dividend drop-off approach. As a firm's share price will typically fall following the payment of a dividend (which is seen to be driven by the activities of short-term arbitrage traders), dividend drop-off studies examine the amount of the price change.

The difficulty here, however, is that it is extremely difficult to decompose this change into the value of the dividend itself and the value of the franking credits that are attached to that dividend. These variables are highly correlated, posing

[36] Gray, S and Hall, J. (2006). The Relationship Between Franking Credits and the Market Risk Premium. Accounting and Finance, 46, pp.405-428.

[37] SFG Consulting (2009). Market Practice in Relation to Franking Credits and WACC: Response to AER Proposed Revision of WACC Parameters, Report Prepared for APIA, ENA and Grid Australia, 1 February.

methodological challenges for these studies (including the problem of multicollinearity[38]).

As part of its consideration of the appeal by ENERGEX, Ergon Energy and ETSA Utilities of the AER's decision to adopt a gamma of 0.65, the Tribunal commissioned a 'state of the art' dividend drop off study from SFG Consulting (the SFG study). The terms of reference for the study were settled between the AER and the applicants, with intervention by the Tribunal.

The Tribunal recognised multicollinearity as an "unavoidable problem", noting that:[39]

> What can be done is to conduct a study as carefully as possible with as large a data set as is available.

It stated:[40]

> In respect of the model specification and estimation procedure, the Tribunal is persuaded by SFG's reasoning in reaching its conclusions. Indeed, the careful scrutiny to which SFG's report has been subjected, and SFG's comprehensive response, gives the Tribunal confidence in those conclusions. In that context, the Tribunal notes that in commissioning such a study, it hoped that the results would provide the best possible estimates of theta and gamma from a dividend drop-off study. The terms of reference were developed with the intention of redressing the shortcomings and limitations of earlier studies as far as possible.

The SFG study estimated a value for theta of 0.25. The Tribunal concluded:[41]

> The Tribunal is satisfied that SFG's March 2011 report is the best dividend drop-off study currently available for the purpose of estimating gamma in terms of the Rules. Its estimate of a value of 0.35 for theta should be accepted as the best estimate using this approach.

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38 Regression analysis is used to test the existence and strength of the relationship between a dependent variable and one or more independent variables (in this case, our two independent variables are dividends and franking credits). The results of the regression will tell us the extent to which changes in the dependent variable are explained by the independent variables. If the independent variables are related, it will not be possible to isolate the impact of each of these variables in interpreting that relationship – this is multicollinearity.

39 Australian Competition Tribunal. Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 para.21.

40 Australian Competition Tribunal. Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 para.22.

41 Australian Competition Tribunal. Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 para.29.

In our view, given the level of scrutiny this study was subject to, and that fact that it is relatively recent, we consider that the SFG study should be relied upon in informing an estimate for theta using a dividend drop-off study. We do not see any reason why any other dividend drop-off studies should be relied upon.

However, there is merit in reviewing other studies that have used market data. There are two reputable studies that have done this, which are summarised below.

Cannavan, Finn and Gray (2004)

Cannavan, Finn and Gray sought to test whether the introduction of the 45-day rule has impacted the value of gamma.[42] Rather than use the dividend drop-off method, they sought to infer the value of cash dividends and franking credits from the relative prices of share futures and the underlying shares on which these contracts are written, based on a no-arbitrage framework.

The authors noted that the data behaved well in-line with the no-arbitrage relationship and as such the model is substantially reliable. This is a key benefit over estimation via the dividend drop-off technique. In terms of overall conclusions, it is again found that the market fully values cash dividends, consistent with the theory.

The main conclusion is that after the introduction of the 45-day rule, the market does not value franking credits. A constraint is also imposed in which the franking credits are given zero value after 1 July 1997. The finding that this constraint cannot be rejected is further support of the hypothesis that gamma is no longer valued by the market.

This study did find that franking credits were potentially valued at up to 50% of their face value prior to the introduction of the 45-day rule (suggesting a value for gamma of up to 0.36). Since then, however:[43]

> …we find no evidence of any positive value at all in imputation credits after the introduction of the 45-day rule. The increased costs and risks involved in transferring imputation credits make it infeasible to engage in this strategy even for the highest-yielding stocks… This means that in a small open economy such as Australia, the company's cost of capital is not affected by the introduction of a dividend imputation system. The company must produce the same return for the marginal stockholder whether an imputation system exists or not if the marginal stockholder receives no value from imputation credits.

[42] Cannavan, D., Finn, F. and Gray, S. (2004).

[43] Cannavan, D., Finn, F. and Gray, S. (2004). p.192.

Feuerherdt, Gray and Hall (2010)

This paper tests the value of imputation credits based on the prices of hybrid securities.[44] A key reason for examining these securities is:

- the signal-to-noise ratio is considered higher than for ordinary shares, reducing the multicollinearity problem associated with the dividend drop-off methodology (which they have therefore applied here); and
- hybrid issues tend to be marketed exclusively to domestic investors. Hence, in order to address regulators' concerns regarding the relevance of foreign investors in setting the value of imputation credits, they have chosen an environment where trading is likely to be almost exclusively domestic-based.

The study examines three samples (ordinary shares, reset preference shares and convertible preference shares) over three different time periods, recognising the tax law changes relating to the introduction of the 45-day rule in 1997 and the ability to rebate imputation credits in 2000.

The results found no evidence of mean drop-off ratios of greater than one. If cash dividends are fully valued, the franking credit has no value. This finding held across all three samples. The key conclusions from this study were cited above, being that the marginal investor is a foreign investor who does not value franking credits.

Finally, we note that the AER has previously sought to use tax statistics analysis to inform its estimate of theta. Taxation statistics measure the quantum of corporate taxation, the amount of credits distributed and the amount of credits claimed. The amount of credits claimed is not the value of those credits. It does not take into consideration the risk that shareholders bear in earning the dividends and credits. Accordingly, taxation statistics should not be used for the purpose of valuing franking credits.

Conclusion

As shown above, there is a range of evidence to suggest that franking credits may have no value to investors. Recognising the inherent uncertainty in estimating theta, and having regard to the outcomes of the SFG study relied upon by the Tribunal, we consider that a range should be specified for theta of between 0 and 0.35. Applying a distribution rate of 70% suggests a range for gamma of between 0 and 0.25.

[44] Feuerherdt, C., Gray, S. and Hall, J. (2010). op.cit.