

Chapter 15 - Rate of Return

KEY ASPECTS

Rate of return - QR's allowed rate of return has been assessed on a post-tax nominal basis at 8.68%.

Risk-free rate - the risk-free rate is 5.97% based on the Commonwealth Government 10-year bond rate, averaged over the 20 trading days commencing 22 May.

Market risk premium - the market risk premium of 6% has been assumed.

Capital structure - a debt premium of 120 basis points was adopted for QR's debt, which was assumed to comprise 55% of QR's capital structure.

Equity beta - an equity beta of 0.76 was assumed, based on an asset beta of 0.45.

Post-tax modelling - only QR's forecast tax liabilities were considered for the assessment of reference tariffs (that is the modelling was undertaken on a post-tax basis).

Dividend imputation - imputation credits were assumed to be valued at 50% of face value.

15.1 Introduction

The rate of return is the return expected by investors in capital markets for investments of a given level of risk. It is a forward looking concept based on estimated future expected returns and future expected risk. The rate of return is, essentially, the opportunity cost to investors to compensate them for the expected returns on foregone investment opportunities (that is, the expected return on the next best alternative asset).

In competitive capital markets, the rate of return is determined by the forces of supply and demand for capital. Accordingly the rate of return should provide a rate of return to investors that is commensurate with the returns available from other assets. It should be set at a level that is equal to the cost of attracting capital to a particular asset.

An inappropriate rate of return for QR's rail transport infrastructure may result in over or under investment in rail infrastructure and distort prices to end users of commodities delivered via the network. For example:

- if too high a rate of return is set, QR would be encouraged to invest in the network to an excessive extent and users would be required to pay too much for using the network, undermining the competitiveness of industries reliant upon QR; and
- if too low a rate of return is set, QR would not be adequately compensated for its investment. Whilst this would lower prices in the short term, QR would be unlikely to undertake further investment in the network, leading to congestion and an inability of users to deliver their product to the market in the longer term.

The method used to determine the rate of return on QR's rail transport infrastructure should encourage efficiency in the operation of the regulated business and shield those seeking access from the cost of inefficient financing decisions. It is also important that the rate of return does not induce any resource allocation distortions between the private and public sectors.

Hence, the identification of an appropriate rate of return is central to the setting of maximum prices for rail access charges that encourage efficient usage of the network and efficient levels of future investment in network assets in the medium to long term.

The calculation of an appropriate rate of return should not be performed with the rigid adherence to a particular conceptual financial model. Rather, the rate of return should reflect discretion and judgement based on realistic, commercial experience and understanding.

15.2 The method to estimate the allowed rate of return

Background

In assessing QR's reference tariffs, the QCA applied the Capital Asset Pricing Model (CAPM) to estimate QR's rate of return, which was presented as the Weighted Average Cost of Capital (WACC).

Stakeholder views

QR - the QCA's recommendation to use the CAPM approach is acceptable.

FreightCorp - accepts the WACC model adopted by QCA. In particular, FreightCorp considers the use of a post-tax nominal model is preferred for its treatment of tax as a cash flow.

RTBU - different approaches to price regulation are appropriate in different contexts. However, if a regulated industry is to be subject to restrictions on the rates of return it may earn from the sale of products or services, then it would be more appropriate to apply target or ceiling rates of return to

total assets, rather than *total equity*. To do otherwise would be to penalise firms with a capital structure which is predominantly reliant on debt rather than equity. It appears that QCA has adopted this approach in the Draft Decision.

Note that the term ‘rate of return’ can be used in different contexts to refer to:

- *ex post* calculations of financial results, assuming the use of accounting procedures to calculate ‘rate of return’ in the sense of ‘profit’ earned in a past period as a percentage of ‘total assets’ or ‘total equity’;
- *budgeted* accounting results: what current budgeted projections would produce as an accounting rate of return in a future period; and
- *ex ante* calculations of ‘rate of return’ as used in project evaluation – a procedure which relates projected cash in flows, projected cash outflows (and projected residual values via sale of the associated assets).

An investment which promises a specified rate of return *ex ante* may not generate the same rate of return *ex post* in subsequent accounting calculations based on reported profits and asset values. This conceptual problem does not seem to have been recognised by the QCA in its repeated expression of concern about potential distortions arising from QR earning an ‘excessive rate of return’ on its below-rail business. However these conceptual difficulties arise in relation to new investment in infrastructure (again underscoring the merits of a two-stage approach to price caps, outlined above).

However it is debateable whether it is appropriate to limit ‘allowed rates of return’ for government businesses to the weighted average cost of capital, in the manner used proposed by the QCA. RTBU cites evidence from finance literature to support its point (p. 84 of its submission). Following from this, if a public sector firm (in this case, QR) is only allowed to undertake new projects for financial returns which are less than or equal to the weighted average cost of capital, then this will **reduce the value of that firm**.

For QR, the rail access regime is a new project. The financial returns are to be capped by the QCA at QR’s cost of capital. The price capping regime will reduce the value of QR. The QCA does not appear to have even considered this basic issue.

This is a clear case of the QCA’s proposals having an excessively discriminatory effect on QR.

QCA’s analysis

The QCA acknowledges stakeholder comments that there are a range of possible methods available to estimate the rate of return.

Following consideration of the stakeholder comments, the QCA reaffirms its support for the use of the CAPM to estimate QR’s rate of return, which was presented as the weighted average cost of capital.

QCA’s Position

In assessing QR’s reference tariffs, the QCA will apply the CAPM to estimate QR’s rate of return, which will be presented as the weighted average cost of capital.

15.3 Segment-specific or QR-wide rate of return

Background

The rate of return could be calculated for QR’s business as a whole or separately specifically for identifiable segments, for example coal and minerals traffics. QR proposes that reference tariffs

will only be developed for its coal traffics, at least initially, as these are the services for which it is a monopoly provider. There are several aspects to this issue, including whether:

- it is possible to substantiate a risk difference between the businesses; and
- it is desirable to attempt to assess anything other than the rate of return for QR's below-rail coal business given the stand-alone cost approach that QR proposes be adopted for this business (that is, the substantiation of a difference is irrelevant in such a case).

Therefore, in assessing QR's reference tariffs, the QCA estimated the rate of return on a segment-specific basis, that is on the undiversifiable risks faced by Network Access in the provision of access for coal traffics.

Stakeholder views

QR - accepts that the QCA's focus in developing a rate of return will be on the coal sector. However, it is critical the QCA recognises the rate of return that is being established at this time reflects the risks associated with existing assets with a proven demand. In the event that QR constructs significant new assets (either within the coal sector, for example an extension of the network to meet potential demand in the Surat Basin, or outside the coal sector) a separate analysis of the project risk should occur to identify whether a different rate of return should apply. For example, in relation to recent major rail projects, it is clear the investment community is seeking higher returns than would be derived through the QCA's proposed approach.

FreightCorp - agrees with a segment-specific approach, although it is not without its problems.

Where segment-specific data is available, it should be used (for example, using segment-specific comparables for beta). In all instances, the approach to estimating segment specific WACC should be based on QR-wide parameters and with marginal adjustments (for example, cost of debt) made as appropriate for the specific case.

QCA's analysis

The QCA maintains that to set access charges at stand-alone cost for the use of the below-rail coal network, it is appropriate to focus exclusively on the non-diversifiable risk associated with that activity.

The QCA endorses QR's concerns with the approach the QCA has adopted for new infrastructure such as the potential development of the Surat Basin. The Authority notes that the WACC approach produces an expected rate of return which does not readily apply to assets with high levels of diversified risk associated with uncertain demand. Regulatory arrangements for such investments must be considered on a case-by-case basis so as not to stifle investment.

QCA's Position

In assessing QR's reference tariffs, the QCA will estimate the rate of return on a segment-specific basis, that is on the undiversifiable risks faced by Network Access in the provision of access for coal traffics.

15.4 Key parameters in the WACC / CAPM derivation

Background

The key parameters relevant to the estimation of WACC whilst using CAPM therefore include:

- the risk-free rate;

- the cost of debt;
- the proportion of debt funding and capital structure;
- the asset, debt and equity betas of the firm;
- the market risk premium;
- the value of imputation tax credits; and
- the corporate tax rate and inflation.

Each of these parameters are discussed in turn.

Risk-free rate

The QCA supported the view that the maturity of the bond rate used for modelling purposes should most closely approximate the lives of the assets of the business being regulated. However, in the Australian market, bonds beyond 10 years are not particularly liquid. In Australia it is conventional to use the redemption yield of 10-year Commonwealth Government bonds as a proxy for the risk-free rate, as it is a liquid instrument, provides the best reflection of the market risk-free rate and can be identified using available market data.¹

Following a detailed analysis of the Commonwealth Government 10-year bond yields, the QCA proposed to estimate the risk-free rate based upon the prevailing 10-year bond rate ('on-the-day' of the decision), unless there was evidence of market perturbation, in which case, the Authority proposed to apply an average over the preceding 5 trading days.

Cost of debt

The cost of debt will vary depending on the default risk of the borrower. Access Economics assessed that an independent credit rating agency could be expected to assign QR's below-rail coal business at an 'A' rating on the basis of the parameters assumed for the review of QR's reference tariffs.

QR requested a debt margin of 120 basis points above the risk-free rate for its return on debt. The QCA accepted that a 120 basis point margin falls within the range of the premia expected in debt markets for a 'A' rated entity.

Asset and equity betas

The QCA estimated and considered comparable asset betas from adjusted equity betas for domestic and international firms involved in rail, alternative forms of transport including domestic road transport, coal mining and entities in the infrastructure and utilities business, and factors likely to affect the stability of QR's below rail coal network cash flows.

Based on an asset beta of 0.45 the QCA arrived at the adjusted equity beta for QR's below rail coal network at 0.76.²

¹ This view was supported in private correspondence (25 July 2000) from Professor Bob Officer to the QCA.

² It should be noted that under the framework adopted by the Authority, the margin on the risk-free rate is primarily a function of the asset beta – the equity and debt betas will vary with the proposed capital structure such that their weighted average will equal the asset beta.

Market Risk premium

The QCA considered that the market risk premium is between 5% and 7% and that an estimate from this range should be used for the determination of QR's rate of return on infrastructure assets. Following consideration of the submissions, recent regulatory trends and research undertaken by the QCA, which suggested a reduction in the market risk premium in recent years, the Authority adopted a market risk premium of 6%, which falls in the middle of the 5% to 7% band.

Value of imputation credits

The QCA accepted QR's proposed gamma of 0.50.

Treatment of corporate tax and inflation

The QCA adopted a post-tax nominal framework for the estimation of QR's below-rail network rate of return. In other words, the prevailing statutory tax rate (which equates to 34% in the 2000-01 tax year and 30% thereafter) has been applied to QR's forecast taxable income in order to estimate QR's tax liabilities. The Authority addressed dividend imputation in the same manner as any other cash flow item and therefore recorded the impact of dividend imputation in QR's cash flows.

The QCA estimated inflation using the Fisher approach as the difference between the nominal bond rate and inflation-indexed bonds over the same period.

Stakeholder views

General

QR - agrees with the general methodology that the QCA has recommended for the assessment of rate of return. However, in establishing the values for the individual parameters that are used to assess the rate of return, QR is concerned that, in a number of instances, the QCA has chosen values at the lower end of the reasonable range for those parameters. As a result, QR considers the rate of return recommended by the QCA is lower than that required to provide an incentive for QR to invest in asset replacement and, where required, expansion.

Method of risk-free rate measurement

QR - is prepared to accept the 10 year Government bond as an estimate of the risk-free rate. However, it has significant concerns regarding the QCA's proposal to set the risk-free rate based on the bond rate applying on a specified day (in the absence of market perturbation). These concerns centre around the risk of temporary fluctuations in interest rates and the resulting practical implications associated with sourcing finance for a regulated business. In this regard, it is possible that QR will seek to fix a significant portion of its debt at an interest rate consistent with the rate of return that it is permitted to earn by the QCA.

In order to better address these concerns, QR recommends that the QCA:

- adopt a smoothing technique over a significantly longer period than one or five days to avoid fluctuations in the risk-free rate and to minimise potential problems associated with sourcing finance. QR would prefer the risk-free rate to be established as the average rate over a 20 trading day period;
- provide certainty regarding the period over which the risk-free rate will be established in order to enable QR to determine its funding strategy with some degree of confidence. In this regard, the QCA's preferred approach of adopting the rate of the day, or a five day average if market perturbation has occurred, does not provide certainty regarding the period over which the risk-free rate will be established; and

- in order to minimise the potential for market participants to manipulate market rates at the time the risk-free rate is set in order to gain an ‘artificial’ increase in market rates, QR believes the QCA should adopt the following approach:
 - avoid setting the rate of return for a number of regulated entities based on the same time period, eg the same twenty day average should preferably not be used for establishing the rates of return for QR and the regulated electricity businesses; and
 - the specific dates over which the rate will be set will not be disclosed to the market prior to the rates being determined.

The QCA has identified it wishes to base the reference tariffs on the 10 year bond rates measured at a time consistent with the release of its Final Decision. As the QCA has recognised, the Final Decision does not provide for a formal approval of reference tariffs – this can only be achieved following the approval of QR’s access undertaking. The QCA has also recognised it could be a significant period of time following the release of the QCA’s Final Decision before an access undertaking is approved. QR believes the reference tariffs should reflect the best information available at the time that the tariffs are approved and, as a result, the risk-free rate should be reassessed at the time that the undertaking is approved.

FreightCorp - given the proposed regulatory regime does not appear overly restrictive, FreightCorp is willing to accept QCA’s 10-year period for the risk-free rate. FreightCorp firmly supports QCA’s view in respect of on-the-day rates, although it is unclear why QCA suggests the rate should be set “at the time of its Final Decision” rather than at the first day of the regulated period unless it was expected that these dates be the same.

QTC - proposed that to minimise the interest rate risk and to reduce re-financing risk that the selected risk-free rate be linked to the regulatory period and that the choice of an ‘on-the-day’ interest rate was undesirable due to the risk of sampling from the market at an inappropriate time due to market interest rates being at the extreme of a cycle, the market being stretched by aggressive trading houses, and structural inertia caused by central bank intervention. Further, the use of an ‘on-the-day’ rate would reduce the period during which DNSPs could implement interest rate risk hedging. The necessary hedging could also lead to market digestion problems and therefore a higher cost of debt for DNSPs.

The QTC proposed a possible solution was to use a long term average such as a four or five year average before each year in the regulatory cycle to smooth cyclical volatility. It was claimed that this would lead to more gradual and diverse hedging behaviour by DNSPs.

Queensland Government – in the Government’s submission on the QCA’s Issues Paper regarding Asset Valuation, Depreciation and Rate of Return, it was noted that IPART had applied an averaging process to smooth the risk-free-rate over a period of 20 days. At the time, the Government indicated it would support the use of such a smoothing process. The QCA’s Draft Decision has not adopted this approach and we would request the QCA reconsider its position on this issue.

Both Queensland Treasury Corporation and Queensland Treasury have previously raised this issue in the context of the QCA’s Draft Determination for electricity distribution network service providers. The Government’s main concern relates to the ability of government-owned corporations to realistically re-finance significant volumes of debt in a short period of time in order to manage the relativities between the risk-free rate set and the actual cost of debt.

Market risk premium

QR - there is little empirical evidence to support the QCA’s view the market risk premium has declined over the last decade. Based on advice it has received (refer Dr Bishop’s advice, Appendix 5 to QR’s submission), QR continues to take the view the market risk premium is best represented as a range between 6% and 8%. If the QCA considers it necessary to adopt a point estimate for the market risk premium, QR continues to believe that 7% is a reasonable assumption to apply, given the potential costs associated with discouraging investment in rail infrastructure.

Stanwell - in deriving an after-tax nominal cost of funds for QR of 8.63% pa, the QCA has used a risk-free rate based on the 10 year Government bond rate on the day of the decision, but a market risk premium of 6% pa, which is a long term average based on historical market movements.

Given that the return on the market fluctuates daily (and intra-daily), and that the rate is to be reviewed every 3 years with each regulatory review, it is unclear why the market risk premium is not also to be measured on the day of the decision, at the same time as the risk-free rate is determined. Thus, if over the next three years the market risk premium declines significantly (for example, if the market return declines further and faster than the 10-year Treasury bond rate), this should be permitted to filter through to lower access charges, for the benefit of access seekers and users.

Queensland Government – the return QR can earn on its assets has been determined over a 40-year period – for example the useful life of the track. Requiring QR to recoup a return over such a long period exposes it to considerable uncertainty (such as where environmental issues adversely impact on coal demand). If the QCA maintains its position in using a 40-year period, it should ensure this additional risk has been taken into account in determining the allowable rate of return.

The QCA has determined through research the acceptable range for a market risk premium is between 5 and 7%. However, the QCA has adopted the mid-point of this range. Given it is a price ceiling which is being determined through the reference tariff process, the QCA should reconsider adopting the upper end of the range at 7%.

Cost of debt

QR - the QCA has coincidentally agreed with QR a risk margin of 120 basis points should be added to the risk-free rate to estimate QR's cost of debt. However, the QCA and QR have not agreed on the credit rating to be used to estimate this margin. The QCA has assumed a rating of 'A' while QR has assumed a rating of 'BBB'. At any given time the risk margin for these credit ratings would be different.

QR considers it important the methodology for determining a credit rating and the risk margin is agreed. In this regard, later this calendar year, QR will be seeking a stand-alone credit rating for its business from a credit rating agency such as Standard & Poor's. At this time, QR intends to also seek an analysis of the stand-alone credit rating that should be assumed for its below rail coal business. In the event this information is available prior to the QCA's Final Decision on the rate of return, QR considers the rating resulting from this assessment should be utilised to assess the cost of debt. In any case, in future assessments of QR's rate of return, the credit rating applied for estimating the cost of debt for QR's below rail coal business should be that assessed by an independent credit rating agency.

In addition, it should be noted credit margins demonstrate significant variability in a similar fashion to interest rates. As such, QR believes this credit margin should be calculated in a manner that is internally consistent with the way in which the risk-free rate and the inflation rate are calculated. That is, the credit margin should be determined at the same time as the risk-free rate and inflation rate. However, given these margins are necessarily determined with reference to illiquid debt instruments, the proposed 20 day averaging period may need to be lengthened.

Asset and equity betas

QR - an asset beta of 0.5 represents the most reasonable assessment of asset beta to apply for the establishment of the allowable rate of return for provision of access for coal services.

FreightCorp - seeks clarification on one matter. The resulting WACC for QR is not substantially different from that calculated for coal traffics in NSW. RIC in NSW does not apply any use-or-pay charge to coal traffics. As QCA is seeking a UOP of 20% (currently 25% in effect as proposed in the Draft Decision), this would imply a significant reduction in the level of revenue risk faced by Network Access in comparison. It would be useful for the QCA to clarify the treatment of the UOP in its assessment of the beta values.

Value of imputation credits

QR - recognises the QCA's recommended value for gamma is, at 0.5, consistent with that proposed by QR. However, since QR's initial submission to the QCA, QR has identified more recent research that questions the basis upon which this gamma value was derived. QR therefore considers that the QCA should review its proposed valuation of gamma to take account of these new findings. QR believes such a review should result in the gamma being lowered from its current level of 0.5 to a number closer to zero.

Inflation

QR - agrees with the QCA's proposed use of a nominal rate of return measure, and also agrees with the QCA's approach to estimating inflation over the evaluation period, which is based on the relationship between the 10 year Commonwealth Government bond yield and the yield on the Commonwealth Treasury capital indexed bonds for a similar maturity.

However, QR believes, in assessing the inflation estimate to apply, an internally consistent approach should be adopted. That is:

- the estimate should be based on the average implied inflation rate calculated over the same period as for the risk-free rate; and
- the estimate should be reassessed at the time the undertaking is approved.

The risk of not adopting this internally consistent approach is highlighted by the volatility of the implied inflation rate over time.

Treatment of corporate tax

QR - the QCA has recommended the adoption of a post tax framework for assessing the rate of return to apply for QR's below rail coal business. While QR understands the reasons for the QCA recommending this approach, QR is very concerned the QCA has not adequately taken account of the concerns that led QR to initially recommend the use of a pre tax framework.

First, QR does not believe that the tax payments modelled by the QCA for the below rail business in central Queensland are representative of QR's future tax position in relation to that business. Due to a combination of QR entering the tax equivalents regime in July 1995 (and having the opportunity to depreciate the entirety of its asset base from that date) and the phasing out of accelerated depreciation, QR expects the notional tax payments for the coal access business will significantly and rapidly increase over time. This expectation is confirmed through the QCA's own estimates of future notional tax payments. Based on the QCA estimates of QR's likely notional tax payments for its coal access, QR's effective tax rate for the period 1999/00 to 2008/09 averages approximately 21.5%. However, over an evaluation period from 2004/05 to 2013/14 (which QR believes is likely to be used for the next reference tariff review) the effective tax rate will potentially average close to 27% - that is, a 25% increase in the effective tax rate over the previous evaluation period. Further increases in the effective tax rate will also be expected beyond this.

It is clear the use of the QCA's modelled tax payment will create an increasing price over time, for use of the same service. In this regard, the QCA has noted the impact of volume growth could outweigh the effect of increases in assumed tax payments, and as such, is not concerned with this issue. Apart from a philosophical view the QCA should not be setting reference tariffs at such a level that volume growth is *required* in order to ensure that the prices remain sustainable, there is a practical issue volume growth will not occur evenly across the four coal systems. In likelihood, the majority of volume growth will occur on the Goonyella system, therefore there is a significant risk that growth on the other systems may not be sufficient to counteract the effect of increasing tax payments and, as such, increasing access charges will be required (over a time period where coal prices are likely to be coming under increasing pressure).

QR notes the view of finance experts such as Officer, Davis and Hathaway that *putting aside the consequences for the time profile of prices and intergenerational equity*, the best way of dealing with tax is within the cashflows. Therefore, having reviewed the QCA's position as outlined in its Draft Decision, QR will be prepared to accept the adoption of a post tax rate of return framework, provided the QCA recognises the issues that QR has noted above, and amend its approach to estimating tax payments such that timing differences are ignored. In effect, this will allow a simple approach to the estimation of tax payments that promotes price stability over time, as the tax payments would be assessed through the application of the statutory tax rate to the forecast accounting profit (adjusted for permanent tax differences only).

Queensland Government – supports the use of post-tax nominal WACC, calculated on a cashflow basis, as long as the WACC is applied to the appropriate tax cashflows. In forecasting the future tax liabilities of QR for this Undertaking and future Undertakings, the Government supports the QCA using the statutory tax rate.

QCA's analysis

The QCA considered each of the submissions made by stakeholders and has conducted ongoing research into each of the parameter estimates. The commentary below reflects responses to the stakeholders comments and where appropriate discussion of the Authority's analysis.

Risk-free rate

Stakeholders have indicated their willingness to accept the 10-year Commonwealth Government bond rate as a suitable proxy for the risk-free rate. However, stakeholders disagreed with the choice of an 'on-the-day' rate as proposed by the QCA.

The Queensland Treasury Corporation (QTC) and QR advised that use of an 'on-the-day' interest rate would cause significant hedging difficulties and additional borrowing costs to cover the costs of hedging over and above normal borrowing costs. The QTC advised that averaging the risk-free rate over 1 to 40 days would reduce hedging costs significantly from an estimated cost of 20 to 25 basis points to perhaps 3 to 5 basis points. The QCA notes that the estimation of the WACC for a business is fundamentally a process of valuation rather than financing. However, the Authority also accepts that from a pragmatic perspective, the choice of a risk-free rate should not increase the cost of borrowing unnecessarily.

Based on the above arguments, the QCA has concluded that whilst an on-the-day rate is theoretically correct for use in a CAPM model, using such a rate in practice could increase distortions to the total cost of borrowing for little practical gain. As a consequence, the Authority has concluded that an averaging process should be used and that the selected interest rate will be averaged over 20 trading-days.

QTC had proposed the use of a 4 to 5-year average rate. The QCA found that whilst long term averages smoothed the interest rate cycle, the resulting averages were not representative of current market rates. In an environment of descending interest rates, these long-term averages significantly and continuously overstated the actual spot rate and the subsequently realised average spot rate for the next period. Further, the use of an updating process whereby averages were re-estimated each year would in effect lead to the need for QR to be reassessed each year rather than as proposed by the Authority. This would be inconsistent with the regulatory approach QR has proposed.

The QCA decided to set the risk-free rate using a 20 trading-day average of the 10-year Commonwealth Government bond rate commencing 22 May, 2001. So that QR could undertake whatever financial management strategies they deemed appropriate, the Authority advised them, in advance, that the averaging period would commence on this date.

Based on this approach, the risk-free rate is 5.97%.

Cost of debt

The QCA acknowledges stakeholder comments that there is a material difference in the credit ratings applied by the Authority (A) and QR (BBB). The Authority supports QR's intention to have an assessment undertaken for its stand-alone network business. However at the time of the Final Decision, this report was not available.

The QCA reaffirms that, despite QR's below rail business having a materially different risk profile to QR as a whole, an 'A' rating is appropriate for these operations based on an assessment undertaken by Access Economics.

The QCA recognises that it is important that the credit rating of QR's network business reflect the current position of the entity. However, in relation to rate of return estimation using the WACC method proposed by the QCA, the size of the default spread above the risk-free rate will make no material difference in the final WACC estimate. This is because the WACC will reflect the asset beta of the entity and the equity and debt betas will adjust to changes in the default premium through the re-levering process.

The QCA therefore reaffirms its original position and accepts that a 120 basis point margin falls within the range of the premia expected in debt markets for an 'A' rated entity.

Asset and equity betas

The QCA considers that the estimation of an asset beta for QR's network business is critical to the estimation of an appropriate equity beta and WACC for the entity. QR was the only stakeholder to provide a submission regarding the level of the asset beta and argued that it should be set at 0.50 rather than 0.45 as set out in the Draft Decision.

QR's consultant, Dr Bishop, provided a detailed analysis of equity betas and commentary regarding the QCA's approach to the estimation of the asset beta. Major points raised were that:

- using an alternative method of analysis to estimate asset betas, QR's consultant implied asset betas from the revenue or cash flow stream of network business.³ The method assumes the value of a business is derived from the free cash flow of the business. The asset betas estimated by QR's consultant were reported to lie in the range of 0.35 to 0.50;
- QR's consultant considered that US rail companies (in particular Burlington and Union Pacific) and Australian rail companies such as Westrail should be given further emphasis in the analysis as comparators;
- measurement issues arose due to differences in equity beta estimates identified by QR's consultant, the QCA and the AGSM; and
- the upper limit of the asset beta range be determined from the asset betas implied from the coal industry. However, due to measurement problems a portfolio of coal companies should be considered rather than considering Centennial Coal in isolation.

The QCA undertook a detailed analysis of the QR submission. Each of the above issues is considered in turn.

The QCA supports the use of the alternative technique for the estimation of an asset beta for QR's network business as proposed by QR's consultant. However it is noted that the resulting range of asset betas is significantly wide (0.35 to 0.50) which therefore provides only limited

³ The method of analysis is discussed in Appendix 5 of QR's submission. The relationship between the asset beta and the revenue beta is estimated as follows:

$$\beta_{\text{Assets}} = \beta_{\text{Revenues}} \left[\frac{\text{PV(FC)}}{\text{PV(Assets)}} \right]$$

where

β_{Assets} = asset beta

β_{Revenues} = revenue beta

PV(FC) = present value of fixed costs

PV(Assets) = present value of operating cash flows

direction to what constitutes a suitable implied measure. It is noted that the asset beta estimates from Dr Bishop's proposed method of analysis imply an asset beta across a range that incorporates both the Authority and QR's submissions.

The QCA remains of the view that the US rail companies⁴ are not suitable comparables for QR's below-rail coal network business – this is due to differences in the regulatory environment, the composition of goods carried with coal being a minor component (and export coal being a trivial component) of total revenue, different industry structures, stock market differences, asset size differences and problems associated with identifying a suitable method for adjusting international returns for currency differences. Each of these issues were discussed in detail in the Draft Decision.

The QCA acknowledges that the beta estimates for many comparators suffer from issues of measurement error. Following discussions between the Authority and Dr Bishop, it was noted that different data sources had been used in their estimations. It appears that the data sources, in adjusting for market capitalisation changes, may have applied similar but alternative assumptions. This resulted in many of the capitalisation adjusted data series being dissimilar. This has had the result of directly impacting on the estimates of raw equity betas. The Authority acknowledges the possibility of measurement error due to differences in the process used by data sources to adjust for capitalisation changes and dividends. However, based on the beta's estimated and reported by Dr Bishop, it is not clear that these differences are material. Further, the AGSM betas are estimated using an estimation period of only 4 as opposed to 5 years. In part, to compensate for the poor statistical properties of the raw equity beta estimates due to their large standard errors as discussed in the Draft Decision, the Authority adopted the use of adjusted equity betas rather than raw beta estimates. The effect of using the adjusted betas inflated the majority of raw beta estimates above their raw beta levels. This resulted in higher de-levered asset betas than would have been possible using raw beta estimates.

To reconfirm original estimates and following discussions with Dr Bishop, the QCA re-estimated all equity and asset betas for Australian listed companies and can reconfirm the original estimates of adjusted equity and asset betas as reported in the Draft Decision.

QR's consultant identified that Centennial Coal's adjusted equity beta has varied from 0.43 to 0.67 over the period from 1998 to 2000. Analysis by the QCA found that, if the raw equity beta had been applied by the Authority, at no time would the raw equity beta have exceeded the adjusted equity beta of 0.59. For example, the adjusted equity beta of 0.67 implies a raw equity beta of 0.51. Thus, by using the adjusted equity beta measure, the Authority has incorporated the impact of the short term variability of the raw equity beta.

The QCA does not support the portfolio approach suggested by Dr Bishop, which uses a portfolio of coal firms to estimate the asset beta. This is because portfolios can distort the beta measure subject to the weighting scheme applied and can be biased due to small firm effects or the initial measurement error in the beta estimates. Further, the use of average or median levels of equity and asset betas can be misleading. The Authority continues to support the use of Centennial Coal as a suitable proxy and disagrees with providing equal weighting to the asset

⁴ On further investigation the Authority identified that equity and asset betas for US comparable railways was initially estimated using unadjusted data. This was remedied and new equity and asset betas were estimated using adjusted betas. The revised estimates for the US betas to 30 June 2000 are follows:

<u>US Railway</u>	<u>Adjusted Equity beta</u>	<u>Asset Beta</u>
Burlington Northern Sante Fe	0.88	0.60
CSX	0.77	0.53
Norfolk Southern	0.81	0.41
Union Pacific	0.85	0.43

betas of CIM Resources and Cumnock Coal. CIM Resources is a small firm relative to Centennial Coal (which is itself small relative to QR's below-rail coal business) which has the impact of increasing its raw equity beta. Cumnock Coal has very concentrated ownership with over 99% of its shares held by the top 20 shareholders. Centennial's share ownership is more diversified in that 27% of its shares are held by top 20 shareholders.

The choice of suitable comparables is an issue of judgement and is not intended to be an exact procedure. Thus not all transport and infrastructure and utility firms were incorporated in the analysis.

The QCA has noted and analysed in detail the comments of QR's consultant. It considers that, apart from the correction to the adjusted equity and asset betas of the US comparators, no further adjustments to its initial position are required at this time. The QCA still supports an asset beta between 0.35 and 0.45 for the network business and, in estimating the asset beta at the upper end of this range (that is, at 0.45), the Authority considers that it has adopted a generous allowance for QR's undiversifiable risk. This is particularly the case given QR's extremely low price risk and the fact that the QCA has offered a revenue cap as part of the regulatory arrangements that virtually eliminates QR's volume risk.

Based on an asset beta of 0.45, the QCA has arrived at the adjusted equity beta for QR's below-rail coal network at 0.76.⁵

Market risk premium

Dr Bishop believes that the market risk premium should be within the 6-8% range, regarding 7% as defensible and 6.50% as a minimum. Dr Bishop supports this view by referring to an article by Dimson, Marsh and Staunton which "presents the arithmetic average market risk premium relative to long-term bonds to be 7.6% (8.6% relative to short-term bills)." In this article the authors compare both the geometric and arithmetic average levels of the market risk premium over a 100-year period from 1900 to 2000.

The QCA reviewed the article by Dimson, Marsh and Staunton and found that the estimation period for the market risk premium differed from that used by Officer. In particular, although the Dimson et.al. paper uses an arithmetic average to estimate the market risk premium, it appears to have been estimated the market risk premium using a different method of analysis than the Officer study.⁶ Caution must be exercised in comparing papers used to measure historical levels of the market risk premium as the resulting measure is very sensitive to assumptions underlying the estimation.⁷ It is the view of the Authority that rather than engage in statistical arguments regarding the choice of method of analysis it is more important to establish a market risk premium relevant to the current market.

Dr Bishop acknowledges that the article also presents a counter view that the market risk premium in the current market may be lower than long term levels due to the current sustained bull run in equity markets and the increased globalisation of investment.

The QCA notes QR's proposed market risk premium of 7% and Dr Bishop's proposed market risk premium of 6.5%. The QCA has some sympathy with the argument that, in its choice of the market risk premium, the Authority has not extended to QR the same benefit of a reasonable

⁵ It should be noted that under the framework adopted by the Authority, the margin on the risk-free rate is primarily a function of the asset beta – the equity and debt betas will vary with the proposed capital structure such that their weighted average will equal the asset beta.

⁶ The Dimson paper appears to have estimated the arithmetic average with annualised rates estimated and then averaged over the 100-year period, rather than using the 10-year moving average approach applied by Officer.

⁷ Comparative problems arise due to differences in the estimation period, form of averaging, whether taxation adjustments have been made, weighting schemes applied or adjustments made for survivorship bias.

doubt as has occurred elsewhere in the Draft Decision. Nevertheless, the Authority considers that the combination of a market risk premium of 6% and an asset beta of 0.45 produces a margin of 270 basis points above the risk-free rate, which does in fact provide QR with the benefit of a reasonable doubt in light of the low undiversifiable risk exhibited in QR's business (especially given the lower volume risk that arises under a revenue cap arrangement).

Value of imputation credits

The QCA considers gamma to be an important parameter in the estimation of WACC and the network business' associated cash flows. Given the Authority's approach to the estimation of WACC, gamma will not affect the WACC estimate. The impact of gamma will be reflected in the modelled cash flows of the network business where a material difference will occur if the level of gamma were to change.

There is very little empirical research in relation to the estimation of gamma. As it is not directly observable, it typically can only be implied from other data. The QCA notes recent unpublished research by Finn, Gray and Cannavan from the University of Queensland who imply estimates of gamma based on the relationship between the value of share futures prices traded at the Sydney Futures Exchange and the theoretical value of the futures contracts. The analysis has several limitations:

- it assumes that the trading of share futures contracts would be used by foreign investors to extract the value of imputation credits that otherwise would not be available to them from holding domestic shares due to their status as foreign investors. There is no supporting direct evidence that foreign investors are the primary users of share futures contracts;
- it assumes that market participants are able to replicate the payoffs to the futures position in the physical share market and the difference between the physical market position and the spot market physical market implied by the futures contract is assumed to be representative of the value of gamma;
- it assumes the theoretical model for the estimation of the futures contracts is broadly known and applied by market participants. The motives for trading share futures contracts include hedging, speculation and arbitrage. The paper assumes the value of gamma can be implied via an arbitrage-based argument which may not be the desired trading strategy of market participants;
- share futures contracts are only traded on a limited selection of of Australian listed companies. Any gamma estimate implied also needs to be reflective of the equity markets perception of gamma and not that of traders of share futures contracts. Imputation credits are received by domestic shareholders based on dividends received from Australian listed companies – not from the trading of share futures contracts; and
- historically share futures contracts have been thinly traded at the Sydney Futures exchange. Thin trading is known to result in a thin trading premium in pricing the futures contracts and can lead to prices that do not always reflect their true theoretical value. If present, this premium would need to be used to adjust the implied parameter estimate of gamma. The model applied assumes market efficiency and the absence of any premium for thin trading. The paper by Finn et.al. makes no adjustments for thin trading.

Thus, at this time, the QCA is not of a view that significant evidence exists to suggest a materially different level of gamma than 0.50. The Authority also notes that Dr Bishop also supported the use of gamma at 0.50. Nevertheless, the Authority will review its estimate of gamma as part of future regulatory processes.

Inflation

Stakeholders supported the use of an implied inflation level using 10-year Commonwealth Government bond data from nominal and Commonwealth capital indexed bonds. Based on this approach, the inflation rate over the period of estimation was 2.52%.

Treatment of corporate tax

The QCA is of the view that the appropriate tax rate is the prevailing corporate statutory tax rate over the regulatory period. At issue is whether the cost of tax calculated using the statutory rate should reflect the actual tax paid (including permanent and timing differences) or notional tax based on accounting profit. Historically, the presence of accelerated depreciation allowances has meant that businesses such as QR have benefited from significant timing differences.

The lack of suitable comparables, intertemporal variations in the level of effective taxation and recent changes to tax law, including changes in relation to depreciation allowances which do not facilitate comparisons with prior years, have all contributed to difficulties in identifying a suitable proxy for the cost of tax.

It is important that QR be compensated for the tax paid during any particular year. It is also important that the tax paid reflects the actual tax payable and not simply the statutory rate of tax. If the effective tax rate is below the statutory rate then QR would receive a benefit at the expense of consumers. Similarly, if an effective tax is applied which understates the tax paid, then the network business will be worse off relative to consumers.

The QCA considers that by passing through the level of taxation, the network business is fully compensated for tax paid and no biases are introduced to distort the level of taxation.

Table 15.1: Summary of parameters and WACC estimates for the Final Decision

Parameter	QCA's Final Decision
Nominal risk-free rate (%)	5.97
Market risk premium (%)	6.00
Equity beta	0.76
Asset beta	0.45
Debt beta	0.2
Debt/value (%)	55
Franking credit (gamma) (%)	50
Debt margin (%)	1.2
Cost of debt (%)	7.17
Tax rate (%)	30
Nominal post-tax cost of equity (%)	10.53
Nominal post-tax WACC (%)	8.68
Nominal pre-tax WACC (%)	9.52

QCA's Position

In assessing QR's reference tariffs, the QCA:

- 1. estimated the risk-free rate as 5.97%, based upon the 10-year Commonwealth Government bond yield averaged over the 20 trading days commencing 22 May;**
- 2. estimated the market risk premium as being 6%;**
- 3. adopted a gearing level of 55%;**
- 4. accepted that the cost of debt should equal the risk-free rate plus a premium of 120 basis points;**
- 5. estimated the asset beta at 0.45 which translates into an equity beta of 0.76;**
- 6. estimated gamma (reflecting the value of imputation credits) at 0.5; and**
- 7. applied a post-tax nominal framework with tax liabilities on forecast taxable income assessed at the prevailing statutory tax rate.**